MY LIFE, TIMES, AND LEGACY

Leonard I. Linkow, DDS, DMSc
Sheldon Winkler, DDS

Leonard I. Linkow, DDS, DMSc

- Clinical Prof. Department of Implant Dentistry, New York University College of Dentistry
- Former Clinical Prof. Dept. of Fixed Prosthodontics, Pittsburgh University, School of Dental Medicine
- Former Dept. of Implantology – Charge d'Enseignement d'Implantologie Orale a la Faculte de Medicine, University of Medicine, Lille, France
- Former Prof. Department of Removable Prosthodontics and Implantology, Temple University, Philadelphia, Pennsylvania
- Former Attending Associate Chief of Oral Implantology, Jewish Memorial Hospital, New York
- Former Chief of Implantology, Haifa Center for Continuing Education, Haifa, Israel
- Former Consultant, Tel-Aviv University, Tel-Aviv, Israel
- Former Visiting Lecturer, Lariboisiere Hospital, Paris, France
- Royal Society of Medicine, London, England
- Post Graduate Instructor and Clinician, Institute for Graduate Dentists, New York
- University of Detroit, Detroit, Michigan; Washington University, St. Louis; Missouri
- State University of New York at Buffalo School of Dentistry, Buffalo, New York; Loyola University, Maywood, Illinois
- Visiting Faculty, Temple University, School of Dentistry, Philadelphia, Pennsylvania; Oregon
- University School of Dentistry, Portland, Oregon; University of Maryland, College Park, Maryland
- Tufts University, Boston, Massachusetts; Boston University, Boston, Massachusetts; University of Bari, Bari, Italy; University of Munich, Munich, Germany; University of Indiana, Indianapolis, Indiana; University of Alabama, Birmingham, Alabama; University of Mississippi, Mississippi; Louisiana State University Medical Center, New Orleans, Louisiana; Albert Einstein College of Medicine, Yeshiva University, Bronx, New York; Emory University, Atlanta, Georgia; University of Puerto Rico, San Juan, Puerto Rico; University of Manila, Manila, Philippines; University of Milano, Milano, Italy; University of Rome, Rome, Italy; University of George Eastman, Rome, Italy; University of Torino, Torino, Italy; University of Pisa, Pisa, Italy; University of Louisville, Louisville, Kentucky; University of Missouri, Kansas City, Missouri; University of California, Los Angeles, California; University of Zurich, Zurich, Switzerland; University of Rio de Janeiro, Rio de Janeiro, Brazil; University of Sidney, Sidney, Australia; Honorary Professor, Nihon University, Tokyo, Japan
- Continuing Lecturer, Brookdale Hospital, New York
- Founder of the Institute for Endosseus Implants, 1965

Sheldon Winkler, DDS

- Formerly Professor and Chairperson of Prosthodontics and
- Dean of Advanced Education, Continuing Education, and Research
  Temple University School of Dentistry, Philadelphia, Pennsylvania

FOREWORD

The name Linkow is synonymous with oral implantology. Dr. Leonard I. Linkow was graduated from New York University College of Dentistry in 1952 and inserted his first implant a few weeks later. Since that time, he has devoted his life to telling not only the dental profession, but anyone around the world who would listen, the benefits of oral implants. It has been a difficult uphill battle, and not until recent years has the validity of dental implants been accepted as a viable option to conventional dental treatment.

Dr. Linkow is responsible for numerous innovations in implant dentistry. Among his major contributions are the blade implant, the self-tapping ventplant root form implant, the tripodal subperiosteal implant, immediate loading, and the internal hex design for root form implants. He holds 36 different patents representing at least 75 different implant systems.

I don't think there is another dentist in the world who has presented as many lectures, seminars, and continuing education courses as Dr. Linkow. An informed and experienced dental educator, he is well known in dental circles throughout the world. A number of international congresses and seminars bear his name. He has written approximately two hundred articles for professional and lay journals, 17 textbooks, and has contributed chapters to a number of dental textbooks. Among the many honors he has received are the Thomas P. Hinman Medallion in 1972 and the Aaron Gershkoff Memorial Award in 1974. He was knighted by the government of Malta in 1974 and honored by the government of Cyprus in 1979.

In 1992 New York University created the first and only endowed chair in implantology in perpetuity with Dr. Linkow as the recipient. New York University College of Dentistry established the Leonard I. Linkow Library of Implant Dentistry, which is readily available to professionals, educators, and lay persons on the Internet; just click on linkowlibrary.org.

I have known Dr. Linkow for approximately fifty years. He contributed the chapter on oral implantology to my standard textbook, *Essentials of Complete Denture Prosthdontics*. In 1979, I invited Dr. Linkow to join my staff at Temple University School of Dentistry as a clinical professor. For many years after he accepted the appointment, he demonstrated surgical and prosthodontic procedures every week and gave interested dental students a unique education in oral implantology that they could not have received elsewhere. He also presented numerous lectures and seminars to advanced education students at Temple University during that time.

It is an honor to have been associated with Dr. Linkow, and to have had him as a close friend throughout the years. There is no doubt that Dr. Leonard I. Linkow is the most outstanding oral implantologist in the world today. His contributions to dentistry are monumental.

—Sheldon Winkler, DDS
Formerly Professor and Chairperson of
Prosthodontics and
Dean of Advanced Education,
Continuing Education, and Research
Temple University School of Dentistry
Philadelphia, Pennsylvania

PREFACE I

Leonard I. Linkow is the man responsible for changing the course of dentistry in one lifetime. Four months after he graduated from dental school (in 1952) he performed his first implant prosthesis, a complete unilateral subperiosteal implant to support a posterior unilateral fixed restoration. He wrote his first implant article in 1953 in "Dental Digest Magazine." From that time - to the present day – Linkow put oral implantology before everything and everyone else. He has said, "This work is my life." As a result, all mankind has benefited, especially our profession and the patients we treat.

Dr. Linkow's accolades are many – and an attempt to list them here could be a disservice. But allow me to mention a few things most people do not know.

Dr. Linkow's hand and body skills are incredible. He not only played professional baseball for the NY Giants farm team, today he can still hit a baseball that is going at 90 miles per hour. He can routinely reflect the soft tissue of a complete maxilla or mandible in less than seven seconds. He can balance a long stem rose on his nose.

In 1983, I worked with Dr. Linkow for six months, in his New York office. His dental chair was customized to swing to either side of the patient's chair. He is completely ambidextrous and often would make crown preparations on both sides of the mouth—AT THE SAME TIME! I would also see him make incisions at the same time in both posterior quadrants of a mandible, a scalpel in each hand. He then used a periosteal elevator in each hand, reflected the soft tissue on both sides of the mandible, prepared an osteotomy for a blade implant with two hand pieces (one in each hand), insert two blade implants, use two hammers and drive them into place – then would suture one side at a time. I cannot imagine anyone even trying this feat – yet Dr. Linkow did this – not to show off (I was the only doctor in the room), but because he believed the faster the procedure, the easier it was for the patient. He would constantly tell me, "You must work in milliseconds, if you want to have the best chance at implant success."

Not only does Linkow have unbelievable hand skills—he can create original thoughts. He has obtained 34 patents during his career and also developed hundreds of original concepts he never considered visionary – for example, x-ray templates, analogs, premade copings for prosthetics, impression copings, surgical guides and premade transitional restorations. It's hard for the younger dentist in the profession to put this into perspective – but in the 1950s, the profession did not even have an elastic impression material for prosthetics. Rubber base was not invented until the mid 1950s. The high-speed hand piece wasn't developed until the 1960s. This is the era during which Linkow developed the bases for implant dentistry. Without this one man, the field of dentistry could not have been prepared to accept the concept of Branemark or others at a later time.

Leonard I. Linkow is the "Father of Implant Dentistry" not because he was the first to perform an implant (Greenfield in 1906, Strock in 1936, Dahl in 1945 all were there before him). But a father does more than conceive a child. He feeds it, nurtures it, clothes it, protects it, and is willing to die for it. He always kept an open door to the profession. If doctors couldn't afford to come to him he would fly to them - for no honorarium and often would pay his own expenses. He was not selling a product for profit - he was nurturing implant dentistry - one doctor at a time when necessary. Nobody had lectured more hours, or in more places (for so little) than Linkow. He felt the teenage years of implant dentistry (the 1970s) were too fragile for anyone to take advantage and profit personally.

Dr. Linkow was the first "implantologist". His practice was restricted since the 1970s to tooth replacement with implants. I can remember asking him one day in the practice, "Why don't we do a 3 unit fixed prosthesis instead of a single tooth implant?" He said, "Carl, as an implantologist - if people come to me, they know they will get an implant." Today (40 years later), I tell the profession and my patients the same thing - Do a single tooth implant, they usually last longer and have few complications.

Dr. Linkow's first published book was in prosthetics, not implants ("Full Arch Fixed Oral Reconstruction - Simplified") in 1960. In Dr. Linkow's last book he quotes the French born Romanian philosopher and artist, Constantin Brancusi, "Create like a God, command like a king, and work like a slave." This is Dr. Linkow's motto.

Another one of Brancusi quotes also applies to Linkow, "To see far is one thing, going there is another." It was far from easy for Dr. Linkow. In the beginning few saw him as a pioneer. Organized dentistry attempted to write him off from the profession. But he always kept his vision clear.

Another thing few people know about this legend is he has a warm heart. The major reason he created new concepts was to help his patients. I would often see him do procedures for a financial loss-because he wanted to help someone. He knew how often a patient's life would change when they could eat in public and not be embarrassed to have relationships with other people. Those close to him say he has the heart of a lion, strong and courageous.

Now that modern implant dentistry is in its mature adult years - like many adults, we forget how important the first 20 years of life is - we forget that we are today a reflection of the past. It's hard to believe one man is primarily responsible for creating a whole new discipline in dentistry - and he is still alive to share and contribute.

I am honored to have been asked by Dr. Linkow to write this foreword. I am honored to have Dr. Linkow as a personal mentor and I am lucky to be one of the thousands who have been touched by his soul.

—Carl Misch
Founder and head of the Misch
Institute, Beverly Hills, Michigan

Dr. Linkow is like all men of genius. They are like thunderstorms. They go against the wind. They frighten and enlighten people. But they clear the air.

—Dr. Ole Krogsgaard Jenssen
Copenhagen, 1978
President of Danish Academy of
Oral Implantology.

PREFACE II

Rarely in life we do have the opportunity to know and be around true legends in any field. Leonard Linkow is one of these men. He has truly been one of the most important figures in Implant Dentistry. He is a real pioneer in every sense of the word, and he has been one of the most inventive dentists in the field. Lenny had to do almost everything on his own since organized dentistry was not ready to accept some of his novel and innovative ideas. He lectured extensively all over the world. He was relentless in his passion to help other dentists wherever he went.

When New York University College of Dentistry formed the Leonard I. Linkow Chair in Implant Dentistry in 1988-1989, it was the first time that Len was officially recognized by organized dentistry. To show the kind of love and respect that so many people had to Len, this chair was funded from dentists and patients from all over the world. This is truly unheard of in dental schools. He has always shared his knowledge and clinical skills with everyone. He would do live surgeries all over the world to help others gain from his pioneering works.

He is also very inventive. When Len was asked why he developed so many different implant designs instead of just one or two, he responded by saying, "I had to come up with multiple ways to help my patients. They all come in with different amounts of bone and with different problems. I needed to make different implants for each of the problems I was presented with."

This is the kind of doctor that Dr. Linkow is. He always put the patients' needs first. Len is a dynamic man. He always gets things moving around him. When he has a passion about something he will go after it with everything he has. He will stimulate others to think and be better dentists as well!

He is a true teacher, clinician and academician. Most of what we are teaching today in implant dentistry in dental schools and specialty programs around the world was actually taught by Lenny over 40 years ago. In fact, it is all in his multiple volume textbooks for people to see and learn from.

Lenny is a great friend and caring person. He is in every sense of the word a true pioneer and a renaissance man.

I am honored to write this preface and I wish him good luck and good health in his well-deserved retirement.

Respectfully

—Dennis Tarnow DDS
Professor and Chair Dept. of
Periodontology and Implant Dentistry
New York University College of
Dentistry
New York, USA

This book is dedicated to the true early pioneers in Implant Dentistry.

There were no others.

Edwin J. Greenfield - Wichita, KS 1909-1913 - USA
Gustav Dahl - Sweden - 1938
Alvin Strock - Boston, MA - 1938 - USA
Manlio Formiggini - Massa - 1948 - ITALY
Aaron Gershkoff - Providence, RI 1948- USA
Norman Goldberg - Providence, RI 1948- USA
Isaiah Lew - New York, NY-1950 - USA
Nicholas Berman - Washington State- 1950- USA
Roy Bodine - California State - 1952 - USA
Art Jermyne - Californa State - 1952 - USA
Luigi Marziani - Rome - 1952 - ITALY
Raphael Chercheve - Paris - 1958 - FRANCE
Jacque Scialom - 1963 -FRANCE
Giordano Muratori - Bologna - 1963 - ITALY
Ugo Pasqualini - Milano - 1963 - ITALY
Stefano Tramonte - Milano - 1963 - ITALY
Sami Sandhaus - Lausanne - 1963 - SWITZERLAND
Norman Cranin - Brooklyn, NY - USA
Sebastian Lobello - 1965 - ITALY
Massimo Corradini - ITALY
Andrei Peron - SPAIN
Luigi Mondani - ITALY
Dino Garbaccio - ITALY
Jean Marc Juillet - 1965 FRANCE
Luca Del Carlo - Venice, Italy
Leonard I. Linkow - 1952 N.Y. USA
Philip J. Boyne - 1951 CALIFORNIA STATE

INTRODUCTION

My name is Len Linkow. At this very sitting I am in my eighth decade of life, born on February 25, 1926.

I had seventeen books published on implant dentistry, where I consider nine of them the bibles of implantology: *Theories and Techniques of Oral Implantology*, St. Louis, MO: CV Mosby Co., 1970 (two volumes); *Maxillary Implants: A Dynamic Approach to Oral Implantology*, New Haven, CT: Glarus Publishing, 1977; *Mandibular Implants: A Dynamic Approach to Oral Implantology*, New Haven, CT: Glarus Publishing, 1978; *Implantology Today: A Multidisciplinary Approach to Implantology*, Padua, Italy: Piccin Nuova Libraria Publishers, 1990 (three volumes); *Color Atlas of Implant Techniques and Implant Prostheses*, Padua, Italy: Piccin Publishers, 1998; *The Legends of Implant Dentistry*, New Delhi, India: Jaypee Brothers, 2010; *Anatomy and Morphology of the Mandible with Various Implant Modalities*, India: AITBS Publishers; *Anatomy and Morphology of the Maxilla with Various Implant Modalities*, India: AITBS Publishers.

And I want it to be known that I did not accept one penny of the royalties from any of those books but instead had the publishers receive the same to use the proceeds to pay for translators to translate the volumes into various languages. So why am I now writing another book if I receive no returns? Because there is a great need to illuminate this negative approach of the dental profession regarding subperiosteal implants and their tremendous need to the millions of edentulous patients who desperately need them.

The book will be written in the simplest manner in order to allow the neophytes to understand the principles and pitfalls of these wonderful procedures that I developed over the many years to the way it was reduced to the procedures of today.

The procedures I reported on might seem quite repetitious to many of you, but if you concentrate on the words of each procedure you will notice that each of the procedures have slightly different approaches in acquiring the impressions, vertical dimensions, and centric occlusions. Choose one of the procedures that you feel more comfortable with and follow the pages, page for page, and you will discover what I have been doing successfully for over fifty years.

New Book Tells the Inspiring Story of the Father of Implantology

Noble Prize nominee Leonard I. Linkow reveals the story of his life and his achievements in the world of dentistry

Fort Lee, NJ—(Release Date TBD)—Nobel Prize nominee Leonard I. Linkow's life has been one of tribulation and triumph. Since starting a career in dentistry, he went on to discover the process of implantology, and through the years he nurtured and refined it into what is now a dental innovation. Follow his incredible journey with the release of his compelling new book *How Green Were My Mountains?*

The text delves into the young life of Lenny Linkow as a young boy, his love for baseball, his closeness with his family, his enlisting in the Air Force during World War II, his graduation from NYU College of Dentistry and the history he made afterward. As a dentist, Linkow found no supporters to help him in his quest to change dentistry. Using his skills and knowledge, the author alone turned completely around the backward, archaic profession and created the most advanced didactic, clinical, and research discipline the world has ever known today. Along the way, he faced fierce opposition to his creation of the entirely new discipline of Implantology. Today, Linkow is called the "Father of Implantology," and he believes that millions of people worldwide will greatly benefit from the implants they receive.

Richly layered and inspiring, *How Green Were My Mountains?* tells a tumultuous and triumphant personal story of one man who made a tremendous difference in the world of dentistry. To order a copy of this book, feel free to visit your local bookstore or log on at Xlibris.com today!

About the Author

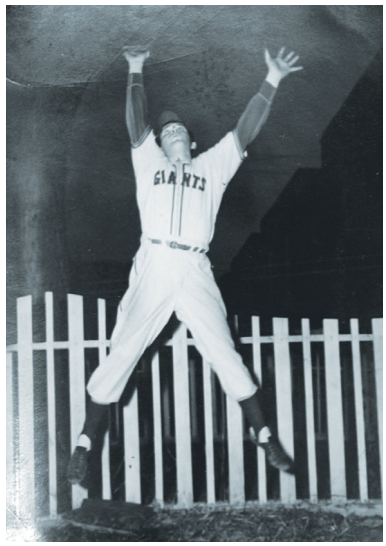
Dr. Leonard Linkow became a dentist in 1952 after graduating from New York University College of Dentistry and soon discovered the rapidly evolving field of tooth implants. He mastered advanced implant techniques by taking existing, often inadequate American and European methods and, through trial and error, transforming them into elegant and practical systems. Consequently Dr. Linkow also became a proponent of life improvement; he knew his work could often improve a patient's appearance and bring an end to their dental suffering. And he grew into a public relations warrior; for thirty years many vested interests of the profession strongly opposed the revolution of implant dentistry. Dr. Linkow vowed to relieve them of their bias, and at times did so single-handedly.

Dr. Linkow has practiced in New York City throughout his career, but in the 1960s he began worldwide journeys to spread the gospel of implantology through lectures and/or surgery. He has been feted in many of the world's great cities—Milan, Rome, Paris, Shanghai, Tokyo, Zurich. He recounts lifelong friendships with some of the most renowned, loyal and eccentric people in the dental profession. A native of Brooklyn, NY, Linkow was a radio operator in the U.S. Army Air Force in the final days of World War II, was once a candidate for professional baseball, having tried out for the New York Giants under Carl Hubbell and

Mel Ott, and twenty-five years later was stunned to learn he was on a list of potential nominees for the Nobel Prize in Medicine.

How Green Were My Mountains? * by Leonard I. Linkow
Publication Date: January 5, 2005
Trade Paperback; 380 pages; 978-1-4010-7913-0
Cloth Hardback; 380 pages; 978-1-4010-7914-7

The Legends of Implant Dentistry with the History of Transplantology and Implantology
Leonard I. Linkow. 320 pp., illustrated, indexed.



My stretching and jumping while in High School and captain of the 1944 champions.

60 years later - I just tripled during the Dodger training camp in St. Lucia, Florida.

Dr. Linkow at Spring training with the great Duke Snyder

INTRODUCTION

A Look into the Future

Since the earliest times there have been only a few developments in dentistry that have resulted in a real improvement in the quality of life. In this respect, the dental profession has lagged far behind the medical profession.

Most of what passes for modern dentistry is not too far removed from what the Greeks and Romans considered the latest word in treatment. After all, fillings, tooth extractions and dentures are all antique inventions.

In my opinion, the science of implantology is one of the very few major breakthroughs in dental history. It is as important to dentistry as the invention of the pacemaker was to cardiology, or the use of corneal transplants to ophthalmology as well as cardiac bypass surgery.

Some of the improvements in dental care from the renaissance to the present include:

The invention of the toothbrush, the invention of porcelain teeth, the discovery that dentures could stay in the mouth without springs or ties, the invention of amalgam fillings, the use of anesthesia in dentistry, the introduction of antiseptic surgery, the discovery of x-rays, the invention of the high-speed drill, the introduction of fluorides, the strengthening of porcelain teeth, the development of electrosurgery, the invention of the panoramic x-ray unit, the development of bonding, the introduction of porcelain laminates, the development of composite fillings, the introduction of colorless osseo-bite plastic devices that are now used in orthodontics, the development of the larger beam, the introduction of synthetic bone augmentation materials, the myomonitor machine, the introduction of the Keyes technique which cleans the gingival tissues in a special way.

There may be other inventions—future breakthroughs—that are waiting to be discovered. I certainly feel that today, with the greatest technological advances ever in all areas of science and medicine, it's about time that the dental community realizes that there is much more to this profession than fillings and extractions.

At this very moment, there may be some unknown dentist slaving away in a little office or laboratory who will someday come up with something that will be truly significant.

It is now 5:00 a.m., and I am sitting at my desk to begin this letter to you with many disturbing figures, not because they have the potential to shock or intimidate, but mainly because they will resonate throughout my introduction in just about everything that I have to say to you.

Let me introduce myself. My name is Leonard I. Linkow. As a leading international pioneer in implant dentistry, I have treated more than one hundred thousand patients using more than 101,700 implants in my fifty-plus years of practice.

I had seventeen books published on implant dentistry, nine of which I consider the bibles of implantology: *Theories and Techniques of Oral Implantology*, St. Louis, MO: CV Mosby Co., 1970 (two volumes); *Maxillary Implants a Dynamic Approach to Oral Implantology*, New Haven, CT: Glarus Publishing, 1980; *Mandibular Implants a Dynamic Approach to Oral Implantology*, New Haven, CT: Glarus Publishing, 1978; *Implant Dentistry Today: A Multidisciplinary Approach*, Padua, Italy: Piccin Nuova Libraria Publishers, 1990 (three volumes); *The Legends of Implant Dentistry*, New Delhi, India: Jaypee Brothers; and more. And as I had previously written, I want it to be known that I did not accept one penny of the royalties from any of those books but instead had the publishers receive the same to use the proceeds to pay for translators to translate the volumes into various languages. So why am I now writing another book if I receive no returns? Because there is a great need to illuminate this negative approach of the dental profession regarding subperiosteal implants and their tremendous need to the millions of edentulous patients who desperately need them.

The book will be written in the simplest manner in order to allow the neophytes to understand the principles and pitfalls of these wonderful procedures that I developed over the many years to the way it was reduced to the procedures of today.

However, as I have written this book, I have written it with a great deal of frustration, disgust, aggravation, bias, indignity, and anger directed toward the tunnel-visioned, "know-it-all" dentists who are merely looking for immediate financial gratification and couldn't care less to learn these significant procedures to truthfully help these poor, suffering patients. They are completely ignorant of the true need and values for these implant procedures, and in this regard I certainly mean blade/plate form implants also.

Many years ago, from my long experience with implants, I was able to come up with a very unusual but bright and important saying: "Even beauty fades but *dumb is forever*." Does this seem familiar to many of you? Or how about this: "The dilemma of ignorance." Just think about these words and then place yourself in front of a mirror and you will see the recipients.

It is now 7:00 a.m. The leaves on the trees are turning green and yellow. Spring is finally in the air, and I couldn't be happier. To you, your family, and loved ones, I hope that your upcoming spring season is one of joy and happiness.

Let us change the scenery for a few moments to delve into the magnificence of nature and its beauty.

Before we delve into the heart and soul of this very needed discipline, I thought it necessary to include the *Journal of the American Academy of Implant Dentures* as it entered its fiftieth anniversary. In those early years it was called the American Academy of Implant Dentures and was changed later to the American Academy of Implant Dentistry.

When you browse through some of its literature, you will get an idea on how things were looked upon.

A bright future for implants

I gaze into my crystal ball, and this is what I see:

Scene 1: More patients are becoming aware that implants may be able to help them. These patients demand that their dentists become familiar with implantology.

Scene 2: To fulfill their patients' wishes, more dentists become familiar with the implant procedure. The use of implants gradually grows and grows and grows.

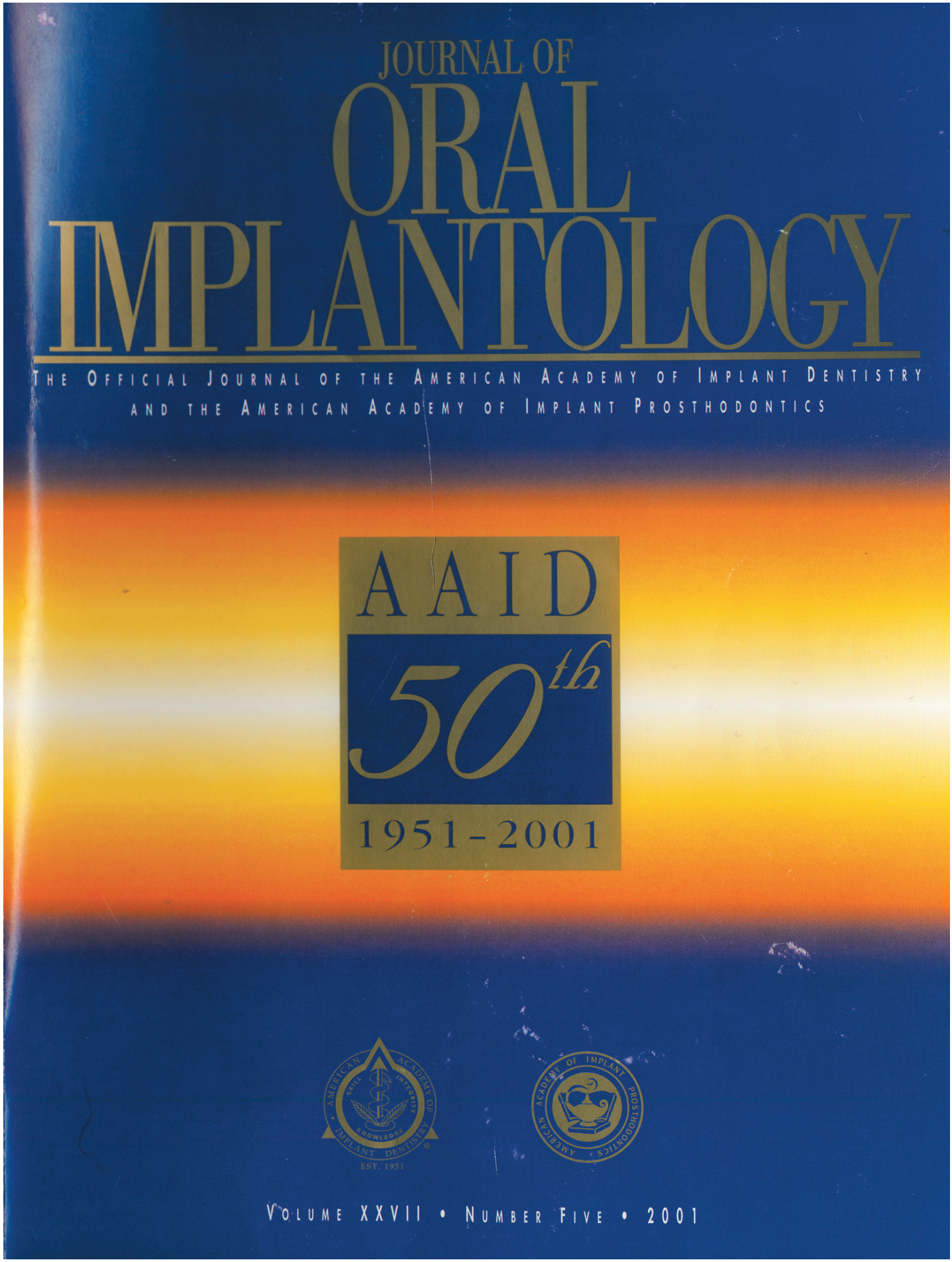
Scene 3: Eventually there are more people with implants than with conventional dentures.

I see many of these happy implant users in my crystal ball. They are enjoying themselves—laughing confidently, eating without fear, and taking advantage of all the good things that life has to offer us.

What a wonderful future! I can hardly wait for that happy day.

I decided to include in this introduction the fiftieth anniversary of the *American Academy of Implant Dentistry Journal* and some of the literature that was published in it.

An early photo of myself taken in 1961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AND THE AMERICAN ACADEMY OF IMPLANT PROSTHODONTICS
AAID
50th
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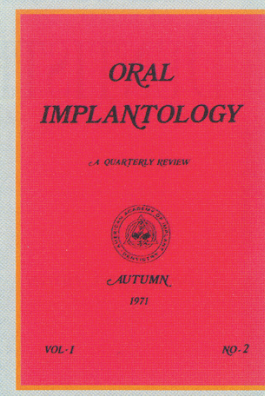
EST. 1951
VOLUME XXVII • NUMBER FIVE • 2001

50 YEARS OF

1966: The organization is officially renamed the American Academy of Implant Dentistry.



1971: The official AAID journal becomes the *Oral Implantology Quarterly*.

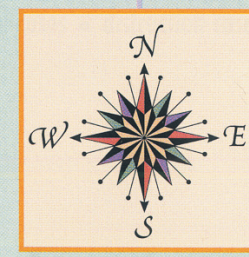
1954: Volume 1, No 1, of the *Journal of Implant Dentistry* published. Requirements for Membership Examination established.

1950 1960 1970

1964: *Journal of Implant Dentistry* becomes the *Journal of Oral Implant and Transplant Surgery*.

1952: Incorporation of American Academy of Implant Dentures, Minneapolis, Minnesota, with ten members; Norman A. Goldberg elected first president.

1969: The AAID and the Institute for Endosseous Implants merge, with the latter becoming the Northeast section.



1970: The four regional sections of AAID are established.

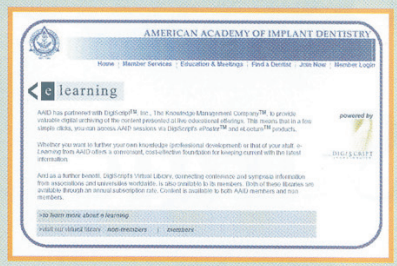
LEADERSHIP

This year, the American Academy of Implant Dentistry is celebrating its golden anniversary. This calendar charts some of the significant landmarks that have contributed to the prestigious position the organization now holds.

1985: The AAID develops criteria for credentialing members, who, upon satifying requirements, acheive the status of fellow or associate fellow.

1985: The *Journal of Oral Implantology* becomes the official publication of the AAID.

1990: The American Board of Oral Implantology grants certificates to its first diplomates.



1999: The AAID initiates active clinical and online instructional programs.

1991: Membership category credentials renamed Associate Fellow and Fellow.

1980 1990 2000

1992: The AAID appoints its first executive director, Vincent Shuck, and moves offices to the ADA headquarters building in Chicago.

2001: AAID membership exceeds 2,000.

1974: The AAID Research Foundation is established at the AAID annual meeting.

1987: AAID Maxicourse® initiated at the Medical College of Georgia, and later at Brookdale Medical Center and Howard University.

1998: First Amendment protection granted for publicizing AAID and ABOI credentials in Florida, paving the way for California in 2000.

LETTER TO THE EDITOR

EDITOR'S NOTE

Below, the reader will find contributions from a group of our members. I am extending my gratitude to them and to all of the other American Academy of Implant Dentistry (AAID) members and well-wishers worldwide. I particularly wish to thank those who sent photographs and documents that our page restrictions prevented from inclusion here. My special privilege as Editor-in-Chief allowed me to review letters and pictures from and about the giants of our discipline from the United States and abroad. They revived memories and events that were precious in our history and will remain forever as lynchpins in the development and current structure of implantology. These will be forwarded to the official archives of the AAID in Chicago and available for all to see. Originals, so dear to those who sent them, will be returned to their contributors.

Space limitations again played a role in governing those historical articles that were chosen; in the end, only material from volume 1, issue 1 was selected for reprinting. The entire library of all past journals is available for review by all members and subscribers at Headquarters' office of the AAID.

The members of the Journal *staff and Editorial Board hope that you will enjoy this special edition, which would not have been possible without their undivided interest and cooperation.*

A. Norman Cranin

April 18, 2001

Modern implant dentistry dates back to April 22, 1938, when Dr Alvin E. Strock inserted the first dental endosseous implant, as reported in the May 1939 issue of the *American Journal of Orthodontics and Oral Surgery.* On June 8, 1938, Dr Strock followed up by inserting the first successful human dental implant when he replaced the upper right lateral incisor. The implant lasted for 15 years, right up until the death of the patient. The beginnings of the American Academy of Implant Dentistry (AAID) arose 4 years later when Dr Gustav Dahl of Sweden applied for a US patent for the lower subperiosteal implant. Then in January 1948 Drs Aaron Gershkoff and Norman I. Goldberg presented the first successful full lower subperiosteal implant to the Rhode Island State Dental Society.

I had just graduated from dental school in 1947 and had set up practice in Wakefield, RI, where I had become the school dentist. In my senior year I heard about dental implants and had the opportunity to reimplant evulsed teeth with great success, so I was deeply interested in what I saw at the state dental meeting. I became a close friend of both Drs Gershkoff and Goldberg, following their work until I moved to Atlanta in 1956. I remained close to Dr Gershkoff and his wife, Miriam, and visited them at their home whenever I returned to the state, discussing with them various implant designs and techniques.

To return to the origins of AAID, on October 3, 1952, Drs Gershkoff and Goldberg, along with 10 other members, incorporated the organization as the American Academy of Implant Dentures, electing Dr Goldberg as their first president. In 1966, the Academy decided to change its name to the American Academy of Implant Dentistry (AAID). The next year I took Dr Linkow's course on endosseous and subperiosteal implants. He and I also became good friends and worked together on various implant surgeries. I inserted many of Dr Linkow's root forms and blade implants and successfully worked with a plastic surgeon at Georgia Baptist Hospital doing fracture work, reimplanting, and stabilizing evulsed teeth. I then decided it was time to do a subperiosteal implant. Dr Julian Franko of the AAID came to Atlanta to guide me, and the case was very successful, lasting over 25 years until I lost track of the patient.

I had been an associate, but was now ready to become an active member. In May 1969, Drs Linkow, Edelman, Vicido, and I gave the first implant course in the South. In the lower left molar region, I inserted a Linkow VT-1 Vent-plant, immediately placing a premade 3-unit fixed bridge over the lower left first bicuspid to put it into function. The female patient still had the bridge at her death 19 years later. It was during this period that I heard that the Periodontal Society had districts, so I introduced the idea to the Executive Council. There was a New York section, the Institute for Endosseous Implants, and my own group, the Southern Academy of Oral Implantology. I was made chairman to bring these two groups under the AAID umbrella, and by special amendment, practitioners from both splinters were declared active members. Today we have 4 districts: the Northeast, Central, Western, and Southern.

At our 1972 meeting in Las Vegas, Dr Gershkoff and Miriam asked me and my wife, Ruth, to go to Australia, but I had a lecture elsewhere and declined. We had a wonderful time on what was to be our last evening together. A short time later a friend called to tell me of the plane crash that took Dr Gershkoff and Miriam's lives. Two years later, in their honor, I had the pleasure of nominating my very dear friend Leonard Linkow to be the second recipient of the prestigious Aaron Gershkoff Award.

There are many remarkable design innovations that AAID's pioneering members have made to implant dentistry:

- Dr Raphael Chéchèrve, endosseous and subperiosteal implants;
- Dr Norman Cranin, anchor implant;
- Dr Gustav Dahl, subperiosteal implant;
- Drs Edelman and Vicido, submergible blade implant;
- Drs Maurice Fagan Jr and Maurice Fagan III, macroporous coated blade implants;

- Dr Aaron Gershkoff and Norman Goldberg, mandibular subperiosteal implant;
- Dr Isaiah Lew, blade implant;
- Dr Leonard Linkow, many designs of blade implants, self-tapping screws, unilateral and full subperiosteal implants.
- Dr Giordano Muratori, endosseous implants;
- Dr Olympio Pinto, anterior ball implant;
- Dr Hans Orlay, endodontics stabilizer implants;
- Dr Sami Sandhaus, crystalline bone screw; and
- Dr Irwin Small, mandibular staple bone plate.

It has been a remarkable history.

Maurice Fagan, Jr
Atlanta, Georgia

June 26, 2001

I was made aware of the American Academy of Implant Dentures during a lecture by Dr Paul Mentag. Because my mother was unable to use her lower denture, I started to research articles written on implants. Aaron Gershkoff, Norman Goldberg, Isaiah Lew, Norman Cranin, Roy Bodine, and Theodore Lee helped open my eyes to the possibilities offered by implantology.

Upon graduating from dental school and passing my boards in 1961, I phoned Dr Gershkoff and told him I wanted to learn about implants and asked if I could observe his surgery. He graciously invited me to his office. I spent 3 days watching him make an impression insert for one patient and a subperiosteal implant for another. I returned home and did my first mandibular subperiosteal implant under Dr Paul Mentag's guidance. Three weeks later, I did the procedure for my mother, and on August 4, 2001, we will celebrate the 40th anniversary of that implant.

The past 37 years have introduced me to a very volatile, vocal, spirited and skilled group of people who would yell to make a good point but remain friends. You could call any of them for help from all over the United States and not only get an answer, but many times a personal visit. I was fortunate to meet and become friends with some of the giants of our discipline: Drs Gershkoff, Goldberg, Paul Mentag, and many others. Dr Leonard Linkow kept implant dentistry alive in the 1970s and 1980s, inspiring me to do more and better dentistry. Dr Lew would brutally evaluate my implant slides, but show me how to elevate my implant dentistry; I treasure the memory of him lovingly singing Yiddish lullabies to my year-old son at an AAID dinner. Dr Cranin, who forced me to learn precise scientific terms to better explain implantology to my dental colleagues and patients, has an enviable command of the English language. Dr Lee took me under his wing with great insight into my fellow implantologists' personalities. Dr Bodine, with whom I shared a similar past and special bond; Dr Milt Smithloff, who gruffly taught me both occlusion and periodontics; Dr Robert James,

who along with Drs Meffert and Jack Lemons brought histology to implantology; Dr Frank Bustillo, who used X rays to demonstrate the difference between eating with conventional dentures vs subperiosteals; Dr Carl Misch, who has kept the field open to all dentists, not just specialists, and who has done more research and lecturing than nearly anyone—all of these legends have helped the AAID grow in stature. Many other hardworking dentists like Charles Weiss, Ken Judy, Robert Katz, Robert Buhite, Robert Schwartz, Vic Sendax, Tom Braly, Maurice Fagan, Alfred Heller, Jack Hahn, Joe Warriner, Burt Balkin, Monty Buck, Hilt Tatum, Benson Clark, Craig Cooper, Richard Guaccio, Edwin Weinfield, Sam Goffen, Larry Hoffman, Fred Metz, Thomas Golec, Thomas Chess, Lionel Richards, and Edward Mills have helped the AAID to transform from "a radical group of crazy dentists who will cause you to lose your license" (as I was told by a Michigan State Board of Dentistry member in 1963) to the recognized, premiere implant organization on the cutting edge of 21st-century dentistry.

We have transformed education from members peering over the shoulders of a "wet-fingered dentist" to offering formalized courses covering all aspects of diagnosis, pharmacology, sterile surgery, and aesthetic restorative implant procedures to give patients healthy, functional, and attractive mouths. In 1961, asking patients' physicians if they were healthy and taking a set of full-mouth radiographs was all we did before surgery. In 2001, we have presurgical planning that can include X rays, CT bone studies, blood scans, and detailed physical exams. With preprosthetic planning, we can determine if we need to graft or grow bone, do sinus lifts, or reposition nerves. Most of our current techniques were first presented at our annual meetings or in our *Journal.*

The education and friendship I have received from the AAID is something I will cherish all my life, and I hope all members can say the same.

Julian Franko
Dearborn, Michigan

June 2, 2001

As one of the pioneers in implant dentistry, I look back at the American Academy of Implant Dentistry's (AAID) beginning in 1951 and I marvel at the great strides we have made in the development of dental implants and the careful clinical examination of the patient. It is thanks to the great, inventive minds of the AAID that we have many new designs of implants that have been successfully manipulated time and again. We started with the subperiosteal mandibular implant developed by Drs Aaron Gershkoff and Norman Goldberg, but it was not until 1960 that the American Dental Association gave its approval to the mandibular form. Great minds like Dr Leonard Linkow developed the blade implant, which was followed by the cylinder implant that became the implant of choice, even though the subperiosteals we placed 30 years ago still survive.

The Academy itself has developed into a strong, internationally known component of dentistry with members from all over the world who have passed extensive membership

examinations. We are the oldest professional organization in the world dedicated to the advancement of implant dentistry, with over 2500 members including general dentists, specialists, and individual practitioners. As of 1970, the Academy established 4 regional sections in the United States, each of which has a program of its own but owes its responsibility to the Academy's Board. In addition, we are recognized by various universities, some of which have developed full programs of oral implantology.

To add to our prestige, we have an important journal now edited by Norman Cranin, who established the first full-time, 2-year training program in oral implantology in 1969. The *Journal of Oral Implantology* has become a vital text not only to its members but to dentists and dental institutions everywhere.

I want to congratulate the Academy on its 50th anniversary and on its many accomplishments. I salute the pioneers, the international leadership, the impressive research program, the *Journal,* and the various members who have contributed to our success. Our 50th anniversary is an historic mark in the growth of the Academy, because its founding members never gave up on the idea that someday implantology would be an essential part of dentistry.

Samuel V. Goffen
Chicago, Illinois

May 12, 2001

Congratulations to the American Academy of Implant Dentistry (AAID) and all its members on reaching the 50-year milestone. I joined in 1972 as a "supporting member" and became active in 1974. The Academy has certainly grown in number and stature since then.

The Academy's rolls are filled with the pioneers of implant dentistry and the best educators around the world. I am especially proud of what I have accomplished for the Academy as well as what the Academy has done for me. Through the AAID, I was allowed to dedicate my efforts and move the Academy from a 3-person office staff to a professional management organization team. During my presidency, we brought about a new and more professional journal, and I became the first president of the activated American Board of Oral Implantology/Implant Dentistry (ABOI/ID). Having served 2 terms for a total of 4 years as president and bringing about the first ABOI/ID exam gives me a sense of great accomplishment. I sincerely realize that it took more than my efforts alone and that past and present members of the Academy and Board were also very instrumental in bringing about the Academy's greatest gift to the field of oral implantology, the ABOI/ID. The Academy's membership rolls are indicative of the highest training and expertise in the world. The fact that they are examined by a bona fide ABOI Board allows our membership the status it deserves in the field of implant dentistry.

Education is important, but examination of what was learned and applied is the true test of honesty when displaying credentials. The Academy has sought and implemented the highest standards for education and examination. My 8.5 years as an officer and member of the Indiana State Board of Dentistry have allowed me to continue to seek high standards of excellence from those who wish to enter dentistry. These past years have been filled with

opportunity to protect the field of implant dentistry from those who would claim it for their own and also from those who would attempt to criticize our ability to proudly proclaim our earned credentials. The battles are not yet over, but great strides have been made by the AAID and others to protect our integrity.

Richard A. Guaccio
Past President, AAID and ABOI/ID
Schererville, Indiana

March 12, 2001

Implant dentistry has been my life interest ever since I took a course from Dr Leonard Linkow in 1968. Afterward, I sold my general practice in 1972 and returned to graduate school to find better implant materials and possible bone grafting materials. With the money from the sale of the practice, I funded my own research and soon developed a new ceramic implant; later, I discovered a tricalcium phosphate that enhanced bone growth.

I was not active in the American Academy of Implant Dentistry (AAID) during the 1970s because I wanted to spend more time with my children, but in the 1980s I became involved in organized implant dentistry and quickly discovered that the AAID was an excellent place to learn the newest arm of dentistry. The AAID was full of members who welcomed others to their offices to observe surgery or answered questions by phone. Although many people criticized dental implants (as often happens with new procedures), the Academy stood tall, relying on its demonstrated history of successful implant dentistry. The Academy was also willing to share the failures of implant technology, which was an even better learning tool for me.

Since I have taught implant dentistry in 10 different dental colleges for over 12 years, I have had the opportunity to observe many different learning institutions and organizations. After 12 years, I am convinced that the AAID is still the best source of knowledge for young dentists wishing to understand the various modalities of implant dentistry.

Milton Hodosh and
Gerald Shklar Providence, Rhode
Island

April 5, 2001

As an associate fellow of the American Academy of Implant Dentistry (AAID), it is my privilege and honor to celebrate the 50th anniversary of our Academy. I was fortunate to take my first steps in implantology in the surgery of Dr Leonard Linkow, who became my teacher and mentor, and to whom I owe profound respect and gratitude for affording me the opportunity to witness all kinds of surgical procedures and using all kinds of implants. He has helped me to understand the best approaches to solving cases, from the simplest to the

most complicated, and to become immersed in the interdisciplinary connection that has made implantology the best dental achievement of our era.

Over the course of time, I have had the pleasure to encounter and develop friendly relationships with the best professionals in the field of implantology. I have had the opportunity to exchange opinions with them, to learn from their experience, to seek the best solutions for various cases, and to extend the horizon of my knowledge. However, the best and most important asset to my practice has been, without a doubt, the heart and soul of the Academy: the *Journal of Oral Implantology*.

Wherever you may have established your practice, the best of the Academy reaches you through the *Journal,* thus maintaining a close, permanent, and viable connection with its achievements. Dr Cranin's editorials are gems, and I offer my best regards and sincere congratulations to him and his dedicated and talented staff. It is a pleasure to rediscover high professionalism in each issue. The *Journal* exemplifies integrity, dedication, and a touch of humor, which is the most diplomatic way to solve all conflicts or disagreements resulting from differences of opinion.

Over time, the *Journal* has reflected changes, each illustrating the orientation of the Academy from its very beginning to this momentous anniversary. I have been witness to the great, glorious time in which the best professional personalities in the field were active and their presence was strongly felt in the *Journal.* These professionals wonderfully illustrated many practices, including complex maxillomandibular rehabilitation cases solved by multimodalities such as root forms, blades, subperiosteals, tripodials, and re-entry systems. All of these make implantology the first and final rehabilitation solution for a great many patients in need.

Every meeting and session in this great period of accomplishment provided a testament to the best achievements of the Academy. Its members worked diligently to convince many practitioners to reconsider their conceptions about implantology and to recognize its cardinal mission to find positive solutions to situations for which classical dentistry has no adequate answers. This period in the history of the Academy was a wonderful time when each practitioner looked to membership in the AAID as the highest, most enviable title for an implantologist. Passing the Academy Board, both practically and theoretically, was a true challenge. For foreign practitioners, it was easier to pass the National Board to obtain a license to practice in the United States, rather than to present 10 cases using multimodalities, but it was also necessary to pass a complex and difficult theoretical examination to obtain the precious and honorable title: member of AAID. Today, in other societies, it seems that quality is replaced by quantity. To become a member, you have to present 3 practical cases, using only 2 different kinds of implants. This concept is flawed, suggesting that becoming a fellow comes first, and that broadening implantology experience comes later.

However, new fellows ought not to limit their experience in implantology or permit themselves to accommodate only root form implants without solving cases in which anatomical situations need, for example, a blade implant or a subperiosteal. The new practitioner must instead be a special individual with a strong will, always improving his or her technique to fulfill the first and last rule of true implantology: to approach and accommodate the implant

that best conforms to the case, not try to fit all cases to only 1 form of implant. If we try to successfully plan all of our cases, we, as implantologists, can solve 33% of them by root form implants. Adding blades to our procedures can improve our rate of success to 66%, and using a subperiosteal implant, it is possible to cover 99% of our practice, fulfilling the best approach and solution for rehabilitation of our patients. Using multi-modalities, we can decrease the rate of failure. Today we have the possibility of saving failed implants and of reconsidering each case. A failed root form can be saved using another root form of a different size or diameter, a loose blade by a bi-blade or re-entry system, or a corrugated or basket blade. In anatomical situations where there is no bone support for endosteal implants, we can accommodate a partial, unilateral, bilateral, or full subperiosteal, depending on the case.

As a result of these new situations, the *Journal* is generally inclined to present more research study. I wish to underscore the importance of such research, for I truly understand its significance and value. I am fully conscious of the importance of every article focusing on deciphering the secrets and mechanisms that govern the relationship between the implant and the host. Such research seeks to improve the ultimate goal in implantology; that is, a long and lasting period of implant viability against the many factors that conspire to diminish the stability and long-term functionality of rehabilitation by implant procedure.

Since there are fewer and fewer case studies from which every practitioner can learn and share his day to day experience, I suggest that we create a forum in the *Journal* for readers' suggestions. The dynamics of exchanging opinions and experience can challenge an increasing number of less experienced practitioners interested in implantology to present their day-to-day practical problems, including complex and simple cases that are solved correctly and with success. Such a forum might encourage the practitioner to develop the desire to approach real implantology. A large number of practitioners are interested in assimilating the correct answers to their needs. And since repetition reinforces knowledge, it will not bore anyone interested in improving a practice to learn from somebody else's experience.

Perhaps at this memorable 50th anniversary, a special section can be dedicated to the use of multimodalities as the real viable procedures that afford an adequate solution to problems in implantology. Such procedures are the best way to advance along with tremendous scientific developments, and they demonstrate the true value of our Academy, which has and will continue to provide a general consensus on issues in implantology. The AAID truly embodies the best achievements of dentistry in the new millennium.

Niki Josefovici
Tel Aviv, Israel

May 12, 2001

It is with great humility and enthusiasm that I write this letter as we approach the 50th anniversary celebration of the American Academy of Implant Dentistry (AAID) in New Orleans this November.

During the mid-1960s, when I saw the need to improve the lives of those struggling

with partial and full dentures, I decided to become involved in implantology and traveled to New York and Boston to study with Leonard Linkow and Aaron Gershkoff. Many of my colleagues told me not to get involved or I would suffer serious consequences. These same colleagues, coincidentally, have been referring me many patients over the years. I placed my first implant December 18, 1967, in a 54-year-old woman. I last saw her in 1992, 25 years later, and even though the bridge was failing, the implant had been successful. By 1970, I was doing some lecturing on custom blade implants, and I even lectured at the Tokyo Medical and Dental Center in 1972. John Thibert, then the head of the Admissions and Credentials Board, heard about this and called me from Boston in 1973 to ask me to come to Houston and take the exam for membership in the AAID. By this time, I had done many subs, blades, and root forms; therefore, I threw my pictures and X rays together and went to Houston for the examination, The examiners were surprised at all the work I presented to them, and I was surprised by all the astute, personable colleagues I met. I even recall that the person standing next to me later became the AAID president. When I returned home, I was comforted to know that I was part of a large group with well-organized courses, and I subsequently met some very knowledgeable implant dentists in the Philadelphia area whom I didn't even know existed.

The AAID became my lifeline in the field of implantology, and I have since made almost every annual meeting. Ultimately, I was asked to serve on the A and C Board, and I accepted the appointment. I then became chairman and befriended president Tom Chess and past president Ron Evasic. As chair, I was required to get the examinations and completed tests to and from many examination sites, including Chicago, the Medical College Georgia in Augusta, Harvard in Boston, and Brookdale in New York. I was required to keep the examinations secure, which made me realize how important it was that I had become a Navy carrier pilot in World War II. Fortunately, I had graduated to my own plane and would fly the examinations and completed tests to and from all the examination locations without ever letting them out of sight.

I am slowing down now, but it was the AAID that spurred me on over the years. Just last week, a woman came in with a 32-year-old custom blade in excellent condition. I am certain that I, as well as the entire field of implantology owe this kind of success to the AAID and its erudite publication, *The Journal of Oral Implantology,* which is so well edited by our own Norman Cranin. I am overwhelmed by the increase in the number of foreign dentists who have become involved and the many I personally have had the privilege to exam since I was inducted. I have met many giants along the way who were always willing to share their knowledge, expertise, and secrets. Many are no longer with us, but they and those still present will never be forgotten. I offer my special recognition to John Thibert who took the time to call me and encourage me to join this great organization.

Thank you, AAID.

Walter E. Knouse
Lumberville, Pennsylvania

April 12, 2001

Fifty years have gone by! I can hardly believe it. These years have been spent trying to convince the rest of the profession that we weren't doing anything wrong. Now, finally, the entire world of dentistry is deeply involved with implants. I have seen our esteemed American Academy of Implant Dentistry (AAID) grow since the early 1950s when there were just a handful of men with vision, strength, and hopes for its maturity to an organization that now boasts hundreds of active members. I am very proud of the AAID, its members, and its continuous education programs as well as its credentialing mechanisms. To those who have passed the examinations of the American Board of Oral Implantology/Implant Dentistry, I hold you in my highest esteem, for truly one cannot hold a higher position in dentistry.

I cannot express in words how glad I am to be here with you sharing this momentous occasion. When I introduced the first self-tapping ventplant screw implant to the profession in 1963, followed by my blade implant in 1967, I traveled around the world many times as a missionary to spread my knowledge, hoping that one day these techniques would become a discipline that would be respected throughout the entire nation. Little did I know how far reaching the art of implant dentistry would go. The advancements made in this field exceeded my wildest dreams. I am so very proud of so many of you who have made such profound contributions. If it were not for implants, dentistry might still be an archaic profession consisting of plugging fillings and making removable partial and full dentures. The profession was just not ready for implantology in the 1950s, 1960s, and 1970s.

I believe that we live for many reasons, but one of the most important, certainly the most sacred, is to pass on what we know and believe to subsequent generations. That transfer begins most intimately with our children and their children. Looking back over my own life, I have come to the realization, however clichéd it may sound, that we are all burning candles in a wind over which we have precious little control. We are born, we grow, we mature, and we contribute our light. And then it's over. It is snuffed out, or it flickers for a while, slowly diminishing. While we are here, some of us give every moment of every hour, always seeking what is out there to share. These lucky few have the ingenuity, the skills, the creativity, the belief, and the fortitude to strive for something that one day may have significant value: a new device or method, an opera or a novel, or some profound insight. Just a few can create something that can inspire thousands, improve the quality of life, or make our society better, whether it be in medicine or any other walk of life.

It seems to me that I have lived my whole life trying to get to the top of the mountain and discover what is on the other side, to find what is hidden beyond the next hill, and the next, and the next, and to attain greater achievements, no matter how impossible they may have turned out to be. In many ways I am still a child setting out for the summit, eager to discover whether the vision I hold in my imagination will be equal to the sight that finally greets me when I arrive there.

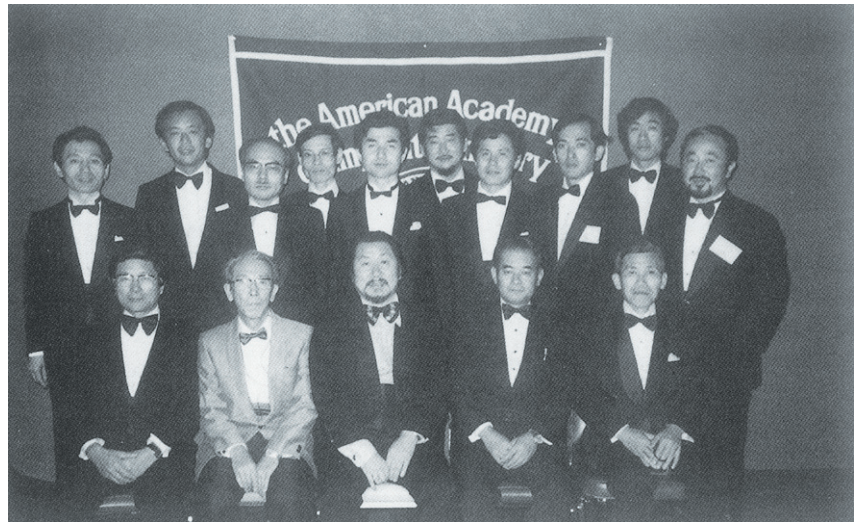
May God bless all of you and give you continued good health and success in your practices.

Leonard I. Linkow
New York, New York

May 28, 2001

The late Dr Shumon Otobe built a significant bridge between the American Academy of Implant Dentistry (AAID) and the Clinical Implant Society of Japan.

Shumon Otobe, left, and Isidore Samuels (circa 1969). They met on African safari, beginning a professional and personal relationship that lasted over 30 years.



The Clinical Implant Society of Japan at the 32nd AAID conference, Washington, DC, 1983.

Michael Chérchève, foreground, and Leonard Linkow operating in Paris, 1969.

Leonard Linkow lecturing in Paris, 1972.

Paul Mentag, left, and Leonard Linkow at the 10th annual Linkow Seminar.

Once a prominent member of AAID, Dr Otobe introduced modern dental implantology to Japan about 30 years ago, thus closing the gap that had previously existed between Japan and the newest dental technologies. The events that spurred Dr Otobe's numerous accomplishments began when he met Dr Isidore M. Samuels (then a clinical associate professor at the New York University College of Dentistry) on an African safari. At the recommendation

of Dr Samuels, Dr Otobe met Dr Leonard I. Linkow, who was fast becoming one of the most renowned dental implantologists in New York. While working in the field of surgery at the University of Tokyo, Dr Otobe collaborated with Dr Linkow on the advancement of dental implantology in Japan and later formed the Clinical Implant Society of Japan. Its members, led by Dr Otobe, began to participate in AAID actively, attending Dr Linkow's operations and lectures in New York. Subsequently, Dr Otobe visited the offices of Dr Charles M. Weiss, Dr Richard A. Guaccio, and Dr Theodore Lee, exchanging valuable information with them about the newest research in the field of dental implantology.

The network of collaboration did not stop there. In November 1974, while I was attending the 23rd AAID conference in Washington, DC, I took the examination for active membership in AAID with Dr Otobe. We had the opportunity to meet top implantologists from around the world, including Dr Ronald Cullen of England, Prof Giordano Muratori of Italy, Dr Mira Yosinovsky of Mexico, Dr Alfred Feigel of Switzerland, and Hans Grafelmann of Germany. These international exchanges provided valuable support during our endeavors. I recall 1 meeting in particular, the 32nd AAID in Washington, DC, in 1983, during which 17 Japanese members participated. We held a rally, announced our theses, and commemorated the 10th anniversary of the Clinical Implant Society of Japan with a "Japan Night" at the Oyama Karate Dojo (gym) in Manhattan. Many of the implantologists to whom we are indebted were invited and were most certainly pleased.

In Japan, we continue to exchange research on dental implants with the doctors of AAID to further the advancement of dental science in our country. There are currently 46 Japanese doctors involved in AAID, half of whom are also members of the Clinical Implant Society of Japan. We express our sincere gratitude to the directors of AAID and its membership of doctors on the occasion of its 50th anniversary by saying "Thank you."

Finally, this letter is dedicated to the memory of 4 who contributed to the development of dental implants: Dr Raphael Chèrchéve (France), Dr Theodore Lee (United States), Professor Giordano Muratori (Italy), and Dr Shuman Otobe (Japan), who passed away November 10, 1994.

Eiichi Kojima
Past President, Clinical Implant Society of Japan
Tokyo, Japan

May 8, 2001

I would like to thank the founding fathers of the American Academy of Implant Dentistry (AAID), people like Drs Goldberg, Gershkoff, Lew, Linkow, Cranin, Weiss, Jermyn, Tatum, Niznick, Visido, James, Golec, Judy, Weber, Mentag, Lee, Harris, and Misch. I also want to note many other remarkable personalities in contemporary implant history, such as Drs

Dahl, Chérchève, Irwin, Benaim, Kiernan, Schroeder, Straumann, Pasqualini, Tramonte, Muratori, Weinberg, Bodine, Lemons, and so many others who had the foresight millennium. For example, much of our approach has been based on the general concept that "bigger is better," that age-old, on-going paradigm. However, I suggest a new paradigm: to use what is appropriate to be optimally functional and stable over an anticipated lifetime; that is, beyond 20 years of in vivo function.

Congratulations to the *Journal of Oral Implantology* and those within this exciting discipline. The important role of the American Academy of Implant Dentistry (AAID) should be ever enhanced as we move into this next century.

J.E. Lemons
University of Alabama at Birmingham

Dr. Eichi Kojima and Dr. Shumen Otobe who created the "Clinical Implant Society of Japan"

A SIX-YEAR PROGRESS REPORT ON FULL DENTURE IMPLANTS[1*]

Norman I. Goldberg, DDS
Aaron Gershkoff, BS, DDS

When natural dentition is lost, and the subsequent processes of atrophy and degeneration takes place, the prosthodontist has a challenge in attempting to reconstruct or restore the oral cavity to useful function.

This challenge is mainly concerned with retention, stability, bulk of dentures, esthetics, establishing correct relationship of the dental arches and obtaining masticatory efficiency with artificial dentures.

Prosthodontia has advanced to the stage, where in most cases, excellent esthetics can be attained, where the correct centric relationship can be established and where an efficient masticatory apparatus can be constructed. However, prosthodontia still has a problem in meeting the challenge of retention, stability, and bulk of dentures.

The implant denture has been devised as an attempt to meet these existing challenges, where indicated, and is not intended to replace conventional dentures.

Some of our reasons for inserting implant dentures are:

1. Dehiscence of mandibular canal.
2. Unusual position of mental foramina.
3. Unusual difficulties encountered with ridges, tissue, and muscle attachments.
4. Patients desire for a stable denture.
5. Traumatic injury to oral cavity.
6. Mutilated mouth conditions due to extensive surgery.
7. Severe gagging.
8. Anatomical defects.
9. Patients' poor mental attitude toward full dentures.

We have inserted seventy-two implant dentures during the past six years. This represents approximately six percent of our full denture cases made during that time.

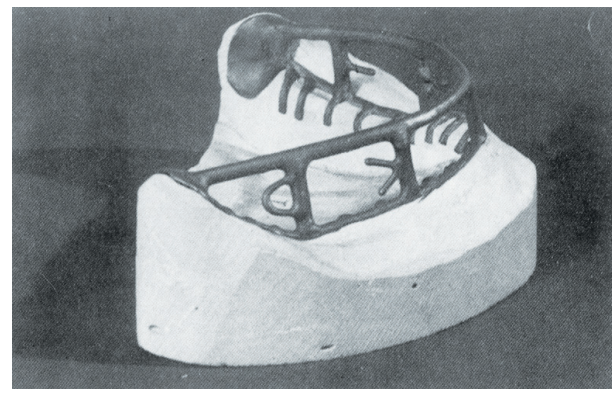


Fig. 1: –Template on model. This appliance was formerly used to determine tissue thickness.

The first twenty cases, all mandibular implants, were constructed by an indirect method,

1 * Read before the Academy of Denture Prosthetics, Miami Beach, Florida, April 12, 1954.

which consisted of trimming a model to resemble the bone (Fig. 1). The implant was inserted in a one-operation procedure. During this one-operation stage, many different designs were attempted in order to evaluate which would be the most adequate. Four of these cases failed. The reasons were: lack of fit of the implant

Fig. 2: Lateral plate of mandibular implant inserted by template method. Implant is deficient in fit to bone, has inadequate meshwork openings and inadequate bony covering.

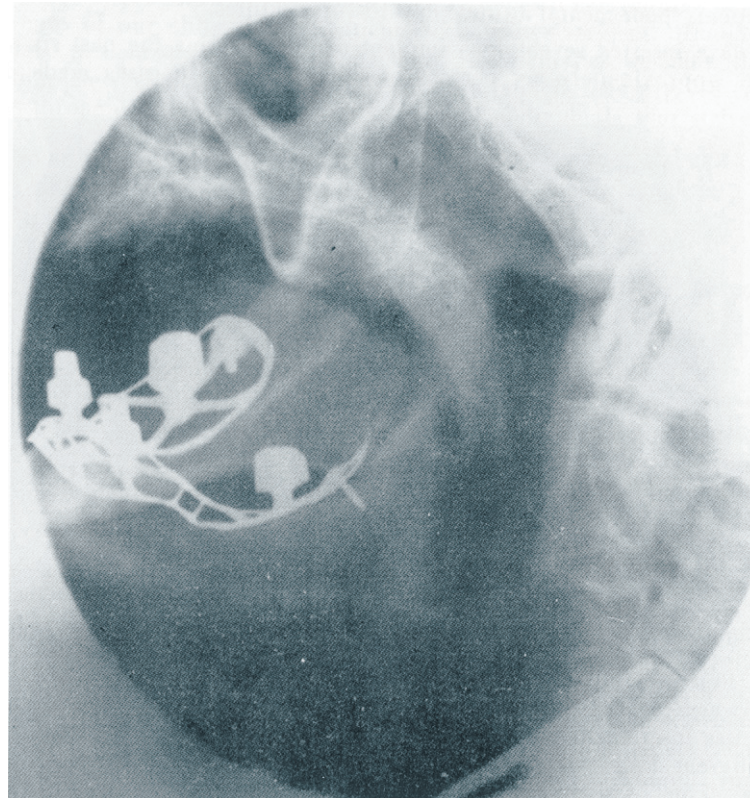


Fig. 3: Lateral plate of implant made from direct bone impression The meshwork is wide open, covers the bone properly, and accurately fits the bone.

*The unusual positions of the mental foramina are, close to the top of the ridge, and due to the degree of ridge resorption, the mental foramina may be found in more of a lingual position rather than buccal.

In more cases than we would ordinarily expect, upon the lingual retraction of the muco-

periosteum, the mylo-hyoid ridges were found to be exceptionally sharp and irregular. These ridges are sharp enough to cut the skin of a finger and it becomes evident why so many patients complain of pain in this area under conventional dentures.

Patients with these conditions have a constant complaint about the pain they experience upon mastication. Spot grinding of the teeth, balancing the dentures and relief of selected areas on dentures are of no significant value because the dentures are not stable. Many times, the weight of the denture itself is enough to produce these symptoms. It follows, therefore, that conventional dentures however carefully constructed under these existing conditions, would have a destiny of failure even before they are started.

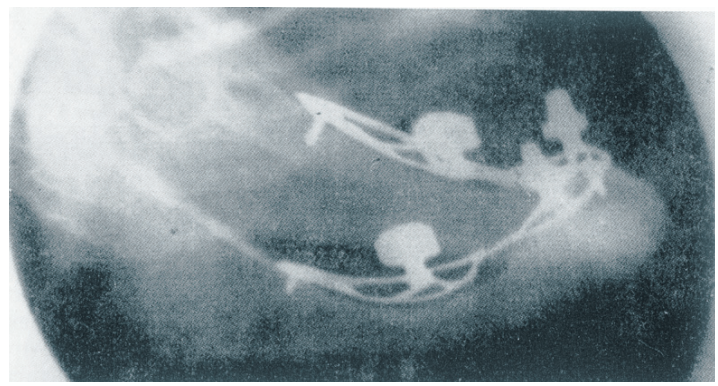


Fig. 8: Mandibular implant designed to bridge dehiscent canal as mentioned.

Oral surgeons as well as prosthodontists have little or no occasion to observe a mandible with a dehiscent canal or mal-positioned mental foramen or an extremely sharp mylo-hyoid ridge because in an atrophied or resorbed mandible there usually is no need for the complete retraction of the muco-periosteum from one retro-molar pad area to the other.

With the advent of the implant denture, it is essential to retract the muco-periosteum along the crest of the ridge, from one retro-molar pad to the other, allowing for the observation of these conditions.

We firmly believe that in atrophied or resorbed mandibles, these conditions are a most common occurrence.

Since the implant is fixed to the bone, it can readily be designed to avoid the mental foramina, regardless of position, to bridge the exposed canal, keeping pressure away from its contents and designed to avoid the mylo-hyoid ridges.

Conclusion:

The full denture implant is an answer to the challenges of retention, stability, and bulk. This work is not intended to replace conventional dentures, but to give the prosthodontist an added denture service for the difficult prosthetic patient. If more careful evaluations and examinations of edentulous patients are made, where difficulties are anticipated, many patients could he saved considerable amounts of discomfort, time, and expense.

343 Thayer St.
Providence, R. I.

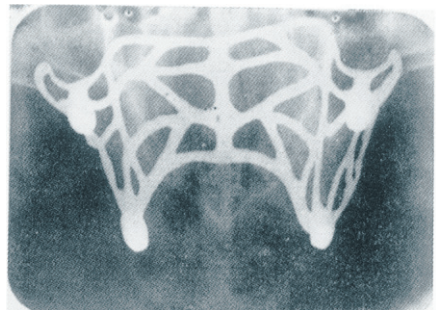


Figure 4: Upper Implant. Nine months showing design (three years old now.)

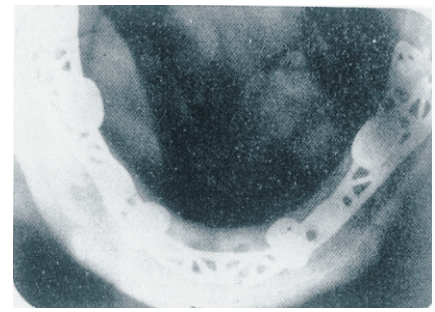


Figure 5: Lower Implant. Four years old.

Holes are drilled slowly at right angles to the surface with a No. 4 and then a 702 burr. The screws are turned until their heads are level with the implant metal. No extra turns to make it tight are necessary. The tissue is brought together over the implant and sutured. Seven mattress sutures are used: one in the midline, one around each abutment, and one on each side between the abutments. Five to ten interrupted sutures are also used. The implant framework is seated and examined for fit.

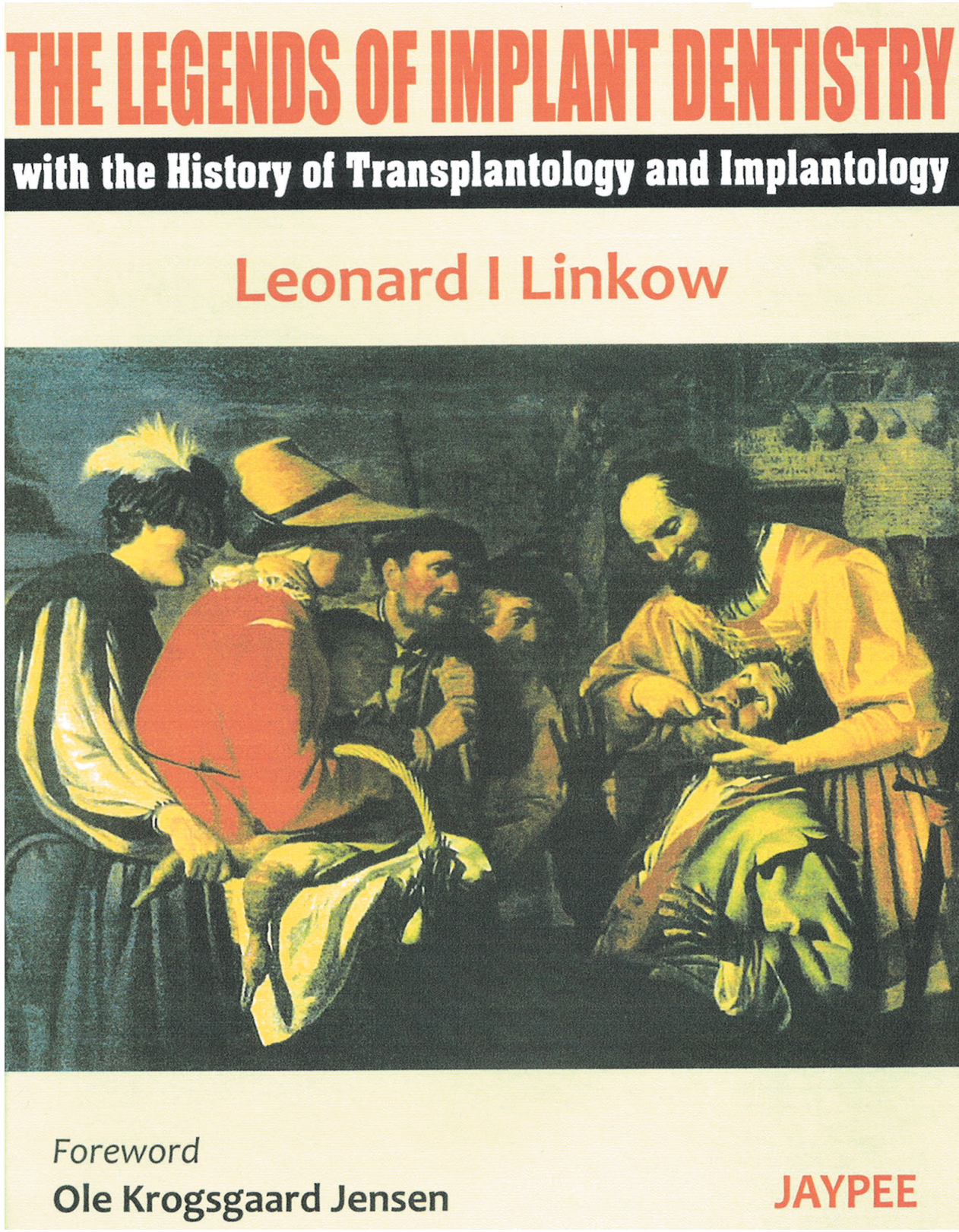
Mandibular Implant

Premedication and anesthesia on the lower is also the same as for the bone impressions. The incisions are also the same except that the vertical incisions are not necessary. Instead one can shoehorn the implant into position. The mucoperiosteum is retracted and the implant is seated on the exposed bone. Holding the implant in place securely, starting holes are drilled. A No. 4 round hurr is used to drill the holes which are to accommodate the cobalt chrome screws. The length of the screws is determined by distance between the operative area and the mandibular canal. The screws are inserted to keep the implant in place until such time that tissue is able to grow through the meshwork. The screws remain permanent.

Exfoliation of the screws has been noted, but is not of much concern since the tissue, which grows through the implant meshwork, holds it in securely after approximately four to eight weeks. The exfoliation of screws is due to being inserted into cancellous alveolar bone. The tissue is brought together over the implant and sutured posteriorly and anteriorly to the abutments closing the gaping wound. Sterile thrombin is dusted into the wound as it is sutured—just enough to moisten the entire depth of the incision. This serves a double function. It affects prompt hemostasis and when it combines with the plasma of the wound, leads to rapid recovery and overall healing of the surgery.

THE LEGENDS OF IMPLANT DENTISTRY

with the History of Transplantology and Implantology
Leonard I Linkow



The famous 1964 photo of the greatest implantologists in the world: Linkow, Gershkoff, Lew, Edelman, Chercheve, Olay, Lieb

THE LINKOW INTERNATIONAL INSTITUTE FOR IMPLANT DENTISTRY

From Implant Naivete And Stubborness To Linkow's Theories And Techniques

Dr. Leonard I. Linkow is currently a clinical professor at the New York University College of Dentistry, Department of Implant Dentistry, New York, New York; clinical professor, Department of Fixed Prostheses, Pittsburgh University, Pittsburgh (PA); and associate professor, Department of Oral Surgery and Implantology, Lille University, Lille, France.

Dr. Linkow, in 1954 appeared in a period of dental upheaval, denial, and antagonism of the dental profession as regard to the science and art of implant dentistry. For most of his life, he had to fight the profession almost single-handedly, but over a course of more than forty years he had won the battle, as all of you now know just how far and advanced the field of implantology has developed.

Dr. Linkow is credited as the father of oral implantology. He not only started a new era in the understanding of endosteal implants when he introduced the first, self-tapping screw implant in 1963 and his blade/plate form implant in 1967, but also developed advanced new designs and applications, especially with the tripodal mandibular subperiosteal implant which he introduced to the profession in 1984.

Above all his accomplishments, Dr. Linkow challenged the scientific dental community to investigate, to qualify, and to quantify dental implants as an alternative restorative treatment. More than anybody else, Dr. Linkow has considered the importance of biomechanical correct design, an indispensable condition for long-lasting results. With just the invention of the

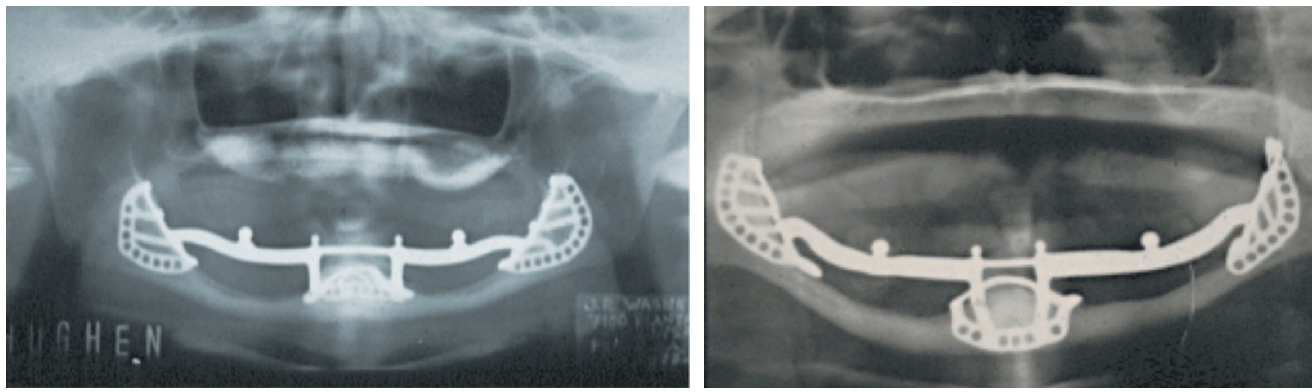
blade/plate form implant, he accepted the challenge to find solutions for those very difficult cases which have minimal bone and knife-edged ridges. Through his vision and persistence, oral implantology is where it is today, an accepted alternative treatment for partial and total edentulism.

Dr. Linkow's masterful lectures will open up your minds to a level of new horizons regarding how to deal with most of the morphological and anatomical conditions of the remaining bone of each and nearly every patient.

Subjects covered in Dr. Linkow's lectures include:

1. The first self-tapping root form implant (1963)
2. Screw in prostheses directly into internally threaded necks of the implants for retrieval (1964)
3. Step by step screw-type implants—surgical and prosthetic procedures
4. One-piece root form systems for immediate load and function (1963)
5. Narrow screw-type implants, long before the MTI implants that appear today existed.
6. Insertion of one-piece (immediate load) endosseous root form implants directly thru the mucoperiosteal tissues and into the bone (Has anything really changed in implantology since the '50s, '60s, '70s, and '80s?)
7. Introduction of endosseous implants for posterior anchorage in Cl.II Division II cases of adult orthodontia when no posterior teeth were present (1970)
8. Classification of bone—Linkow (1970)
9. Photo-elasticity studies (1977)
10. Harvesting bone from the symphysis to be used as bone grafts for maxillary ridge augmentation, infrabony pockets, apical lesions, sinus lifts, etc. (1970)
11. Reevaluation of the endosseous blade/plate form implants regarding its obvious advantages of immediate loading, simplicity of parallelism of their prosthetic posts, and patient's immediate satisfaction.
12. Histological sections using eleven different stains for biopsies showing more than 70 percent bone to metal interfaces of blade implants that were removed with bone blocks because of neck fractures after being into immediate function for as long as nineteen years and three months.
13. Nerve repositioning without the destruction of the "precious buccal plates" of bone.
14. Full-arch stabilization for the ideal fixed prostheses over endosseous implants (1963)
15. Clinical observations of bone regeneration over the "shoulders" of endosseous blade/plate form implants as early as three months postoperative (1968)
16. Prefabricated fixed prostheses that are placed into immediate function the moment the implants are inserted (1964)

17. The use of sterile, fast-setting plaster as barrier membranes covering the implant sites (1970)
18. The use of gold guiding templates for proper positioning and angulation of root form implants into bone and then immediately using the gold templates and the prefabricated full-arch prostheses for immediate function (1970)
19. Maxillary ridge augmentations with nonresorbable HA (1980)
20. Blade/plate form implants placed in knife-edge ridges of children with anodontia (1970)
21. Unilateral subperiosteal implants as posterior abutments.
22. Vestibular extensions versus maxillary implants when little bone exists.
23. The three-dimensional external oblique implant (used in those situations where very little bone exists in the mandible above the mandibular canal and a deep concave submandibular fossa exists lingual). The implant is placed buccal to the canal while its post is situated lingually for proper alignment with the teeth of the opposing arch.
24. The reentry three dimensional systems of implants as developed by Dr. Linkow to replace failing implants.
25. Full mandibular conventional subperiosteal implants as they were designed and used in the ’50s, ’60s, ’70s, and ’80s.
26. The mandibular tripodal subperiosteal implants as they were designed and introduced by Linkow (1984) for those cases where very little bone existed above the mandibular canals or especially in those cases of inferior alveolar nerve dehiscences. A unique surgical protocol was developed where no surgery was done in the areas of dehiscences and in only two surgical visits, three or four weeks apart, the patient not only receives the implant, but also the snap-on mandibular overdenture is delivered and placed into immediate function.
27. Ion beam sputtering of hydroxylapatite directly into the substructures of implants (Linkow 1990)
28. Angulated abutment posts with their screws in systems exactly as they are today.
29. The very latest most advanced and unique root form system today.



A panoramic x-ray showing the uniqueness of the mandibular tripodal subperiosteal implant.

Dr. Linkow is the author of seventeen books on implant dentistry and one autobiography. We strongly suggest you order the three most classic and comprehensive three-volume work, *Implant Dentistry Today: A Multidisciplinary Approach*, published by Piccin Publishers, Padua, Italy.

Subjects covered in above publications:

Volume I

The true history of oral implantology
Implant techniques
An overview and the reevaluation of earlier inventions
The tissues involved in implant procedures
The implant site
The endosseous blade-vent implant
Prospective and retrospective studies on the endosseous blade-vent implant

Volume II

Mandibular subperiosteal implants
The ramus frame and ramus systems of implantology
Maxillary subperiosteal and pterygoid extension implants
Tuber blades
The tripodal subperiosteal implant
Symphyseal and iliac crest bone transplants used for alveolar ridge augmentations for the support of endosseous blade-vent implants and subperiosteal implants

Volume III

Clinical procedures and features of the original ventplant implants
Reentry systems of implantology and their procedures
Intraoral implant cosmetic surgery
Fundamentals of implantology
Osseointegration, fibro-osseous integration, or osseovarigration?
Osseointegration? What's in a name?
The significance of sinus elevation for bone augmentation
Visions of the future
Procedure of the consensus development conference on dental implants
Osseointegration in oral implantology
This magnificent and essential work in three volumes with a total of 1,624 pages with 2,826 color and 737 black-and-white illustrations is available for $665.

Volume V

Implant Techniques and Implant Prostheses—a color atlas of all implant designs and procedures, also published by Piccin Pub., Padua, Italy

Frequently asked questions related to oral implantology:

1. Is immediate loading of endossous implants not new?
2. Did you know that endosseous blade/plate form implants can osseointegrate as much as root form implants can?
3. OK it's time to learn the surgical operative and prosthetic procedures for successful blade/plate form implantology, especially in shallow and knife-edge ridges posteriorly where no type of root form implant procedures are possible.
4. Don't you think it's about time to learn and understand the surgical procedures, the prosthetic devices, and the tremendous role that subperiosteal implants play in implant dentistry?
5. Are you one of those dentists who continuously augment ridges with bone grafts? Isn't it sometimes more practical to fit the unique type of implant to the remaining existing bone rather than reposition nerves, causing unnecessary paresthesias and inconveniencing patients for months waiting to complete cases which might have a high-risk potential just so a root form implant might be able to be placed? If you were efficient and well trained in subperiosteal and blade/plate form implants, you could easily complete these cases without bone grafts and without needing to include cat-scans.
6. How do you handle your implant failures? Is it a routine procedure such as removing them, leaving the patient edentulous and inconvenienced for many months, or would it not be more advantageous for you and the patient to immediately enter with another implant system which often places the patient back into an immediate state of function?
7. How about the placement of endosseous implants immediately into extraction sites?
8. What kind of occlusion is proper for the totally edentulous mandible or maxilla supported by only endosseous implants?
9. What if teeth are present? How is the occlusion addressed in unilateral situations?
10. When is the final reconstruction done with porcelain over metal or acrylic over metal and when not?
11. Wouldn't it be advantageous to reenter a bony site immediately after a group of periodontally involved teeth, a series of root form implants, or a failing blade/plate form implant had been removed and immediately replaced with one of the authors three-dimensional reentry implants such as the bi-blade which could replace the "blown-out" area?
12. Reevaluation of the endosseous blade/plate form implant
    A. Immediate load
    B. Simplicity in parallelism
    C. Overwhelming patient acceptance
13. The importance of bilateral stabilization in implant dentistry

14. Implant histology showing osseointegration with blade implants as much as any root form implants.
15. Don't you think you should go back to the basics regarding bone physiology, healing mechanisms, trauma, and bone morphology of the maxilla and mandible?

Upon completion of the course,
you will receive a certificate shown to the right:


The Linkow International Institute for Implant Dentistry

Accredited by the American Academy of Implant Prosthodontics hearby recognizes
Dr. _____ for completing the course of
_____
and successfully passing the examination, thus earning _____ Continuing Education Units

Held at: New York, NY, USA

Date: _____

Program Chairman

President

Dr. Francisco Manguri, director of the Linkow International Institute of Implantology
Bori, Italy

AN EDITORIAL: THE DILEMMA OF IGNORANCE—LEONARD I. LINKOW

To my colleagues from all over the world.

For a long time now, I have kept my feelings silent regarding the progress of implant dentistry.

When Dean Edward Kaufman of New York University College of Dentistry was still alive, he created the first and only endowed chair in implant dentistry which he named the Leonard I. Linkow Professorship of Implant Dentistry in perpetuity with me as the recipient. It was to be for the very first time in the world when all implant modalities and devices would be explored, used, and evaluated. Did this ever happen? Never!

All the academia around the world is "screw" happy. That's all they know, and the multimillion-dollar screw companies compensate some of them very well. So why should they not promote these screw companies?

Students today are only taught root form implants; so are the practicing dentists.

I just came back from lecturing at one of the maxi courses held in Portland, Oregon. I lectured for two days—the first one I spoke for seven hours. The students were amazed, stunned, and frustrated that they never heard a lecture from anyone on blade/plate form implants and subperiosteal implants. What a crime—what a disgrace to implant dentistry—what a disaster that the academia continues to ignore these incredibly magnificent implants, their procedures, and their longtime successes. Why has this been an ongoing secret? Because very few of the academia know the first thing about them.

Secondly, because the multimillion-dollar root form companies from their very beginning were feeding the universities with much of their armamentarium and some of their many "presents." So why should the universities not use them and report mostly positively as to their values?

Since there were very few blade/plate form implant companies in business that were "rich" enough to donate their kits, etc., to the universities, they were ignored and overlooked and hushed to silence or looked upon with negative remarks. Then again, isn't it easier to give a weekend course on screws and then sell ten to twelve screws per edentulous jaw to the students for an excellent profit and much easier than if they had to teach in the same weekend how to place blade implants and then only have to sell three or four for an edentulous jaw at even a cheaper price per implant? Unfortunately however, the dentists would rather place in ten to

twelve screws rather than three or four blades which would accomplish the same results but these dentists would make much more money placing in the screws.

What about subperiosteal implants? These are some of the most magnificent and helpful implants ever used especially the tripodal mandibular subperiosteal implant that I introduced to the profession in 1984, twenty-five years ago. But why would these "nonshelf" implants be popularized by these screw companies?

There is no way that they can make one penny because they cannot sell them. These are implants that have to be designed by dentists and then cast in vitallium or titanium by technicians.

I remember in the late 1960s, when none of the dental universities invited me to lecture on implants. I was very fortunate to be given that chance at the Institute for Graduate Dentists which was situated on West Sixty-seventh Street and Broadway in NYC. There was only room for fifty seats, but there existed a sliding back wall that allowed another fifteen seats. I gave three to five courses each year for about five years, and the dentists were breaking down the doors to take my courses.

Strangely enough no oral surgeons ever appeared which lead to their demise. The general practitioners took these courses and did many implants which eventually gave them the courage to do apicoectomies, third molars extractions, and many more of the surgical procedures that they would originally refer out to the oral surgeons. So for a good number of years they were hurting financially pretty good.

Then came the savior! Branemark and NoblePharma did some brilliant research which led them to realize that the oral surgeons were starving. So they did a two-fold move. They first downplayed all screw, blade, and subperiosteal implants claiming they were no good and then presented their "osseointegrated" root form implant that must first be buried in bone for three to six months and be placed into bone with slow running contra-angles, and it came off a great success, and they only allowed these starving oral surgeons to use their implants; and naturally they all jumped on this bandwagon. Today, of course, NoblePharma is pushing immediate loaded implants which were my procedures from the very beginning.

So this tells just a small part of the story. For one not to do blade/plate form implants or subperiosteal implants is like telling a patient who is blind that there are no ways to restore his sight when there are.

Dentists who teach implant dentistry in universities or to study groups or congresses that continually ignore the benefits of these other implants are not only short changing themselves but also even more importantly short changing their patients.

You all have been brainwashed (Branewashed) by the multimillion-dollar marketing companies, and you all fell for it. You should be ashamed of yourselves—all of you.

To continually push the envelope beyond its limitations so bone augmentations can be used anywhere, just so they could create an arena for the placement of some root form screw rather than place a properly designed implant type to fit the unusual remaining bone is going way out of line.

I was always hoping that the tremendous amount of pioneering work I had done in implant dentistry would someday allow the future field to fall on fertile ground. It's still not too late.

I can be as vocal as I want in the above editorial, as I am completely free of any financial gain from my statements, nor do I intend to receive any monetary considerations in the future. My statements are based on my extensive surgical experience with root form, blade, and subperiosteal implants, and my dedication to those patients who are in desperate need of implant therapy.

The past does not impede the progress of the future, but rather enhances it. Without a past, there can be no future. I would like all future dental school graduates throughout the world to have a comprehensive knowledge of oral implantology so they can offer their patients the luxury of choice.

Linkow and Chercheve (Paris) who was responsible for introducing the very first coordinated system of implantology to the profession.

When I was young I had the courage to do some unusual things. Seen on this x- ray is a "Star of David Implant" that I designed and placed in the mouth of an Athiest.

EPILOGUE

Reflections On Implantology And Human Emotions

My very dear colleagues,

It is indeed a great pleasure for me to share your thirtieth anniversary of your very respected DGZI academy. These thirty years flew by so rapidly since Hans Grafelman and I gave the first seminar with only a handful amount of colleagues.

I cannot express in words how much I wanted to be here with you sharing this momentous occasion.

I could have kept implantology to myself in the early sixties when I introduced the first self-tapping ventplant screw implant to the profession in 1963, followed by my blade implant in 1967, but I choose not to. Instead, I traveled around the world many times as a missionary to spread the gospel, hoping that one day it would become a discipline that would be respected throughout the entire nation. Little did I know how far-reaching the art of implant dentistry would go.

The advancements made in this field were far above my wildest dreams. I am so very proud of so many of you, who have made such penetrating contributions.

One person above all stands out to me over all the rest, and he is the one and only Carl Misch. Do you know what else this man has done beside his contributions that you are aware of? In 1983 when I had to undergo quadruple bypass surgery, which kept me away from my practice for three whole months, he volunteered to run my practice and refused to accept any money. I'll never forget his kindness, support and respect he had given me. God bless you, Carl.

My dear friend and scholar Emanuel Chanavaz, to me you have one of the most brilliant minds in medicine and dentistry that very few others possess; and your students, I know, have great respect for you. However, you must take your eyes off the women because they have a direct effect on your concentration! Only fooling of course, so don't get nervous. I always admired you, Manuel, with great respect and admiration.

Hans Grafelman—it was you who kept the Linkow seminars alive from the moment the DGZI was formed for twenty more years. They were great years we spent together.

Manfred Lang—I am very proud of your expertise and accomplishments in implant dentistry and have kept abreast with the wonderful contributions that you have given, more than you realize.

But unfortunately, these were only the good sides of our professional triumphs.

Always on the other side of the coin were the nonbelievers, those dentists who tried to do everything to tear us down.

Was it all worth it, to butt heads with the Luddites, the know-it-alls, the resentful and envious? On principal, yes. But practically speaking, given the frequently cynical and self-serving human nature, I don't know. Too many times it was like shoveling sand against the tide.

Eric Frown once wrote, "There is perhaps no phenomenon which contains so much destructive feeling as moral indignation, which permits envy or hate to be acted under the guise of virtue."

Are you familiar with the tale of Sisyphus, condemned for some transgression to forever push a huge boulder up a hill?

I have climbed many mountains during my career thinking that with each success I would be happy at the achievement. But at the summit I have often found myself alone and either too tired to continue or too consumed with explaining why I had to be first, or why someone else didn't get the chance, or defending myself against those who simply didn't or don't realize that I am not their proper adversary.

To my mind, in the end, the color green is beautiful because it signifies the attempt, the journey, and not the summit. But many of the hills I climbed were anything but green—barren or water-deprived, rocky or steep; they were not always hospitable to wayfarers like myself trying to rise above the din below.

It is strange how certain events or dreams remain in the mind and heart throughout our lifetimes, long after others have turned to haze or fallen into the void. One such event has haunted me from the age of eleven years old, spending my summer at a sleep-away camp.

Often I would gaze at one of the several distant mountaintops that overlooked the campsite. *How exciting*, I thought, *it would be to climb to the summit and gaze down into the valley below. What*, in my daydream I wondered, *would it be like*?

One morning all the campers were scheduled to go on an all-day hike. We were not told where we were going. It was a mystery destination. First we piled on a bus for a slow-motion drive that seemed unduly long (but in fact was only a couple of miles). Finally the bus stopped, and we filed out. Led by the adults, about twenty children began to walk up a gently sloped path. It occurred to me that the landscape looked familiar. Then I realized that we were climbing up the very mountain that had caught my eye from camp. The venture was like waking up from a dreamy sleep and then entering a new reality that was exactly as I had imagined it to be! I was thrilled!

At last we came to the end of the road which marked the summit. Peering down the steep undulating hill that seemed to me as big and as wondrous as the day of its creation, I saw a small house with a white fence and patches of multicolored hollyhock flowers growing all around. Like out of a fairy tale. What a beautiful view the people who live there must have, I thought enviously. My gaze wandered and beheld a magnificent view of the valley. Extending

for miles in all directions, it was as vast as I had imagined. What made for an even more breathtaking sight was the checkerboard pattern of the terrain. Farmhouses of various colors dotted the valley like jewels on broad swatches of green velvet interspersed with fields of corn and other crops. And with the sun high in the sky shining so brightly, the many lakes below had taken on the aspect of melting pots of gold. It was a sight that I will never forget.

It seems to me that I have lived my whole life trying to get to the top of the mountain and discover what is on the other side, to find what is hidden beyond the next hill, and the next, and the next, and the next, to attain greater achievements, no matter how impossible they may have turned out to be. In many ways I am still that eleven year old kid setting out for the summit, eager to discover whether the vision I hold in my imagination will be equal to the sight that finally greets me when I arrive there.

It had been far from easy for me all those difficult years while remaining on the cutting edge of dentistry. If it were not for implants, dentistry might still be an archaic profession consisting of plugging fillings and making removable partial and full dentures. The profession was just not ready for implantology in the fifties, sixties, and seventies. The importance of what words will follow must be repeated because of the significance for future generations.

It is amazing that by two or three years of age children have many of the traits—expressions, gestures, temperament, likes, and dislikes that form their identity for life. One can't help but wonder about the many mysterious factors of environment and spirit that come together to create a personality.

I believe that we live for many reasons, but one of the most important, certainly the most sacred, even one of biological imperative, is to pass on what we know and believe to subsequent generations. That transfer begins most intimately with our children and their children. Some will succeed. Unfortunately, many will not. But that is life.

Looking back over my own life, I have come to the realization, however clichéd it may sound, that we are all burning candles in a wind over which we have precious little control; and I said this long before Elton John wrote his song for Princess Diane. We are born; we grow and mature and contribute our light. And then it's over. It is snuffed out, or it flickers for a while, slowly diminishing. While we are here, some of us give sixty minutes of every hour, always seeking what is out there to share. These lucky few have the ingenuity, skills, creativeness, belief, and fortitude to strive on against imposing odds and the pressure to conform. They attempt to invent or create something that one day may have significant value—a new device or method, an opera or novel, some profound insight. Just a few can give those sixty minutes from each hour to create something that can inspire thousands, or improve the quality of life, or make our society better, whether it be in medicine or any other walk of life. How greatly or for how long they will be appreciated, if at all, it is part of the equation. If their contributions are to have any effect, ideally while they are alive, there has to be a degree of acceptance among even members of groups that may be inclined to resist. I have found that often those groups are partly comprised of souls who give very little to their profession, but expect a lot—influence, prestige, money—in return. Some of them get it, but they remain disappointed that life was not better for them. This may come from a suspicion that they were not all they believed

themselves to be, that much of the gratification they received was in trying to deny others what they could not attain themselves. These people have all the answers from the questions that for some reason they choose not to understand. Einstein once said, "Great spirits have always encountered violent opposition from mediocre minds."

None of the striving is done without cost. To turn the huge wheel requires great effort, especially in this complex and competitive world we have created. Straining against the opposing efforts of forces who refuse to concede, the strivers find that much of their energy is spent just thwarting the untoward criticisms of their self-appointed adversaries.

That is not the ideal path to progress. That, indeed, is a prescription to silence many worthy voices. The majority are fools, but they make the rules and the rest are under pressure to practice or at least endorse methods they repudiate. To do otherwise means pushing against the wheel.

At each point of the wheel burns a candle with a delicate flame. The small fire needs to be carefully nurtured with spirit, discipline, and determination. These qualities are vital. But not easily maintained or applied. It shouldn't be taken for granted that they will come to us at all, or remain once they arrive. They are gifts, but they are not free.

We must climb the mountains to take them and climb still others to prove we are worthy of them.

So how green were my mountains? I have had my days of glory, my thrills and memories. I even have a few left to enjoy. But at this point, looking back down the years, I must ask myself if it was worth the cost.

I have found that when one is successful, many want to share the rewards, to bake in the spiritual sunlight pouring through one window in a darkening room full of people. But when the rough periods come, many helpful and even loyal allies seem to recede into the shadows or leave the room, apparently concluding that to get the appropriate recognition, their energies are best directed elsewhere. That is why many of the dentists practicing today, even though they know me, or know of me, are so often so quick to denigrate my methods—but would not know me in the street.

Shouldn't one know his enemies to see if they are really so disreputable? Many of these people have spent their time going, wrongly into what they believe are greener pastures. They don't go out on a limb, don't risk the disapproval of their peers, and have not frequently called to ask our advice. By this, they imply that they know better. Or rather, they are compelled to take someone else down in order to build themselves up.

I had received many letters over the years from patients who praised me for restoring them to the pleasures of life. And living without pleasure is not much of a life, they imply, so benefiting from my work is for them often a kind of epiphanous experience.

I offer this one letter from one of my Manhattan patients, the widow of an older dentist to whom I had also taught implantology, that bears proof of a refrain I have heard over and over again in my four decades of practice.

Dear Lennie,

It is rare to find a doctor with total dedication, meticulous attention to detail, and extensive knowledge of your profession, combined with kindness, compassion, and humor.

You are truly a humanitarian spreading knowledge around the world.

Thank you so much for all the care you have given me. I lucked out when we became friends and I became your patient.

With love and eternal gratitude.

Martha

Last week as I prayed in Synagogue during the most holy holiday in the Jewish religion called Yom Kippur, I came across a beautiful poem which I wrote down after the Holiday and now wish to pass on to you.

My Mother and Dad and Dr. Ole Krogsgaard Jensen
(Copenhagen, 1978 President of Danish Academy of Oral Implantology)

My parents and I

Birth is a beginning
And death a destination
And life is a journey:
From childhood to maturity
And youth to age;
From innocence to awareness
And ignorance to knowing;
From foolishness to discretion
    And then, perhaps, to wisdom;
From weakness to strength
Or strength to weakness—
    And, often, back again;
From health to sickness
    And back, we pray, to health again;
From offense to forgiveness,
From holiness to love,
From joy to gratitude,
From pain to compassion,
And grief to understanding—
    From fear to faith;
From defeat to defeat to defeat—
Until, looking backward or ahead,
We see that victory lies
Not at some high place along the way,
But in having made the journey, stage by stage,
    A sacred pilgrimage.
Birth is a beginning
And death a destination.
And life is a journey,
A sacred pilgrimage—
    To life everlasting.

In conclusion I will say that:

There are some of us who make things happen, and there are some of us who watch things happen, and there are some of us who say, "What happened?"

May God bless all of you giving you continued good health and success in your practices.

Occasionally a new book about oral implantology, presenting material never before published, attacks with total accuracy. This is the case with *The Legends of Implant*

Dentistry with the History of Transplantology and Implantology. It is the finest book on the history of dental implants published to date, and will probably remain so for a long period of time.

The author, Dr. Leonard I. Linkow, is considered by many of his colleagues as the "Father of Oral Implantology." In 1982 New York University College of Dentistry created the first and only endowed chair in implantology in perpetuity with Dr. Linkow as the recipient.

Part I includes a comprehensive account of the history of implant dentistry and transplantology starting in 2000 BC. The progress of prosthodontic replacement of missing teeth and the improvements in dental materials over time are covered in detail. The first modern dental implants are reviewed, along with the pioneers responsible for their development. Major books and articles on dental implants are listed in the extensive bibliography. Twelve historical paintings of oral surgical procedures are included.

Part II (The Pioneers) and Part III (The Innovators) contains bibliographies of prominent dentists and laboratory technicians who significantly contributed to dental implantology, and are responsible for the major advances that occurred over time. The biographical parts (page 259 to 320) contain 126 individual biographies and photographs.

Dr. Linkow explains that the reason he went so far back in time to compile the bibliography is it was those pioneers who helped pave the way that brought us to where oral implantology is today. Dr. Linkow stresses that implantology did not begin with the "newly founded" commercial root form implant companies or academia. Implantology evolved over many decades from those brave pioneers who had the dreams, beliefs, drive, and courage to take harsh and continual criticism from their skeptical peers.

The book is dedicated to Dr. Linkow's daughter Robin. The Foreword is prepared by Dr. Carl Misch and the Preface by Dennis Tarnow.

Copies of *The Legends of Implant Dentistry with the History of Transplantology and Implantology* can be purchased from Implandent Ltd, 198-45 Foothill Avenue, Holliswood, NY 11423, telephone 1-800-526-9343 or 1-718-465-1810. Purchase orders can be faxed to 718-464-9620.

New York University-College of Dentistry with the head of the medical librarian and the head of the dental librarian created the very first digital library of its kind in the entire world called the Linkow Library. It is free to millions of people throughout the world by merely pressing Linkow library.org on their computers.

What will be seen are thousands of surgical slides of all disciplines of implant dentistry with their unique reconstructions as well as legends underneath each and every slide. Secondly many live surgical procedures done by Dr. Linkow with a running "blow by blow" description of all his unique procedures are presented.

Anything and everything needed to learn about implant dentistry will be included in the magnificent and gigantic visionary presentation. If one chooses to remain on the computer for eight hours a day it would take close to two whole years to cover and digest the overwhelming material.

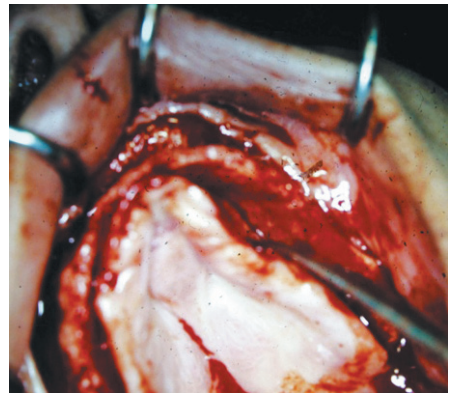
Remember, all this is for nothing!

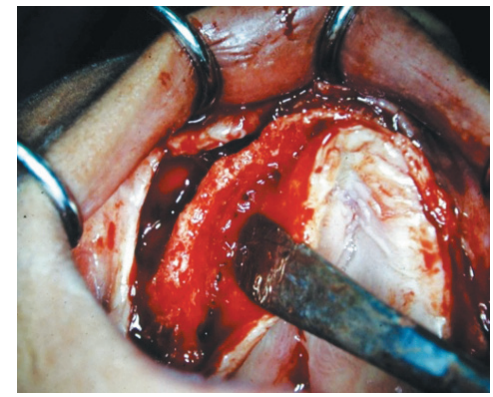
Just plug in to "Linkow library.org." There is nothing in the entire world that compares to this monumental work!

At this very moment I wish to add another magnificent procedure that I developed for totally edentulous maxillae where severe anterior and posterior undercuts appeared which contradicted doing maxillary subperiosteal implants.

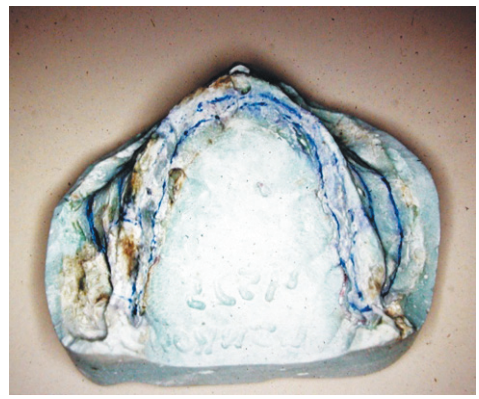
UGO PASQUALINI WITH LINKOW

Dr. Anastasov is a great friend of mine whom I hold a great deal of respect for. He is one of the finest maxillo-facial surgeons that I have been fortunate enough to be close to.

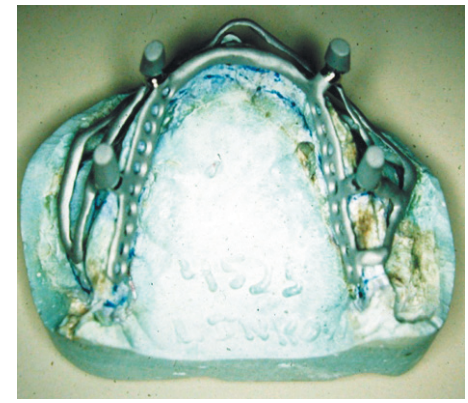




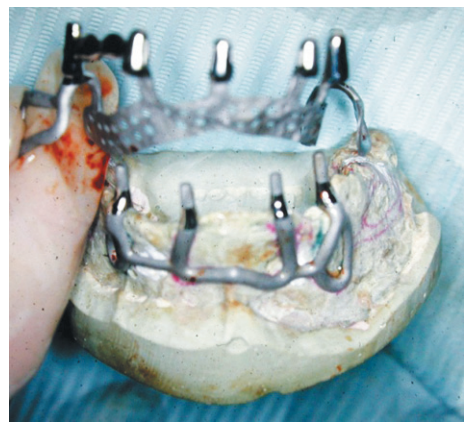
Notice the severe labial and buccal undercuts that prevent a one piece subperiosteal implant from a proper fit.



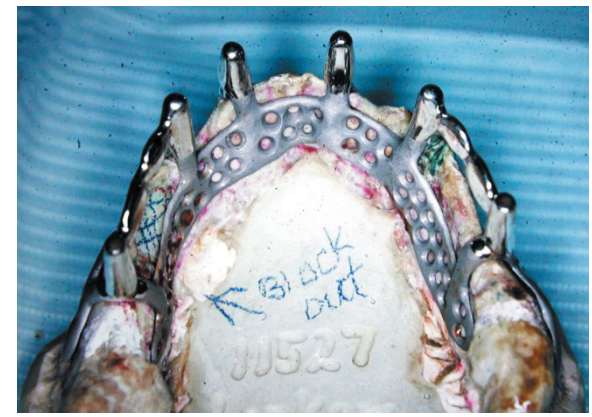
The master model showing the severe undercuts



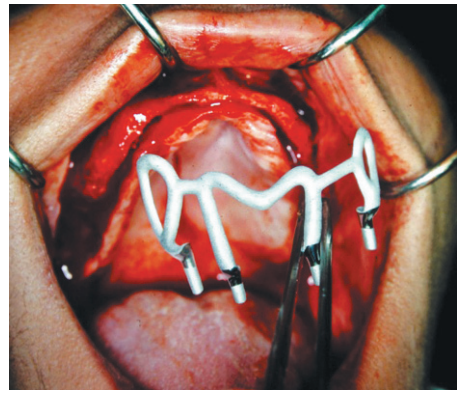
The implant cannot fit properly



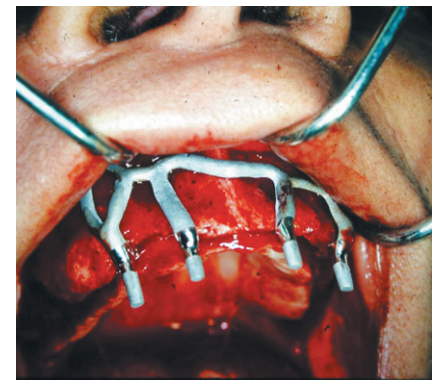
Linkow developed the two piece maxillary subperiosteal implant



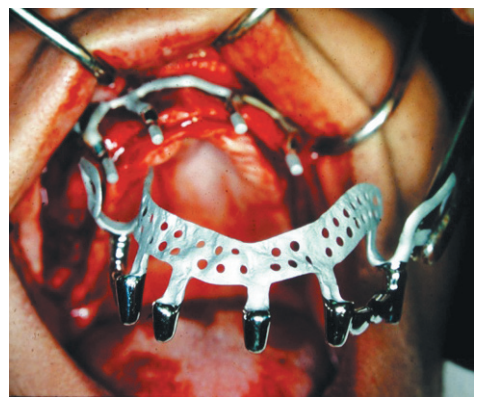
The exact fit of both parts



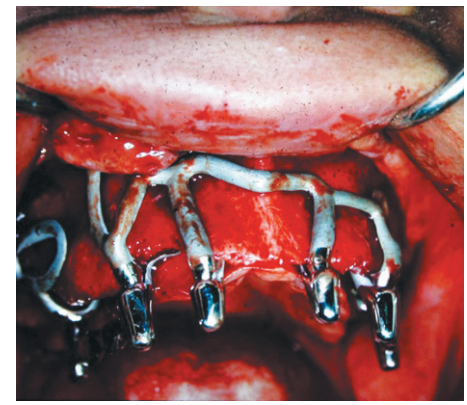
The Anterior portion is brought to the mouth



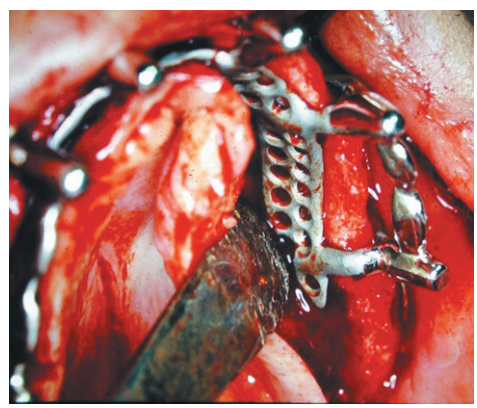
The exact fit of the anterior framework to the anterior labial bone

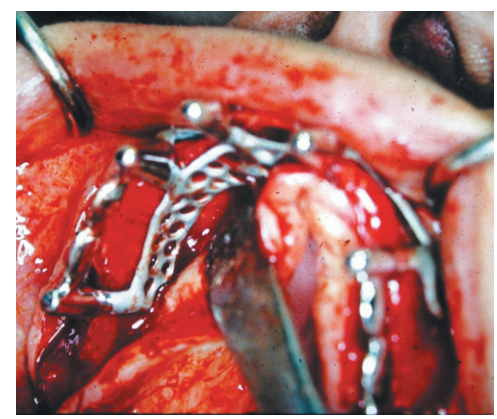


The palatal portion contains hollow posts which join over the posts of the anterior casting. Also, it includes a broad fenestrated strap that resists the anterior thrusts of the tongue as well as the lateral forces from the eccentric movements of the mandible.

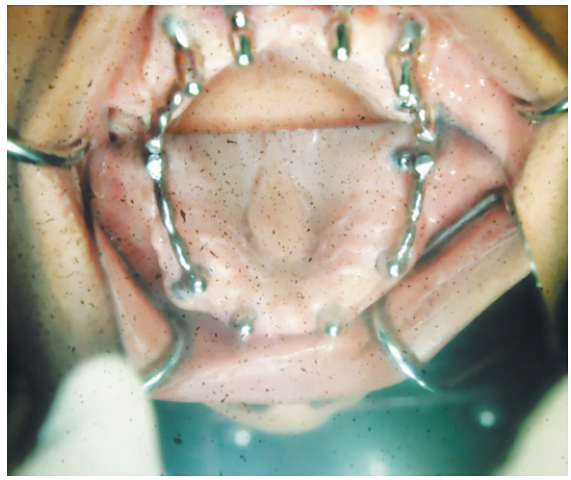


The exact fit of the palatal portion to the anterior posts of the anterior framework





Both sides of the posterior fenestrated struts can be seen flush against the left and right palatal sides of the bone.

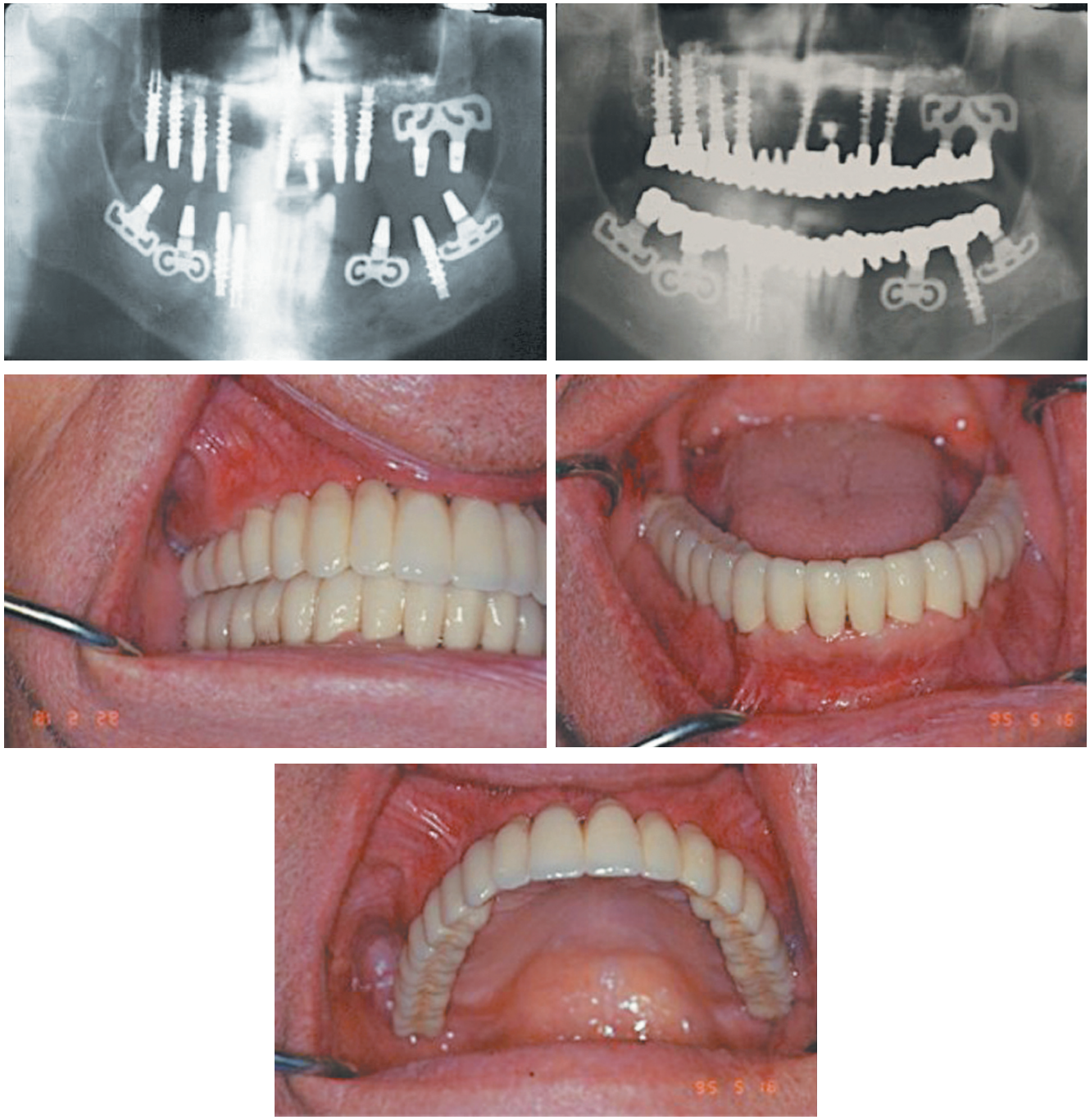


The healed tissues

The occlusion

The happy patient

The post operative panoramic X-Ray showing the two piece maxillary subperiosteal implant and four mandibular blade implants—Supporting a full lower full arch prosthesis



A combination of various type implants done in two stages.

Manlio S. Formiggini introduced his implant in the mid 1940's. It was fashioned of an inert tantalum wire put back upon itself to form a series of spirals and the two ends will be soldered together to form a post.

Ugo Pasqualini and Linkow

The True History of Oral Implantology

Prehistoric Attempts

The greatest strides in the field of oral implantology have been accomplished in the last five decades. Until recently, implanting alloplastic materials into human jaws was considered highly experimental. The breakthrough, however, was inevitable. During the past fifty years a tremendous amount of knowledge had been acquired in the rapidly growing field of implantology.

Early implantology was mostly transplantology. However, there is more tangible evidence in archaeological findings that show the ancient Egyptians, Greeks, Etruscans, Romans, Chinese, Indians, and Arabs used tooth transplantation procedures.

Most probably, they used allogenic transplanted teeth which were taken from the poor or slaves and reimplanted into wealthier patients for some fee given to the tooth seller as well as the "implanter." Various animal teeth were later used such as sheep, goats, dogs and baboons. They also used carved ivory and precious metals for the first dental implants. Tooth reimplantations gained some popularity with varying degrees of success in the middle 1500s.

A pre-Columbian skull is exhibited in the Peabody museum at Harvard University showing a carved stone that had been implanted into the lower jaw of some desirous patient. During the pre-Columbian time in the Americas, Indian relics were found exhibiting tooth transplantation and replantations with fillings of gold discs and jade.

In a museum in Peru, there exists an Inca skull with all thirty-two individual quartz and amethyst tooth implants. These teeth were implanted before the great Inca, 800 AD. Consider this is 1000 years after the Mayan discovery and over 1000 years ago.

The Chinese Emperors Chin Nong (3216 BC) and Hong Ang-Tu, as related by Darby in his published work in 1863, gathered all the medical treatments that enjoyed great favor during their time, such as acupuncture, gold and silver needles, and selection of areas and dental transplants.

Probably the first person credited with a written paper of transplants as a means of replacing missing teeth was the Arabian surgeon Albucasis de Condue (936–1013). He also included the use of implants made from oxbone. During the next two centuries barber surgeons in England and Europe were previously responsible for tooth transplantation operations.

In his book, Albucasis de Condue stated that when a maxilla was broken, and its teeth come out of their sockets, it is necessary to place them back into their original sites and keep them there by means of small bamboo rings intertwined by gold and silk threads. This is the most ancient record of dental transplants together with the previously reported news relating to the Mayas. (It must have been a very ancient practice, even though ancient remains, necropolises, sarcophagi, etc., have not revealed anything really substantial.) But even without reverting that

far back in history and to so distant countries, in Abulcasiz di Zabra's "Chirurgia" (Cordova 1 106-1 112) we read that "pullen teeth replaced and tied can be kept in place, or else teeth can be made from cow's bone."

Another early investigator of tooth transplants was the Frenchman, Ambroise Parefin. In 1530 he stated, "I had it reported by a credible person that he saw a lady of the prime nobility who, instead of rotten tooth she drew, made a sound tooth drawn from one of her waiting maids at the same time to be substituted and inserted which tooth in process of time as it were taking root grew so firm, as that she could chew upon it as well as any of the rest."

The Englishman, Charles Allen, did not agree with the concept of the "haves, getting teeth from the "have-nots." In 1687 Charles Allen said, "Taking out the rotten teeth or stumps and putting in their places some sound ones drawn immediately out of some poor body head—I do not like that method—it is only robbing Peter to pay Paul."

However, Allen was not against transplantation of teeth; he only objected to the current method at that time. He considered a better and more profitable method to be "xenogeneic" tooth transplants, transplanting the teeth of "brutes" such as sheep, goats, dogs, and baboons to human jaw sites.

Others followed, such as Bourdet in 1768, Gardette in 1827, Vassey in 1861, Thompson in 1881, Younger in 1886, Fredel in 1887, Curtis in 1890, Mendel-Joseph in 1890, Fletcher in 1891, Fuller in 1899, Farret in 1901, and Wilkinson in 1917.

The French dentist, Pierre Fauchard, the father of dentistry, in 1728 showed for the first time a protocol for reimplantations of teeth that required the recipient be young in age with healthy gingivae, and that the transplant be completed as quickly as possible.

The foremost proponent of tooth transplantation was the Englishman, John Hunter. In 1778, he discussed tooth transplantation in his book on teeth. He remarked, "Success of this operation is founded on the disposition of all living substances to unite when brought in contact with one another although they are of different structure even though the circulation is carried on in one of them. In a like manner a fresh tooth, when transplanted from one socket to another, becomes to all appearances, a part of that body to which it is now attached as much of the one from which it was taken; while a tooth which has been extracted from some time so as to lose the whole of its life will never become firm or fixed." Hunter disagreed with Fauchard over the use of teeth that had been extracted a long time previously.

Other investigators reported varying degrees of success ranging from one year (Fauchard) to four years (Hunter) and amazingly, ten to sixteen years (Pfaff and Taft). At that time, nothing was known about immunology and failure of transplants was attributed to poor mechanics and techniques. Gardette, Fauchard, and Hunter all believed the main cause of failure was related to the lack of conformity of tooth to socket.

Gardette stated, "If another tooth could have been found the root of which was exactly of the same length, size and form it might have been placed in the socket of the extracted tooth and it would certainly have become firm and have lasted as long as the tooth which had grown in the socket."

In the eighteenth century, an Englishwoman dentist became involved with tooth

transplantations. Her name was Mrs. De St. Raymond. She stated that she "transplants teeth from the jaws of poor lads into the heads of any lady or gentleman."

The Englishmen, Thomas Berdmore, in 1768 discussed transplantation as an expensive procedure. He said, "Transplantation is also immoderately expensive, for it is not to be supposed that any young person will sell a handsome tooth, to be torn out of his head, without being extremely well paid for the loss and pain."

Le Mayeur 1785 and 1786 implanted one hundred and seventy teeth but a Philadelphia dentist named Gardette claimed not a single one was successful. In fact, Gardette claimed he removed over fifty of Le Mayeur's transplants with his fingers.

Later, tooth implant materials were developed by Maggioli in 1809, when he used gold roots. Bugnot in 1886 successfully transplanted embryonic teeth into other areas of the same mouth.

Also, in 1886, Younger successfully transplanted a tooth into an artificial socket.

In 1887 Harris and 1888 Berry, implanted porcelain crowns fixed upon a platinum post around which lead was melted in a mold to resemble a tooth root. Other pioneers in tooth transplantation or reimplantation were Harris in 1887; Edwards in 1889 used platinum roots; Znamenski in 1891 used teeth made of porcelain, rubber and gutta percha; C. Payne in 1900 used gold and iridium pins; and R. Payne in 1901 used silver capsules. In 1915 Widman devised a method of autotransplantation of unerupted maxillary canines.

In more recent years, as information had accumulated about all types of organ transplants, interest in transplanting teeth revived. Chronologically, the most important animal experiments in tooth transplantation were undertaken by Huggins on dogs (1934); Hahn on dogs (1941); Willfane on rats (1942); Sapiro on cats (1945); Aveyon on salamanders (1950); Fleming on guinea pigs (1952); Sata on rabbits (1955); Agnew on monkeys (1955) and Cserepfalvi on dogs (1955).

Transplantation of teeth in humans were reported by Pafford (1955). Hale (1956) and Apfel (1956).

In Europe, Silvestrini, Biavati, Hammer, Bertolini, Andreasen, Emertsen, Clark, Mitchell, Cserepfalvi, Fleming, Fong, Nordenram, Widman, Axhausen, Hubert, Chercheve, and Azoulay contributed to tooth transplants.

Aside from animal studies, another factor in the renewed interest in tranplants was the development of tooth banks. Cserepfalvi, while in Hungary in 1934, organized the first tooth banks. Later he moved to the United States and continued reimplanting teeth taken mostly from his orthodontic patients who had to lose their bicuspid teeth.

Pafford in 1953 organized the first American tooth bank in Phoenix, Arizona. Later, a tooth bank began at the University of Tennessee by Siskin, who later had ventplant implants in his own mouth by Linkow, the author.

In the 1950s, the method of transfer of partially developed third molars into the extraction sites of first molars was popularized by the work of Miller, Apfel, Hale, and Clark and his coworkers. In 1955 Lew introduced the technique of autogcnic canine transplants for severe impactions.

Successful cases of replantation also were reported with the works of Tomkins (1921), Wilkinson (1926), Tilley (1933), Bodecher and Lefkowitz (1935), Azhausen (1936), Perint (1948), Kroner (1948), Alexander (1945), Maxmen (1945), Lovel and Hopper (1954), Butcher and Vidain (1954). Hammer (1955), Miller (1956), and Emmertsen (1956).

Linkow, Chercheve, Cullen

IMPLANT DENTISTRY—THE WAY IT SHOULD BE PRACTICED

1. Don't you think it is about time to learn and understand the surgical procedures, the prosthetic devices, and the tremendous role that subperiosteal implants play in implant dentistry?
2. Wouldn't you like to learn that endosseous blade/plate form implants can as easily osseointegrate as much as any root form can?
3. Understandily, therefore, don't you think it's time for you to learn the surgical, operative and prosthetic procedures for successful blade/plate form implantology—especially in shallow, knife-edge ridges posteriorly, where no type of root form is acceptable?
4. Isn't it a lot simpler to fit the type of implant to the remaining existing bone rather than reposition nerves, add bone, cause unnecessary paresthesias, inconvenience patients for months, even years, waiting to complete cases which have high-risk potentials just so a root form implant might be able to be placed?
5. Don't you think you should go back to basics regarding bone physiology, healing mechanisms, trauma, bone morphology that you do not want to tamper with, rather than tauting the aggressive root form companies that are only out to sell screws?
6. When root form implants fail and have to be removed couldn't you reenter these areas nine to fourteen months later with endosseous blade/plate form implants or subperiosteal implants to support fixed or fixed/removable prostheses?
7. Is it necessary to augment the mandible with synthetic bone when the neurovascular bundles are dehiscent? What are the advantages, if any, and how about the disadvantages?
8. What about destroying a good portion of the mandibular buccal plates of bone, as well as a great deal of the alveolar bone to first locate the mandibular nerve so it can be moved buccally followed by insertion of root form implants lingually while no buccal plate of bone remains to support them from the strong anterior and lateral thrusts of the tongue and excentric movements of the mandible? Would you accept this as treatment in your own mouth? Instead a simple operation making a lingual channel to avoid the canal for the insertion of a blade implant is indicated—or a unilateral subperiosteal implant.

9. The advantages and disadvantages of sinus lift implants with subantral bone augmentations in comparison with partial subperiosteal implants or two piece submergible osseointegrated blade/plate form implants will be discussed and illustrated on a very scientific, clinical, and morphological basis.
10. Are there any other types of implants to learn about other than root forms, blades and subperiosteal implants?
    A. How about Ramus frame implants?
    B. How about sliding cable symphyseal/rami endosseous implants?
11. Wouldn't you wish you were capable of treating the compromised maxillae?
    a. learning how to deal with the exposed antral floors
    b. sinus infections
    c. successfully closing the tissues beneath these dehiscences with or without the use of gold foil
    d. introducing intelligently designed subperiosteal implants avoiding these areas and obtaining primary intention healing?
12. Do different kinds of implants successfully function in the same arches together? Hundreds of cases will be shown, illustrating to you that they certainly can.
13. How about the support from endosseous implants in posterior edentulous areas in CL.II division II cases for the ability to use intra oral rubber bands for orthodontic movement of the teeth.
14. How about the use of blade/plate form implants for the reduction of bone fractures?
15. What about histological sections taken from humans and not dogs and do they show osseointegration, fibroosseointegration or fibrous integration and for how long a time? How about nineteen years and three months or 988 weeks showing a blade/plate form that was placed into immediate function with three other blades in a totally edentulous mandible showing better than a 72 percent osseointegration with not a remnant of fibrous tissue in the other areas? How about comparing this to root form implants placed into dogs for a period of from eighteen to twenty-four weeks and placed into function for only one week with about 44 percent osseointegration?
16. Do you splint osseointegrated implants to natural teeth?
17. How about the occlusion with implant supported bridges? When is porcelain, acrylic, or metal used and when not?
18. Cat scans—are they necessary?
19. Wouldn't you like to do maxillary vestibular extensions in edentulous maxillae that really work?

20. Two hours of morphology and anatomy of the maxillae and mandibles.
21. Cinefluororadiography showing numerous "moving skulls" with implants.
22. Reevaluation of the endosseous blade/plate form implant regarding:
    a. immediate function
    b. simplicity in parallelism
    c. instantaneous patient satisfaction
23. Full-arch support for bilateral stabilization of all implant cases.

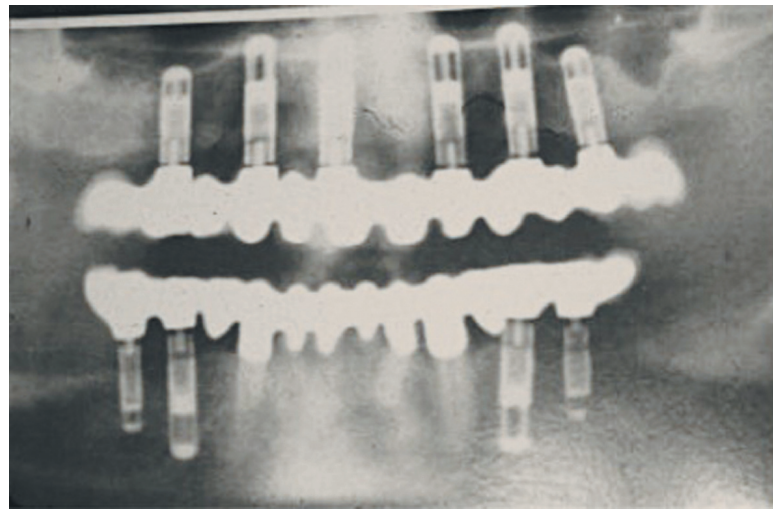
Familiarizing the students as to:

1. Resorptive patterns that take place in the edentulous maxillae and the changes in the maxillary sinuses so that you will know where, how, and the directions endosseous implants would be placed and how to successfully design subperiosteal implants that are predictable.
2. The dehiscent mandibles and the best way to handle this atrophic situation without even involving the exposed nerves using tripodal subperiosteal implants.
3. Placing blade implants into multiple open sockets and thru the dense cribriform plates giving even more immediate support than when inserting them into virgin medullary bone.
4. Knowing exactly how to deal with implant failures and rapidly placing the patients back into a fixed state of function without inconveniencing the patients for months and possibly forever and then doing nothing.
5. The simple approach to sinus elevation procedures with subantral bone augmentations.
6. The Linkow self-tapping (the first) ventplant screw-type implant, as well as his self-tapping osseovent press fit/tap-in antirotational root form implants. The uniqueness of all three endosseous implants is their self tapping features and the large apical vent surrounded by the nonthreaded struts and hollow apical rings. All these features allows for the cut bone to migrate thru the sleuce ways and become deposited inside the vents thus taking away pressure from bone chips that are crushed against the surrounding bone with all other systems that do not have these features. The Linkow system of screws act as a hydraulic system regarding the allowance of the exit of dead bone cells, bacteria, debris, etc., immediately after their insertions by allowing their exit back through the sleuceways and into the oral cavity.
7. The multimodal approach showing that three and even four different implant systems can symbiotically function in the same mouth for decades.
8. Three dimensional implants such as the bi-blade and external oblique blades for reentry into previously failing situations and for going buccal instead of lingual to the canal when severe submandibular concavities exist.

9. The successful surgical, operative, and prosthetic procedures for successful blade/plate form implants, especially in shallow knife edge ridges posteriorly where no other endosseous implant can be used and knowing that they will osseointegrate as well as any screw or root form.
10. Teaching the basics regarding bone physiology, healing mechanisms, trauma, bone morphology (that you did not want to tamper with) rather than tauting the aggressive root form companies that are only out to sell screws.
11. Isn't it a lot simpler to fit the type of implant to the remaining existing bone rather than reposition nerves, add bone, cause unnecessary paresthesias inconvenience patients for months, even years, waiting to complete cases which have high-risk potentials just so a root form implant might be able to be placed?
12. The tripodal subperiosteal design combines a harmonious union of a delicate surgical and impression technique with advanced biomechanical considerations applied to the mandible.

    The mandibular tripodal subperiosteal implant originally conceived by Linkow in 1984 (although he did one other one in 1967 to save another implant). In its present design it is indicated for the edentulous patients with advanced mandibular atrophy who could not be successfully treated by endosseous therapy without significant prior bone reconstruction. Wearing a conventional denture in advanced mandibular atrophy may cause severe pain from direct pressure to exposed nerves. Denture retention is frequently minimal and the ability to masticate is compromised. Secondary systemic problems related to the inadequate mastication often occur in these patients with digestive disorders.

    Psychological or emotional effects are common, causing depression and social withdrawal. These patients are truly debilitated and qualify as genuine dental cripples.
13. Full-arch fixed bridgework for bilateral stabilization for most implant cases.



A panoramic x-ray showing Linkows tap-in/press-fit antirotational root form implants.

Implant dentistry today is not so much in how to place an implant into the bone and load it correctly but rather replacing a failing blade or a group of failing teeth or root forms and immediately replacing them with one of authors three dimensional reentry implants and placing the patient back into immediate function.

Reentering in the site of a failing endosseous dental implant often requires inventive and extraordinary, materials, techniques and procedures. When time is a major factor, considering the required surgical procedures, the necessity for integration before prosthetic intervention, and for the social or economic requirements of each patient, reentry with a procedure that would allow immediate function for that patient is mandatory.

In this regard, most commonly employed root form implants are not acceptable—they will require variable periods of a quiescent state before a prosthesis can be applied.

The blade-vent implants, however, being placed with very intimate bone contact can be immediately placed into function. Thus a reevaluation of the blade/plate form implants regarding:

A. immediate function
B. simplicity in parallelism
C. patient satisfactions instantaneous

The tridimensional bi-blade dental implant, a specifically modified design of a commonly used blade-vent dental implant employs the same intimate bone to implant contact, and is therefore, capable of being placed into immediate function.

The bi-blade reentry system has been in use since 1983. Success ratio comparisons reflect an approximate 98 percent positive persistence. One can conclude that this unique reentry system has a significant impact in the solving of one specific dental implantological complication—that of reentering and replacing failing endosseous dental implants.

This technique not only allows one visit reentry, but more significantly makes possible the placement of immediate prostheses for the patients involved.

Feigel (Swiss) and Linkow
Feigel was a great implantologist

The reestablishment of the true history of implantology and the pioneers that had played significant roles with its advancement will be thoroughly discussed.

1. Would you rather limit yourselves to doing only root form implants, which not only limit their indications, which unfortunately, would cause you to push them too far thus creating a serious situation where the treatment is far worse than the cure with very unpredictable results?
2. Wouldn't you like to know exactly how the maxillary bone resorbs after being totally edentulous and what happens to the sinus expansions so that you will know where, how, and the directions endosseous implants would be placed and how to successfully design subperiosteal implants?
3. How about your knowledge increase regarding the two-piece full maxillary subperiosteal implants to exactly fit against some of the severe labial and buccal undercuts that often exist in edentulous maxillae?
4. How about the dehiscences of the inferior alveolar and mental nerves that more than often occur in edentulous mandibles? Wouldn't it be a tremendous revolution if these patients could be fitted with a tripodal mandibular subperiosteal implant that supports a full complement of teeth? Wouldn't it even be more unbelievable if the surgical protocol was such that no surgery whatsoever had to be done in the areas of the dehiscences? And it requires only two surgeries—three weeks apart, and the patient receives his/her implant and overdenture and starts chewing immediately?
5. What about those multiple open socket areas where, instead of waiting months for healing so that root forms might be placed, instead, thin channels are made across the sockets and into the dense bone of the cribriform plates and lamina dura for the immediate support of blade/plate form implants?
6. How about your implant failures, Doctor? How do you handle them? Is it a routine procedure such as removing them, leaving the patient edentulous and inconvenienced for months and possibly forever or wouldn't it be advantageous both for you and your patients to immediately enter with another implant system that often places them back into an immediate state of fixed function?
7. Are you finally ready to commit yourselves in learning what implant dentistry is all about instead of burying your heads in the sand and repeating that only root forms work? It is about time that you become honest with yourselves and your patients and truly reeducate yourselves so you will hopefully be able to handle each morphological situation that presents?
8. Wouldn't it be nice if you can reenter a bony site immediately after a group of periodontally involved teeth, a series of root form implants or a failing blade/

plate form implant was removed with one of the author's three-dimension reentry implants such as the bi-blade which could replace the area?

9. Wouldn't you like to be able to augment a severely atrophied maxilla with nonresorbable hydroxyapatite so a better fitting denture can be used?

FIFTY YEARS OF IMPLANT DENTISTRY

L. I. Linkow

- Wouldn't you like to reevaluate your opinions regarding a multimodel approach to implantology?
- Has anything really changed since the '60s, '70s, '80s, '90s?
- Regarding implant classification—just how many implant root form designs that you thought were excellent are no longer available?
- When will you remove your heads from the sand and realize the very true need and values for subperiosteal implants and endosseous blade (NRI-narrow ridge implants)? Those whose heads remain in the sand develop burnt butts!
- Practically every implant design that you have been using were designed by the true pioneers nearly six decades ago.
- How about immediate function? This lecturer has placed over nineteen thousand documented implants into immediate function during fifty years of practice. The implants included from 1952—mandibular subperiosteal implants, from 1963, the Linkow self-tapping ventplant screw implant and from 1967, the Linkow immediate loading blade/plate form implants.
- How do you handle your failures?

What has changed in fifty years?

1. Better understanding of bone physiology
2. Implant surface treatments
3. Accuracy of machining (for matching parts)
4. Laboratory materials and techniques
5. Esthetic expectations
6. Marketing
7. Photoelastic stress studies of various implant designs
8. Implantology yesterday, today, and tomorrow
9. Surgical procedures for root form implants, narrow ridge (blade) implants, and subperiosteal implants

10. Linkow live surgery at the Chicago Mid-Winter meeting in 1973
11. Implantology in the ’60s, ’70s, and ’80s. Has anything changed?
12. Complications
13. History of subperiosteal implants
14. Cinefluororadiography showing numerous “moving skulls” with implants
15. Fifty years of implant dentistry

GUSTAV DAHL (Sweden)
The first to insert subperiosteal implants 1938

Norman Cranin – editor of AAID/AAIP Journal for many years. Cullen (Great Britain) and Linkow

Gustav Dahl seen at a Convention

FORTY YEARS OF EXPERIENCE IN MODERN IMPLANTOLOGY

Have We Gone Full Circle?

Leonard I. Linkow, DDS DMSc

Hundreds of thousands of patients can now take advantage of our experiences in the last forty years of modern implantology. The great explosion and widespread acceptance of our discipline is due in large part to a closer understanding between the original development of oral implant fundamentals coupled with our current refinements and advances.

Four decades ago, some of us were experimenting with screw design implants, needle implants, two-piece screw and cement-retained prosthetics, as well as various surface treatments. (1–8) What we may have lacked was predictable repeatable success. The last decade or two has changed that. We now have refined designs, greater accuracy of machine parts, advancements in surface treatment, knowledge of the value of screw torqueing components, and the development of ergonomic surgical protocols that can be accurately repeated.

Moments in History

The early designs, the first screw retained prosthetics, small diameter screws, experiments with surface treatment (HA), early blade and subdesigns all preceded the miniscrew-type implants that are being used today.

In 1963, the very first self-tapping root form implant was introduced to the profession. Prior to the endosseous Linkow Ventplant all other screw-type implants first needed special taps to create the osteotomy prior to the insertion of the implants.

Today the use of miniature dental implants has become a routine procedure in many dental offices. Their versatility, ease of placement, and multitude of uses make the "mini" a valuable adjunct to the dentists' menu of treatment options.

Fabricated from titanium alloy, present-day mini implants have diameters ranging between 1.8 mm and 3.0 mm. They are self-threading and efficiently penetrate dentin, cortical, and cancellous bone. Mini implants can be placed directly into mandibular or maxillary bone or anchored in the roots of endodontically treated teeth and extending well into the underlying bone. The placement protocol allows for minimal surgical intervention. Pilot holes are utilized to establish the proper path of insertion, and threading is accomplished by handpiece, ratchet, and/or a wrench, whichever technique(s) the procedure demands. Mini implants rely upon the

elastic qualities of both dentin and bone and are further retained by the intimate approximation and wedging forces of the implant threads as they cut their way into place.

These devices may seem to have appeared on the market spontaneously. In reality, their development has been deliberate with a long historical lineage.

In 1939, Dr. Strock reported a method of reinforcing anterior teeth whose roots are abnormally short as a result of incomplete formation or amputation necessitated by disease. His technique consisted of the surgical placement of a tantalum or Vitallium wire rod or pin implant inserted through the root canal and into the area where the original root existed. Initial results indicated that normal reorganization and regeneration of bone into the cavity and around the apical end of the rod took place. In the years that followed other doctors began utilizing endodontic implants between 0.7 mm and 2 mm in diameter in an attempt to duplicate and expand up on his results.

The Italian Manlio Formiggini introduced his own tantalum endosseous implant which consisted of a wire twisted upon itself in 1947.

Dr. Marziani in Italy, Drs. Souza and Bruno in Uruguay, Dr. Chercheve in France, Dr. Orlay in England, and many others began reporting substantial radiographic evidence that endodontic implants were well tolerated by the tissues and bone did regrow up to the implanted pin. Introduction of titanium alloys proved it to be the best material assuring biological compatibility as well as strength. They also found that histological features characteristic of an endodontic implant did not differ radically from other endosseous implants.

In 1962 Michel Chercheve, the younger brother of Raphael Chercheve, introduced the narrow ridge implant and was used often in narrower ridges in the early ’60s and ’70s and reported widespread clinical success in the literature.

The natural progression of these early findings led to the use of pins, rods, and threaded screws as endosseous implants ideal for knife-edge ridges and cases presenting a small amount of alveolar bone flanking a maxillary sinus or mandibular canal.

In the coauthored book, Dr. Leonard Linkow and Dr. Raphael Chercheve (*Theories and Techniques of Oral Implantology*, volume I, Mosby Company, 1970) reported on “a titanium screw post for narrow ridges that is along most of the shaft. Above the threaded part is a fairly long neck that extends from the alveolar crest through the mucosa. Up the post is a square head that fits exactly into a hand ratchet so that the implant may be worked into the bone, not driven into it. When the implant is in position, its protruding head is held firmly with a flat-nosed plier; and by virtue of the ability to bend the neck, the post can be made parallel to the prepared teeth and to the abutment posts of other implants.” Dr. Linkow went on to carefully describe his protocol for insertion of these types of implants. “Drilling instruments include a latch type contra angle with a water attachment and burs. A number 6 round bur or a spear-point bur is used for entering the bone” (these burs created a pilot hole). The bone may be approached either directly through the fibro-mucosal tissue or the tissue may first be incised and reflected, a preferable method. When the operator feels that the implant is starting to thread into the socket, he can switch from the ratchet to small pliers and continue screwing the implant into its correct position.”

Despite its clinical success, this implant design and its insertion protocol were largely sidetracked during the period following the advent of larger diameter screw implants in the late 1980s. The popularity and acceptance of wider diameter screw-type dental implants (approximately 3.3 mm to 6.0 mm, with the most popular diameter of 3.75 mm) presented its own challenge. The reported literature at that time discouraged their immediate loading. These larger implants required (and in many clinical situations still do) an extended healing period that leaves patients with less than desirable function and aesthetics, often for months at a time. Even the smallest diameter implant in this family, 3.3 mm (and coincidentally designated as mini dental implant by a number of the major dental implant manufacturers at the time) required a healing period during which time the implant has to be out of function. Since 1963, Dr. Linkow had been immediately loading all of his large diameter and small diameter endosseous implants as well as blade/plate form implants and subperiosteal implants. Necessity often is the mother of invention and invention is often a reapplication, redefinition, and enhancement of existing technology.

In the early 1990s, Bernard Weissman manufactured and marketed the first commercial application of the small diameter (1.8 mm diameter) screw postimplant concept; the Dentatus MTI or modular transitional implant. These implants could function as both an endosseous implant or as an endodontic implant. Dentatus was one of the leaders in the manufacture and marketing of endodontic posts and the company was well positioned to present this implant. Patent No. 5, 575,651 was issued to Weissman in November 1996. The purpose of this invention was to provide a system whereby patients who were receiving conventional implants would not have to remain edentulous while the dental implants were submerged and undergoing osseointegration.

In essence, a provisional bridge was fabricated after the placement of the "mini" endosseous implants. This provisional bridge would allow the patient to maintain the cosmetic features afforded by a provisional splint while also permitting functional events, such as speech and mastication to take place uninterrupted. The component that provided the anchoring mechanism for the provisional prosthesis was a post extending over the mucoperiosteal tissues from its underlying apical portion.

The small, threaded implants were designed to be placed directly into the bone "without the need of surgery to expose the underlying bone," just as mini dental implants are placed today and the same as the method recorded in the literature by Drs. Linkow and Chercheve in 1970 (*Theories and Techniques of Oral Implantology*, St. Louis, MO: CV Mosby Co., 1970, p. 6).

The patent and the MTI published protocol provided the dental implant community with a whole new dimension of provisional possibilities for this mini-sized implant. Its success, however, spawned an unintentional consequence.

A number of clinicians discovered what their predecessors reported many years ago.

Anatomical considerations sometimes present the clinical problem of placing a full sized implant in narrow ridges. Experimenting with the MTI in those situations, they found identical results reported by Chercheve thirty years before! The implant worked as an anchor

in bone in the same manner it does in a pulpless tooth root and/or underlining bone. When the mini implant is wedged in the bone and immobile from the outset, it can be immediately loaded and functions beyond the "transitional" period. The small diameter of the implant also allows for entry directly through the soft tissue (if desired), requires a minimal amount of drilling instrumentation, has a simplified placement protocol and perhaps most important of all, they are immediately functional and as a bonus these implants always have a maximum amount of bone flanking them labio/buccally and palato/lingually far more bone that flanks the larger diametrically screws.

One of the clinicians, Dr. Sendax, approached Dentatus with a request to expand their MTI implant labeling beyond its transitional status. Weissman and Dentatus preferred to concentrate their efforts on providing a modular-designed provisional bridge useful mainly in providing function to patients whose full-size implants were in a healing stage. These implants were clearly labeled and intended to function transitionally between stage one and stage two implant surgery.

Sendax continued his search and in 1998 entered into an alliance with Imtec Corporation, a dental implant company. They agreed to manufacture a Dentatus-like design; the Imtec Sendax mini dental implant, MDI. The company labeled their mini as ongoing and long term. A common 0-ball prosthetic interface previously marketed as a feature in endodontic implants, added to the implants appeal and made it ideal for denture stabilization.

A number of specialized companies acknowledged the implant's potential and began development of their own versions of a small diameter mini dental implant.

The 0-Company, the original patent holder of the 0-ball implant prosthetic interface entered the market with their version of the "mini implant" concentrating on their knowledge and expertise with this popular prosthetic connection. Their ISD, implant small diameter, is 3.0 mm in diameter.

The next company with an entry in the field was Sterngold. They offered the ERA implant, a small diameter implant (2.2 mm). It incorporates their well-known ERA overdenture attachment. The systems color-coded nylon made attachments provide for six levels of retention. Although the protocol for placement of this implant strays slightly from the original concept the implant remains loyal to the narrow diameter and self-tapping design. This was soon followed by the introduction of the mini drive lock, MDL, by Intra-Lock International. A global implant company, they introduced refined features to more closely resemble dental implants than endodontic implants. A sophisticated acid etched surface, a polished collar for periodontal health, improved body strength and an aggressive and specialized thread profile adds to its appeal. Their design is further complemented by the addition of drive-lock technology that allows for a streamlined and ergonomic surgical delivery and insertion protocol.

The mini drive lock also expanded treatment solutions with the introduction of a cementable abutment that fits over the 0-ball assembly and easily converts the implant from removable to fixed prosthetic options. The abutment's laboratory protocol matches customary implant crown and bridge prosthetic procedures.

As much as technological improvements have advanced features of the mini implant, the basic device and its surgical protocol remains surprisingly the same. Fifty years after Drs. Strock, Chercheve, Linkow, et al. first reported their success with small diameter threaded implants, patients in need of an additional modality of implant therapy benefit immensely from their efforts. The user-friendliness, versatility, and clinical success of the miniature implant guarantees its prominent position in the history of dental therapy.

Literature has shown that when used properly, those miniature implants can function just like larger implants. Osseointegration is not the privilege of larger implants; it is obtained with the right material, (titanium or titanium alloy), the right implant's surface, and other clinical considerations such as proper surgical and prosthetic protocol, which allows for stabilization and absence of micromovements throughout the healing process. Their limited diameter, however, implies reduced biomechanical resistance, and cases must be planned with this in mind.

Even though the ease and simplicity of the protocol is appealing, every implant dentist should carefully treatment plan. There is no one implant design to solve every clinical situation.

Dr. Holger Burkel - the doctor who was responsible for renaming the street in Kappel-Graffenhausen, Germany to Leonard Linkow Strassa

Gerhard Heim (Germany) Linkow, Raymond Gerard (Dr. Linkow's Technician) and Dr. Isiah Lew (great implantologist)

A REEVALUATION OF THE VERSATILE ENDOSSEOUS BLADE-VENT IMPLANT (NRI-NARROW RIDGE IMPLANT)

Leonard I. Linkow, DDS, DMSc

In the early 1960s, most of the implant designs were introduced to the world of dentistry by pioneers such as Formiggini, Peron Andres, Strock, Raphael and Michel Chercheve, Muratori, Jacque Scialom, Tramonte, Sami Sandhaus, Ugo Pasqualini, Linkow, and Lew.

Linkow in 1963 introduced the very first self-tapping screw implant called the immediate load ventplant. Prior to its introduction each and every screw just had to include a tap to thread into the bone before they could be installed. Due to its unique cutting features and large open vent to house the bone chips it took the pressure away from the surrounding bone. With all other screw implants the chips had no place to go which caused excessive pressure around the surrounding bone of most of the other implants that did not have these features. The Linkow ventplant was able to be immediately loaded from day one.

In 1967 Linkow introduced his uniquely wedge shaped and horizontally designed blade-vent implant which, if it were first introduced to the profession today, it, with no uncertainty would revolutionize the field of implant dentistry.

Marketing, unfortunately, has taken over very much of the dental and implant community.

Most of these multimillion-dollar implant companies pay large sums ($5000–$10,000 or more) per day to the many dentists for giving their "positive expertise" in relationship to the companies who they are lecturing for.

In simple dollars and sense—wouldn't it be extremely easier for these companies and "dentists on board" to teach the students over a short weekend course how to place screw implants and be able to sell them the very same day. Much easier I am more than certain than to try to teach them during the same weekend time table how to insert a blade implant?

But even more exciting to the implant salespeople is the fact that they can easily sell the neophyte ten or twelve screws for a totally edentulous mouth rather than only three or four endosseous blade/plate form implants to do the same job.

And monetarily speaking, a dentist who can place twelve to fourteen screws in the same jaw as compared to only four blades can immediately see the financial advantages of going with the root forms.

To me, this is a very unfortunate situation which will probably remain for a good number of years because today this is what the majority does and the majority somehow always tends to rule—like the sheep following the shepherd. Therefore, an honest reevaluation of the endosseous blade-vent implant is now being called to the plate.

The old saying, "What goes around comes around" is so true.

Just four of the dozens of qualities of the blade implant such as:

A. Immediate loading
B. Simplicity in parallelism of their posts
C. Immediate patient's acceptance
D. Long-term functioning should be sufficient

Regarding immediate loading, each and every blade I ever placed (in excess of seventeen thousand) was immediately loaded. Today, the profession is finally shying away from the Branemark two-phase surgery including Branemark himself and doing more and more immediate loading. When placing the implant into immediate loading it forms laminated bone which is much more stable than bundle bone which forms around the two-stage buried implants.

During the past ten years or so, there have been some dentists preaching the spreading of bone ridges with various-sized osteotomes. Exactly as the wedge shaped blade implants have been spreading and widening the bony ridges since 1967! When will they ever learn?

Regarding simplicity in parallelism of the posts, this is accomplished by gently bending the necks in a buccal-lingual or mesio-distal direction. No "off angled" expensive screwed in abutments which complicate the system even more and add on a financial burden.

Patient acceptance? If you were the totally edentulous patient needing implants would you prefer to suffer with a conventional denture compressing against the tissues covering the submerged screws and wait months before the case can continue or would you prefer to immediately leave the office with a prefabricated full-arch acrylic provisional splint or a chair side acrylic splint. I am sure you all know the answer.

As far as long-term function, there are many blade cases still functioning after thirty years.

Now that I was able to express myself, let's get into the physiology and specifics of blade implants.

Advantages of the Blade/Plate Form Implant. (NRI—narrow ridge implant)

1. Easily functions successfully—long term in shallow ridges.
2. Extremely successful—long term in severe knife edge ridges while widening these ridges by the wedging effect of its tapered body doing the same job that the hematomes were designed to do.
3. It offers the extreme advantage over all other implant forms to be immediately loaded.
4. The simplicity to parallel its posts to one another is a great advantage.

5. Most patients are amazed that they can leave the office the same day of surgery with a provisional acrylic fixed prosthesis.
6. Most blade/plate implant forms have more surface area contacting the surrounding bone than the root form implants have.
7. The blade/plate form implants allow the surrounding bone to heal much more rapidly than it does around root form implants. Why? Because being that the body of the blade implant is so narrow and filled with open vents, the bone flanking the labial and lingual surfaces of the implant are practically joining each other while the cut vessels merely have to cross from one side to the other to continue with the regeneration process—the distance being no more than 1 to 1.1/2 mm.

In contrast to this, the cut vessels that were damaged during the insertion of most of the root form implants have to travel a much longer way around the periphery to get to the other side of the implant thus delaying bone healing.

8. The blade-vent implant can function successfully with three different interfaces.
    a. osseointegrated—where at least 22 percent of bone contacts the implant.
    b. fibroosseointegrated—some bone and fibrous tissues are in direct contact with implant—fibrous tissue not to exceed 1 mm.
    c. fibrous integrated—as long as the acellular fibers do not exceed 0.38 to 1 mm.
9. Elimination of many of the bone grafts and augmentation can be eliminated with the use of blade implants.
10. Placing the blade implants into immediate function accelerates the formation of lamellar bone instead of the bundle bone that forms around a submerged implant.

Assuming that the blade implant is inserted with reasonable surgical skills the amount and type of tissues that form around the implant will be dictated by the amount and direction of forces that are placed upon the implant while in function.

Forces transmitted to a unit area of bone are partially determined by the shape of the implant, and in this regard blade implants distribute a given force differently than screws or pins (Chierenza).

Blade type implants as well as root form implants can be loaded in such ways as to demonstrate little or no fibrous connective tissue and can be continuous over many years while in function.

A nineteen-year-three-month bone block with an entire histopathological report of a blade that was placed into immediate function (the longest in situ report ever accomplished) easily substantiates my earlier comments.

In some of the cases where the blade implant was slightly inclined away from the vertical occlusal forces as well as the bending of its neck, the vertical forces of chewing were translated to some mild horizontal loading resulting in a massive bone response and at a greater increased rate than the bone which responded along the interface around the implant that was originally inserted parallel to the occlusal loads.

Along with the increased bone mass and density a fibrous connective tissue interface (no thicker than that of a periodontal ligament) forms.

It seems to indicate that the greater the horizontal load, the greater the bone formation and along with it the formation of a fibrous ligament (Chierenza).

When, due to severe obliquely placed blade implants causing the forces from the vertical biting to be translated to almost pure lateral loads at the body of the blade, the result is the formation of a thick fibrous capsule. Blade mobility leads to blade failure.

There is no mystification as to what occurs around the interface of any metallic or nonmetallic endosseous implant. Bone resorption first takes place from the trauma created in the bone due to the surgical procedures necessary to insert the implant. The mucoperiosteal tissues covering the bone are first incised and then reflected to expose the underlying bone. This alone causes trauma to the periosteum and underlying bone. Then a bur must be used (high or low speed) which then cuts through the circumferential bone lamella, the interstitial bone lamella and the Haversion osteocytes and osteoblasts; it severs and crushes some of the anastamosing processes that bring in food and oxygen to the bone cells and allows the exit of waste products.

As it continues it may cut through a Volkmann's canal which brings in the blood supply from the innermost layers of the periosteum to a central axial canal of a Haversian system. The bur also is sure to destroy some of the areas of osteoclastic activities as well as injure some of the hematopoetic marrow which exists in the everyday physiology of the histogenesis of bone.

The first reaction to this initial trauma is resorption of the bone around the interface of the screws or blades which is eventually replaced by fibrous connective tissue, especially if the implants are immediately placed into function. If the proper surgical and prothodontic protocol was carefully carried out, a bone to metal interface of the blade implant can often be the result. If an ossesointegrated interface is not accomplished then the ideal physiological mechanism is to have the fibrous connective tissue to remain as thin as possible (from .038 to .1 mm) and in this manner, it will continue to function as a suspensory type of ligament or as periodontal membrane does; by intermittent stretching of these fibers; the innermost surfaces tenaciously attached to the interface of a well-designed implant such as a blade with its numerous internal vents, and the outermost surface physically and physiologically attached to the surrounding alveolar bone. It is only when this membrane becomes thickened, which can be attributed to poor surgical, operative or prosthetic technique, as well as poor bone care and maintenance by the patient does the implant begin to loosen and will usually become an irreversible failure.

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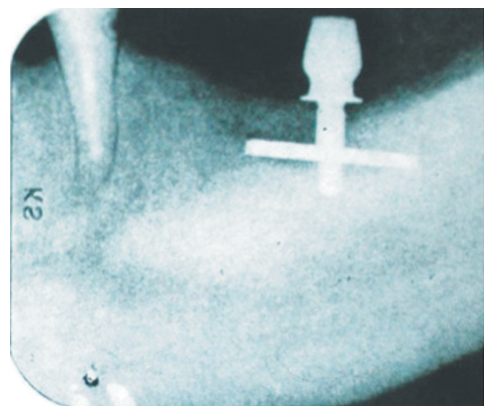
IMMEDIATE LOADING OF ENDOSSEOUS IMPLANTS IS NOT NEW.

In 1963, I introduced the endosseous ventplant screw implant to the profession. It was the very first self-tapping root form implant ever presented. Each and every self-tapping ventplant screw was *immediately loaded* and immediately stabilized by splinting the implants to each other in totally edentulous cases or to all, or some, of the remaining teeth in partially edentulous cases. Some of the implants included internally threaded shafts for a screw-in type fixed prostheses. Most of these shafts were solid which dictated for the cementation of the various types of fixed prostheses over the one-piece implant. In 1967, I introduced the endosseous blade/plate form implants to the profession. From the very inception all of the endosseous blade/plate form implants were *immediately loaded* by placing them into immediate function joining them to some, or all, of the remaining teeth in the arch, or to all of the implants themselves in totally edentulous situations.

More than nineteen thousand self-tapping ventplants and blade/plate form implants were inserted from 1963 to the present day, all of which were immediately loaded! The early work showed many more failures than the more recent results of the past fifteen years due to the failure of not inserting the implants closer to the lingual and palatal surfaces of the ridge crests. Instead many were placed in the center or labial aspects of the crests. This resulted in the major failures causing saucerization of the bone along the labial and buccal crests leading to failure of the implants.

The second major mistakes were due to the cementing the temporary prostheses over the healing tissues using such cements like temrex or temp-bond which proved too strong. When these provisional splints had to be removed by tapping them out in order to remove the week-old sutures, the cement very often did not separate from the implant posts and therefore dislodged the implants from their close adaptation to the bony channels. When this occurred, failure became inevitable. The blade implants can accept all of the vertical "pounding" downward toward their apices but cannot tolerate tapping it away from their initial seating.



An x-ray of Lo Bello's 3D implant

THE ENDOSSEOUS BLADE-VENT

Twenty Years of Clinical Applications

Leonard I. Linkow, DDS
Reprinted from the Scientific 1987 Alpha Omegan

IMPLANTS

The Endosseous Blade-vent—Twenty Years of Clinical Applications

Leonard I. Linkow, DDS

Dr. Linkow is clinical professor at Temple University School of Dentistry in Philadelphia, Pennsylvania, and is a visiting professor at the Nihon University of Japan. He is a past president and fellow of the American Association of Implant Dentists and the International College of Implantologists. He has authored six texts on Dental Implants.

Dr. Linkow is being honored with the first Endowed Chair of the Leonard I. Linkow Professorship in Implant Dentistry being established at the New York University Dental Center.

Twenty years have passed since the initial introduction of the endosseous blade-vent implant.[1–3] Blade-vent has become a generic term for all of the blade or wedge shaped implants that are now manufactured by various companies around the world.

The blade-vent has more than merely passed safety and efficiency standards.[4–12] Some original blade-vents that were inserted in the beginning of 1968 are still in function today, even though the prostheses have had to be changed several times during those long years. (Fig. 1, 2A, 2C, 3, 4, 5)

All well-trained dentists who have been practicing endosseous blade-vent techniques for many years agree that it is still the most versatile, dependable implant in use today. It can be used in most areas of either jaw, it can be immediately inserted into multiple socket areas and placed into function from the day of insertion with excellent long term success rates.[13–19]

It is unfortunate, however, that the blade-vent came before the dental profession was ready for implantology. It was also disappointing that longitudinal studies were almost impossible to do, since all who were using the system were clinically oriented dentists who were greatly

satisfied over the fact that some of the many dental cripples were aided, where "conventional methods of dentistry" failed. Hundreds of thousands of lives have been changed and still are being changed by implants that help support any remaining teeth or provide complete support in totally edentulous arches for full-arch fixed prostheses.[20–39]

In 1978, forty-seven actively involved academicians, clinicians and researchers participated in the Harvard, National Institutes of Health, Consensus Development Conference on Dental Implants. The endosseous blade-vent was the only implant to receive acceptance, with guidelines. In addition, the subperiosteal implant was accepted, due to the fact that it is a custom fabricated device.[8]

After this three-day conference, the ADA Council on Dental Materials and Devices (CDMIE) redefined its 1972 statement which emphasized the need for research to provide answers to questions posed by potential users of dental implants. At that time, CDMIE indicated that insufficient information was available on the causes, failures, and reasons for successes of implants. In 1980, CDMIE still did not recommend endosseous implants for routine clinical practice, nevertheless; "It was becoming more evident that in selected cases in which the balance of benefit versus risk was carefully evaluated and discussed with patients endosseous implants might be used." Although CDMIE's position has not changed since 1980, it has developed an acceptance program for endosseous implants similar to those used for the manufacturers of other materials, instruments, and equipment.

In the March 1981 issue of the JADA, CDMIE published guidelines for submission of various endosseous implants by individual manufacturers. These guidelines included suggestions concerning the clinical studies necessary to provide safety and effectiveness.

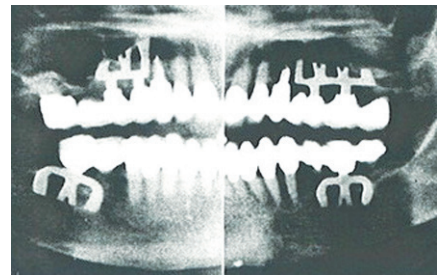


Figure 1: Inserted in 1968—this panorex was sent to me by another dentist.

For an implant to be considered for full acceptance, CDMIE requires at least two independent clinical studies of at least five years duration, with each involving a minimum of fifty patients. In provisional acceptance, CDMIE required clinical data from two independent three year studies. In 1985, based upon the long-term clinical studies of Branemark, et al, CDMIE granted a classification of "provisional acceptable" to Nobelpharma, Inc., for its Biotes endosseous implant.

Even though there has been much controversy in the interpretation of the original research findings that led to this provisional acceptance, this author commends the work of Branemark and his associates and hopes that this will encourage the implant manufacturers of other implant systems to support the appropriate studies necessary to receive ADA acceptance.[43] This

author has had an independent onlooker, invited from the University of Munich in Germany, scan personal patient records for two weeks. His results were written in an article that is being published and is titled "Success and Survivability of Endosteal Blade Implants Managed in the Practice of Dr. Linkow."

As stated by Dr. Acivido, assistant professor to Prof. Schlegal of the University of Munich, Germany, "Only eight working days were available for this study, and therefore the number of evaluated cases were correspondingly limited. Dr. Linkow and his staff gave a direct and unlimited access to his patients' charts and radiographs. The clinical examination limited itself to a random sample of recall patients during this period."

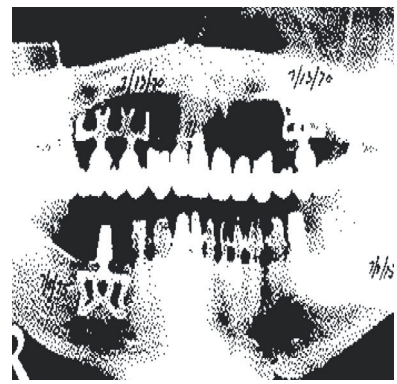


Figure 2a: Maxillary implants were inserted on 7/13/70 and the mandibular implants were inserted on 7/8/75, the day this panex was taken.

"Since 92 percent of all cases were reconstructed with a full-arch fixed bridge, there was no possibility to reliably test the individual implant mobility. Because of this, only two objective parameters remained:

—the loss, removal, or planned removal of an implant classified as a failure

—the evaluation of radiographs relative to the bone loss

The result of this study verifies the opinion of Dr. Linkow that the prosthetic reconstruction with a full-arch bridge leads to a better chance of implant survival. Interdental blade implants have a higher success and survival rate than the distal free-end blade implant. The mandible provides a more favorable implant site than that of the maxilla.

A total of ninety-one cases representing 171 implants (implant duration one to five years) of endosteal blade implants were reviewed. The success rate was determined to be 91.2 percent. The study of Tetsch and Pappmeier with forty-six endosteal implants gave only a success rate within the same implant duration of 76.1 percent."

In 1979, Linkow and Kohen carried out an evaluation of 564 implant patients, representing 1540 implants, seventy-seven of which were mandibular subperiosteal implant patients who will not be considered for the purpose of this article.[7] General information about the patients will serve as an introduction to that study. Women outnumbered men by almost two to one. Most of the patients were partially edentulous (302), although fifty-one patients were totally edentulous. A total of 206 patients were totally edentulous in one arch.

Ultimatics Inc.—Springdale, Arkansas, USA.

Figure 2b: The same case as it appeared on 10/8/85.

Results of the evaluation showed that of the 487 patients considered here, 269 patients had blade-vents in one arch, 188 had them in both arches, and thirty were totally edentulous and restored with four blades in each arch.

Ninety-six cases were maxillary and 191 were mandibular.

These represented 860 blade insertions in the maxilla and 603 insertions in the mandible.

Nine-year postoperative recall evaluations were done on nineteen blade-vents (chart 2), of which seventeen were considered excellent. Bone remained over the entire shoulder of the blade-vents, three of seventeen eight-year follow-ups showed some asymptomatic resorption below part of the shoulder but no subjective symptoms. Of 115 seven-year cases, eleven were removed due to mobility, radiologic bone loss and slight discomfort. In the six-year follow-ups of 309 implants, four were removed and fourteen showed radiographic resorption beneath the shoulders of the implants. Of thirty-six blade-vents representing the five-year postoperative group, eleven exhibited radiographic bone loss from moderate to extreme. Out of these, seven were removed. The other four were being observed. The three- to four-year groups began to reflect the utilization of more sophisticated treatment planning. Asymmetrical blades, used to circumvent maxillary sinuses, were used less in favor of deeper and more symmetrical blades (Fig. 7).

The implant channel preparations were modified by creating a more palatal position in the maxilla and a more lingual position in the mandible.

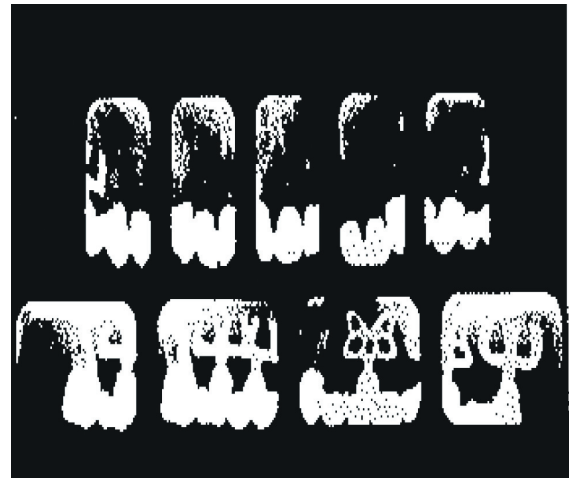


Figure 2c: Periapical films of the maxillary implants as they appeared over fifteen years later on 6/17/87. The mandibular implants are also still functioning, but the radiographs were badly stained.

Which gave the blade-vents a maximum amount of bone, flanking them buccally and labially where the bone was needed to resist the anterior and lateral thrusts of the tongue and the eccentric movements of the mandible. Of the remaining 967 blades that were in function from one to four years, only seventeen had to be removed. A total of thirty-two implants out of 1463 were removed during that period.

Another study of the blade-vents highlighted the Harvard Benefit/Risk Study of 1978.[8]

1. This author's overall experience from 1968 to 1979 with all free end posterior blades in both arches.

The blade-vent survival was good at intervals of three years, five years, and ten years with estimates of 96 percent, 92 percent, and 84 percent, respectively.

2. Mandibular three-unit bridges (using one anterior abutment with one posterior blade) opposing fixed bridges or natural teeth.

Figure 3: A periapical film showing an eighteen-year-old bladevent that has been acting as the posterior support for a mandibular full-arch prosthesis.

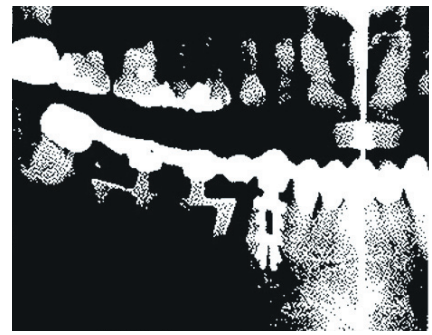


Figure 4: Very early blade-vents, inserted in 1968. The last contact we had with the patient was when this X-ray was taken in 1983.

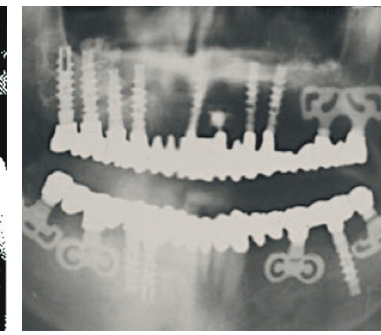


Figure 5: The late Dr. Isaih Lew inserted one of my earliest designed blade-vents in 1968 on this patient. The patient had recently consulted me, and the panex was taken in June 1987, nineteen years after its insertion.

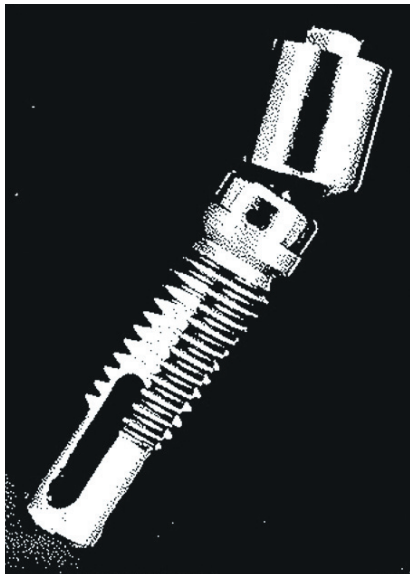


Figure 6a: The new restructured ventplant with its rotating "robutment TM."

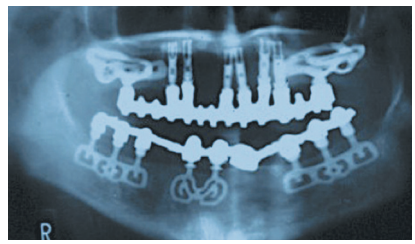


Figure 6b: Often patients require immediate splinting with implants for the support of their remaining teeth. Blade-vents have been the ideal implants for immediate function. Also are seen some "seeded" osseointegrated abutments or "robutments" TM when they might be needed. Robutments—patented abutments that rotate in a 360° circle to as much as 34° off from the implant itself thus eliminating the cosmetic nightmares as with the Swedish system.

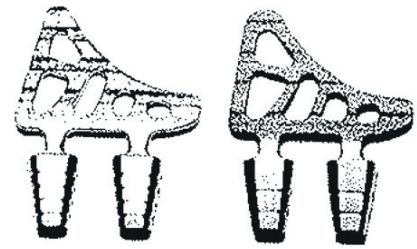


Figure 7: Asymmetrical blade-vents; both are made of pure titanium; the right one is plasma coated.

The three- and five-year survival was at 91 percent.

3. Free end mandibular Blade-vents with two pontics and more than two natural teeth abutments. (Fig. 8)

   The three- to five-year survivals were at 98 percent and 92 percent, respectively.

4. Single interdental implant abutments.

   Although only twelve cases were reported, the three- to five-year survival was at 88 percent for both time intervals. Today, these survivals for single tooth implants have greatly increased into the mid 90 percent rates by contra-indicating many which were done previously when little bone existed.

5. Full-arch blade-vents in maxillary arches opposing natural or artificial dentitions.

   Survival was only fair at three- and five-years with 80 percent and 75 percent survivals, respectively.

Figure 8: A periapical radiograph of a sixteen-year-old blade-vent that was inserted in 1971. The X-ray seen was taken in June of 1987.

In the final analysis, a blade implant can function for years when the applied forces are within physiologic limits. It is the author's opinion that the blade-vent is an excellent implant because it takes the best advantage of any available bone by allowing for the greatest amount of force transmission. It can be placed into multiple socket sites and into function immediately without going through a three- to six-month "seeded" stage. The blade-vent has a fine balance of biocompatibility and biofunctionality that make it a nearly perfect endosteal implant. Even so, an understanding of exactly how much force can be absorbed within physiological limits, in each given situation, is essential to a correct diagnosis and treatment plan. Form, function, understanding, experience, and skill do lead to benefits that far outweigh the risks.

The patients surveyed in this study routinely presented themselves for periodic checkups. These patients tended to be more successful implant cases. Patients with immediate postimplantation problems that led to rapid failure were not included among those surveyed. If an implant is not initially inserted properly, it can fail within a short period of time. Success demonstrates that a properly inserted blade-vent is functional and compatible for long periods of time. Nine-year cases looked better than some of the two-year postoperative follow-ups.

In 1980, the author introduced his tuber blades to be used as posterior supports in the maxillary tuberosity. (Fig. 9A, 9B). In 1981, the author introduced the multipurpose blade that could be fashioned into thirty-four different designs. (Fig. 10A, C). The Linkow blade-vent design is based upon the horizontal principle. By using the horizontal dimension rather than the vertical dimension, the blade-vent implant has a greater resistance to torqueing forces, upon insertion, and can be used posteriorly in both arches as well as anteriorly. (Fig. 12A, B). Stress concentration upon loading is distributed along the shoulder and body of the implant in a mesial and distal direction, then apically. This concept works to dissipate the forces over the widest possible area. (Fig. 13A, C, 14A, C).

Due to the nature of the design, the blade-vent implant can be placed into immediate "controlled" function and does not require a buried phase of healing before loading has begun.[44–46]

The physiologic width of a healthy peri-implant ligament, which forms around the implant, is within the range of 0.1 to 0.38 mms. The short collagen fibers which are elastic, suspend the implant in a hammocklike manner, but do not cause movement from a successfully functional implant, and offer a good osteogenic potential.

Once healing has taken place, long-term survival will be dependent upon the biological and biomechanical capacity of the bone tissue at the interface and not the actual numerical height of bone at the interface, as well as the elimination of overloading the implants. (Fig. 15A, C). Thus, the maintenance interface, whether it be osseous, fibro-osseous, or a combination of both, is a direct function of the biomechanical environment at that implant's surface. This environment is also dependent upon many factors such as implant sterility, cleanliness, design of the implant, tissue trauma due to surgery, fabrication of the prosthesis, forces of occlusion, and oral hygiene.

A loss of control of any of these factors will result in breakdown of the interface, which will eventually lead to a physiologic change from one of highly differentiated tissue to a low

differentiated, nonosteogenic connective tissue. This series of events will lead to implant mobility and eventual loss due to a pumping action which develops when the bridge is in function, drawing oral fluids and debris into the implant alveolus and contributing to bacterial invasion and widening of the implant alveolus in a buccal-lingual and inferior direction.

Most probably, a successful endosseous implant is often both osseous and fibro-osseous integrated, in various proportions, at different points along its interface.[47]

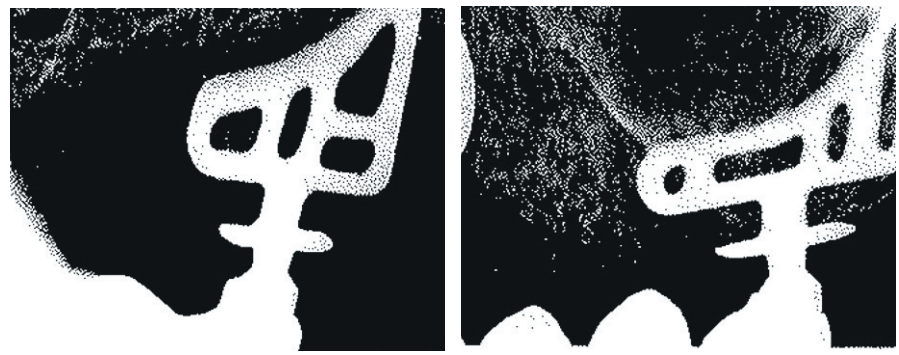


Figure 9a, b: Tuber blades when implanted into maxillary tuberosities.

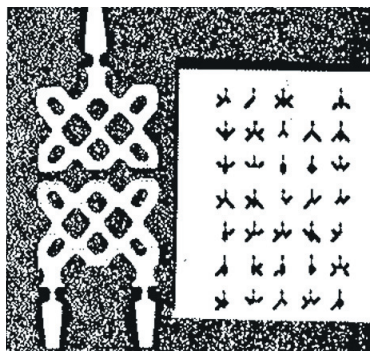


Figure 10a: Multipurpose blades can be fashioned into thirty-four different designs.

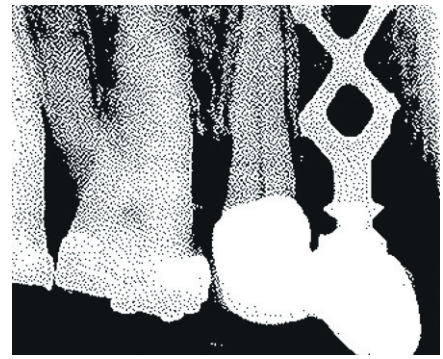


Figure 10b: Here it is prepared for a single-tooth implant.

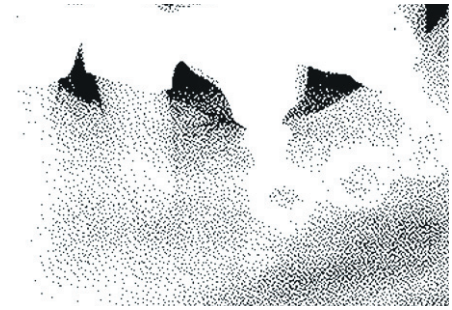


Figure 10c: The x-ray reveals a shallow multipurpose blade-vent.

PHILOSOPHY LEADING TO THE DESIGN OF THE BLADE-VENT

The degree of retention of any type of screw, whether it will be solid or hollow (such as the hollow basket type implant), or pin implant, is directly proportional to the surface area of the bone with which the outer diameter of the screw implant comes into contact. Therefore, the smaller the diameter, the less retention and the greater the diameter, the more retention. Also, the degree of retention of these vertically placed implants is directly proportional to their depth in bone, the difference between their inner and outer thread dimensions, and whether the implants are hollow or solid.

Unfortunately, the longer the patient remains edentulous, the less bone height and width remain. This greatly restricts the use of large, cumbersome implant shapes and designs that need a great deal of bone width and depth before they could even be considered implant

abutments. Because of the brittleness of many types of implants such as vitreous carbon, ceramics, and bioglass, their failures far exceed their successes, even though they could only be used in ideal bone situations. A screw or basket implant is nothing more than a blade implant rolled up upon itself. It usually can be proven that most of these blade designs have far more metal to bone interface and are situated a maximum distance away from the vulnerable labial and buccal plates of bone. Large diametrically sized screw-type implants tend to encroach much too closely to these fragile areas.

For success in implantology, the author has never deviated from his initial five basic principles.

1. The architectural design of an implant must be correct. It must be able to withstand both lateral and occlusal forces and must be able to be placed in resorbed knife edge ridges as easily as in ideal ridges. Its mesio-distal dimensions (not its depth in bone) must be depended upon for retention. It must have large openings or vents within its framework to allow bone to grow through, as long as the implant is placed correctly into the bone. It must also be relatively simple to insert and must always be inserted into a channel which should always be made on the palatal side of the crest in the maxilla or lingual of the mandible. By doing this, any possible impingement on the antral floor or inferior alveolar canal and mental neurovascular bundle can be reduced. By placing it lingually it creates a maximum amount of bone to flank the implant labially and buccally where it is readily needed to resist the anterior and lateral thrusts of the tongue, as well as eccentric movements of the mandible.

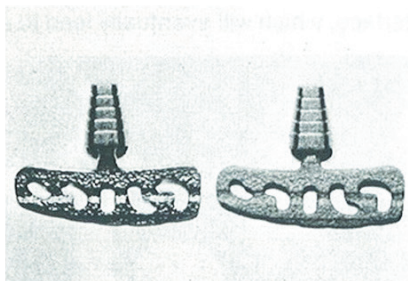


Figure 11: Two similarly designed blade-vents for the mandible. The one on the right side is plasma coated.

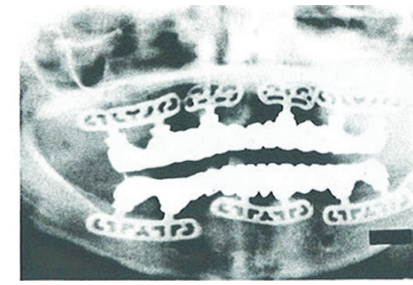


Figure 12a, b: Two completely different totally edentulous cases restored with four blades in each maxilla and only three blades in each mandible.

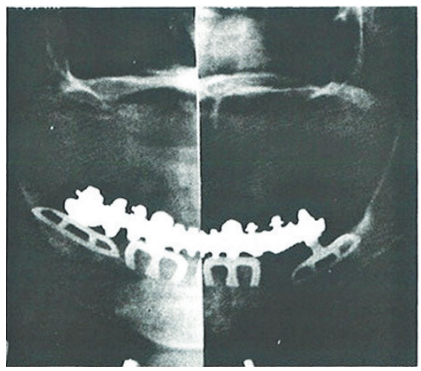


Figure 13a: A totally edentulous mandible supported by four blade-vents inserted on 11/9/69.

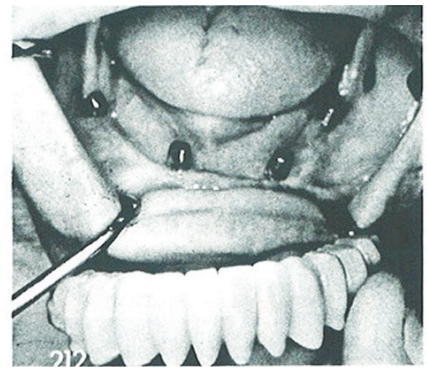


Figure 13 b: Linkow's multiple type implants supporting both maxillary and mandibular prostheses (32 units of full-arch prostheses).

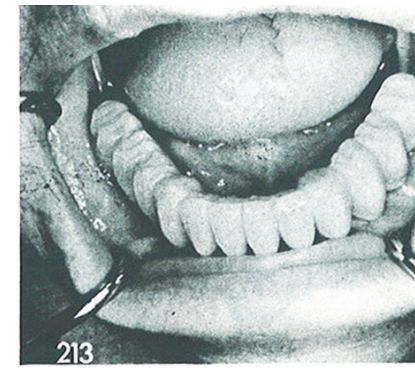


Figure 13c: The case as it appeared in 1969.

The blade must also have the flexibility in its body so it can be bent to fit passively into a curved channel, which often must be made to follow the curvature of the arch. The neck often has to be bent in order to parallel the posts with one another and with the remainder of the teeth and other implants so that a fixed restoration can be fabricated to fit passively over the abutments. The endosteal wedge shaped vented blade has more than met these requirements over the past twenty years.

2. The implant must be placed correctly into the bone. Often, a correctly designed implant will fail rapidly when not properly placed by the operator.

3. There must be enough available bone to be able to correctly insert the accepted implant designs. A good implantologist is one who knows what types of implants are contraindicated, as well as what types are indicated in a specific case. However, it is this author's strong belief that the degree of contraindications is often directly proportional to the operator's skills and expertise. What one dentist with little experience will reject for use is often the routine implant procedure of another dentist.

4. There should always be a minimum amount of trauma related to the hard and soft tissues, as well as the implant itself, from the moment of its insertion to the moment the final prosthesis is cemented into position. Even if the surgical phase went perfectly well, abuse can cause a rapid loosening of the implant with irreversible, adverse effects to the bone implant interface. The operator should be cautioned not to allow impression materials to be left beneath the mucoperiosteal tissues or in the unhealed channel. Another potential problem may be the forcing of a tight-fitting metal framework over the implant posts, possibly not parallel to begin with, and then having to tap this tight framework off, thus causing the blade-vent to be dislodged. If rapid loosening of the implant or implants occurs, they will have to be removed from the channels. The channel must be reprepared by making them longer mesio-distally and, if possible, a little deeper. A new implant should then be immediately inserted. If too much "channel width" has been created then the author often widens and fashions the channel to immediately insert his series of three-dimensional implants. Two bi-blades are seen in two X-rays from different cases (Fig. 16A, 16B).

5. The completed prosthesis must fit properly and passively, and the occlusion must be precisely balanced and articulated with complete accuracy.

Oral implantology, as we know it today, is both a science and an art. Like a good deal of dentistry, there is a strong component of art. When techniques for implant intervention are carefully followed with every recommended detail, success ultimately follows. When the art is abused, failure is inevitable.

The one major problem with the blade-vent is that it takes experience and excellent clinical skills to accomplish the appropriate insertion techniques. In addition to the artistic aspects of the procedure, the scientific knowledge of why it must be done in a certain manner is of prime importance and must be carefully understood by the dentist. In this way, the operator will not be influenced to carry out the procedure, while selecting an inappropriate blade-vent design.

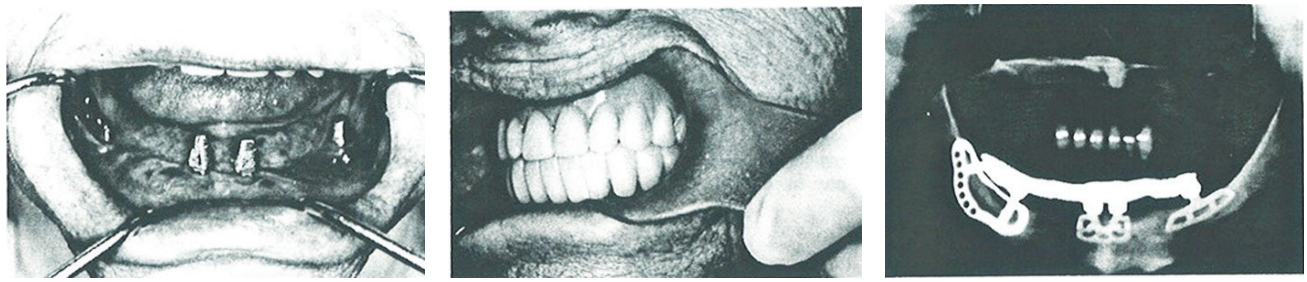


Figure 14a, b, c: The case as it appeared in May of 1987. The right posterior blade was lost and replaced with a unilateral subperiosteal implant. The two blade implants along the left side of the arch remain with no bone loss after 22 years. The patient willed her lower jaw to Dr. Linkow.

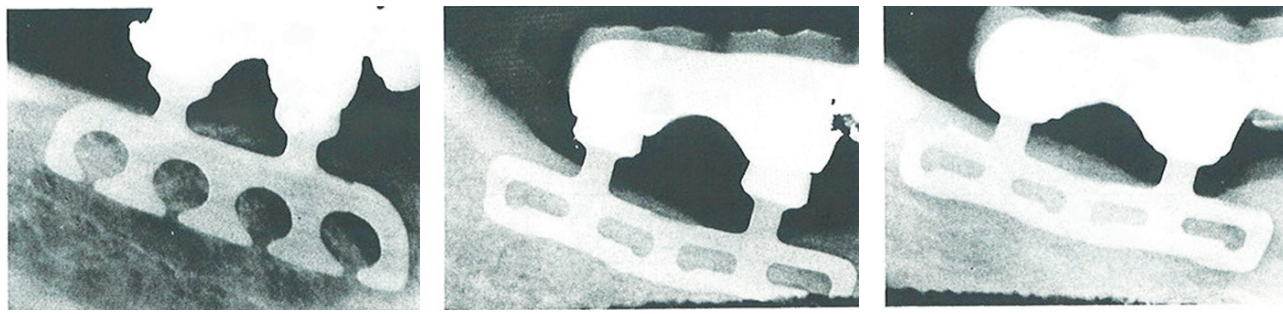


Figure 15a: A blade-vent can function extraordinarily well in shallow bone.

Figure 15b, c: The X-rays reveal the small percentage of bone that resorbed in seven years in this exceptionally shallow ridge.

Within the past few years, two-piece submergible blade-vents (Figs. 17a, b, c, d) have been used with much success in implant dentistry. The process involves submerging the blade in the mandible for three months, or the maxilla for 6 months or more before the surgeon reenters the implant site to screw on the abutment posts. Some believe that proceeding in this manner allows the bone to adapt itself closer to the implant's interface. Regarding blade-vents, however, only time will tell whether placing the implant into immediate function is any less beneficial than the prescribed submerged healing period.

Blade-vents have been placed into immediate function for the past twenty years, and it is the author's opinion that this procedure can continually be done in the same manner because of the implant's unique horizontal designs.

The author strongly believes that placing all implants into immediate function is far more advantageous than first burying the implants for several months before placing them into function. The rational is simple—placing implants into immediate function immediately forms laminated bone while the two stage procedure forms bundle bone which is much weaker.

As a word to the wise, be sure that you have blade-vent and subperiosteal implants available in addition to cylindrical implants so that you will be able to respond to any clinical situation your patient may present (Fig. 18). Forty-seven outstanding researchers and clinicians in implantology throughout the country were invited to the National Institute of Dental Research two-day symposium at Harvard University. The purpose was to establish a benefit/risk ratio of numerous implant types. Blade and subperiosteal implants were approved for use in the bone with appropriate guidelines.[47]

Progress in the cylindrical dental implant area will help to augment these two basic acceptable implant modalities. Our profession can present to the public highly predictable prognoses in much the same manner that the medical profession has given their very needy patients the high rate of success in bypass open heart surgery. I think more than enough time has passed for us to realize that we have the means at our grasp to help millions of edentulous and partially edentulous sufferers obtain a normal, happy life.[48, 49, 50]

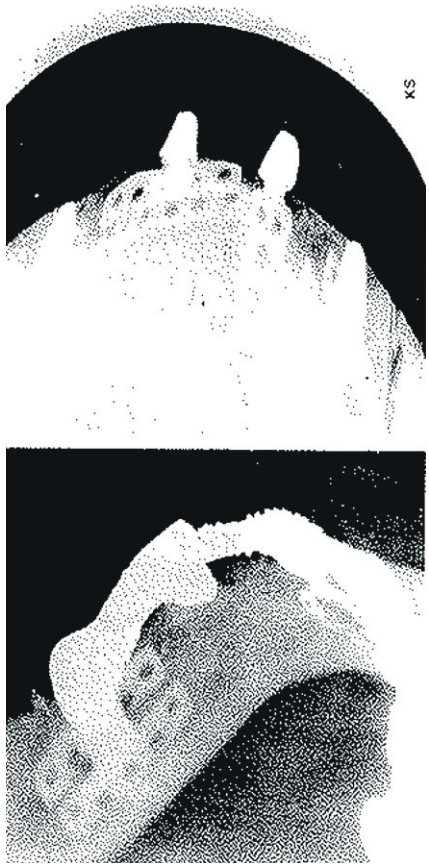


Figure 16a, b: Bi-blades used immediately after failing blade-vents are removed.

Figure 17a: Illustrates a semisubmergible blade-vent with the healing cap and healing cap wrench.

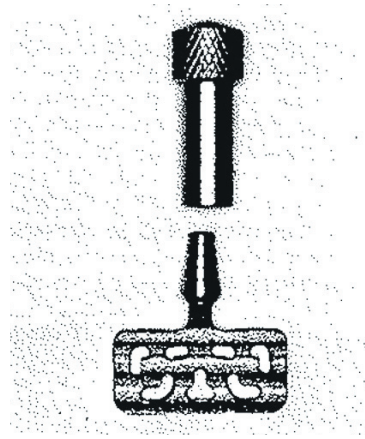


Figure 17b: Shows the same blade with prosthetic post screwed into position using the prosthetic post wrench.

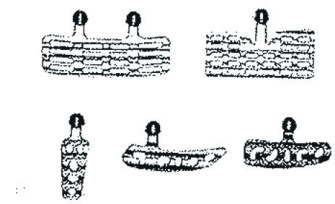


Figure 17c: A few semisubmergible blade-vent designs with their healing caps screwed into their threaded necks.

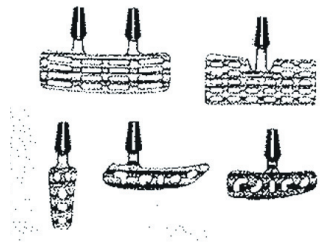


Figure 17d: Shows the same implants with their prosthetic posts screwed into position.

Figure 18: Often it is necessary to combine blade-vents with subperiosteal implants to restore the patient with full-arch fixed prostheses.

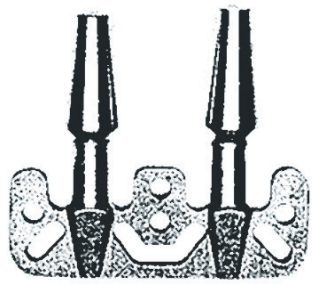


Figure 19: Startanius submerged (S-2) endosseous implant with detachable abutment head in place.

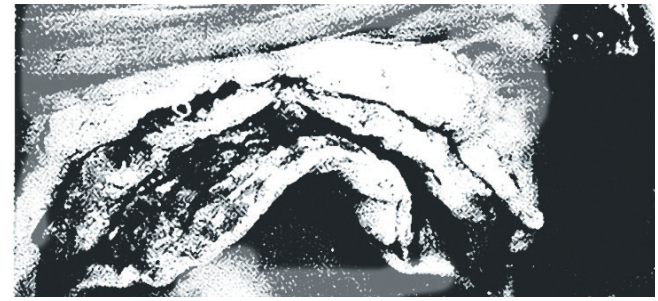


Figure 20: Full maxillary ridge with mucoperiosteal flaps reflected. Note extreme knife edge configuration of the bone.

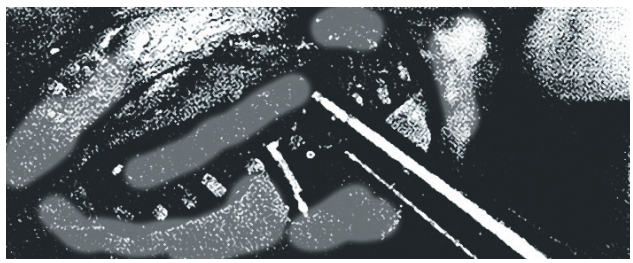


Figure 21: The S-3 implant configuration prior to placement in the bony channel.

Figure 22: Occlusal view of two implants in preliminary position in the bony channels.

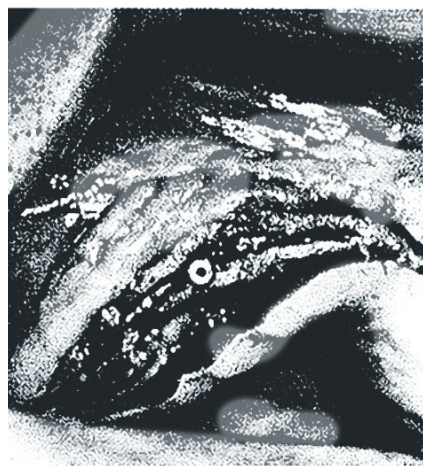


Figure 23a: Posterior implant in final position.

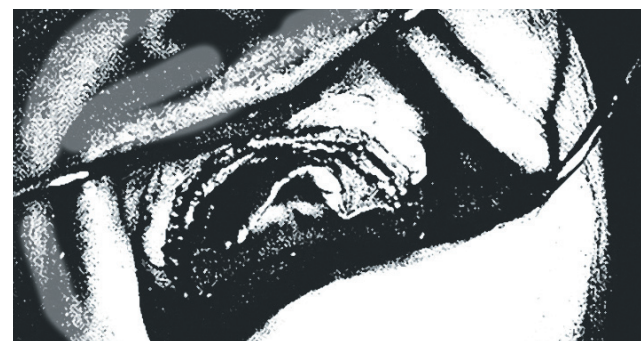


Figure 23b: Occlusal view of all implants in final position.

Figure 24: The mucoperiosteal tissues are repositioned and sutured closed.

Figure 25: The final prosthesis is totally implant supported.

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One of many Linkow's seminar held in Japan

IMPLANT DENTISTRY—YESTERDAY, TODAY, AND TOMORROW

1. Implant dentistry has advanced more rapidly and uniquely and has had the greatest impact in dentistry over all other dental disciplines. However, it took a very unusual course over more than forty years.
2. During the early 1950s, only a few general dentists had been pioneering mandibular subperiosteal implants.
3. In the middle 1960s, a few more general dentists from all over the world developed many configurations of screw-type endosseous implants.
4. In the late 1960s and early 1970s blade implants, Ramus frame implants, staples, self-tapping screws and cylinders, and subperiosteal implants came into use but still mostly by the general practitioners with very few specialists. Many of these implants were used alone or in combination with others to help provide a higher level of restorative dentistry to patients.
5. The 1980s brought many marketers and promoters to the field with the end results leading to "screw" and "cylinder mania."
6. Many of the newcomers to the field were convinced that only cylinders worked and all other implant types were "old-fashioned."
7. Many statements were made during this time that were a dichotomy against simple bioengineering principles as well as from the basic principles of sound dentistry.
8. Upon the arrival of the 1990s, the pendulum has turned again, this time in a positive direction toward restorative realities.
9. These specific changes will be discussed and the fallacies that have retrospectively caused failures in implant dentistry and how to overcome these problems.
10. Turning implant cases into immediate successful cases will also be discussed giving their rationales.
11. It will include sinus elevations with subantral bone augmentation, reentry procedures for restorations and replacements of failing implants, tripodal mandibular subperiosteal implants for severely atrophied mandibles, as well as a multimodal approach in order to restore patients with full complements of teeth.

Dear Dr. Leonald I. Linkow,

It was a great opportunity that you gave us a best lecture about Implant now and then. Your personal history and very aggressive work was really dramatic!

All of attendant Japanese dentist tell me "Thanks of our invitation to you and what is truth of dental implant history"

You suggest us what's next and what we should do to implant practice also. What is principal theory of our field?

We never forget what is your basically opinion.

We should try hard to establish future Oral Implantology. I don't like just same way of crazy commercialized business implant too.

I hope you have more good health and peaceful life.

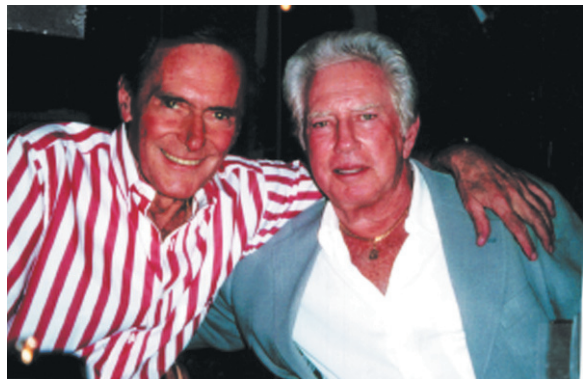
God bless you!

If we have a chance to meet in AAID or NJ, we would like to meet you.

My girl friend say hello to you.

With my best regards

Kiyooki Hoshino DDS PhD



Geordano Muratori (Bologna)
a superb implantologist and dear friend of mine.

Dr. Maxximo and myself.

IMPLANTOLOGY—BEFORE YESTERDAY AND AFTER TOMORROW

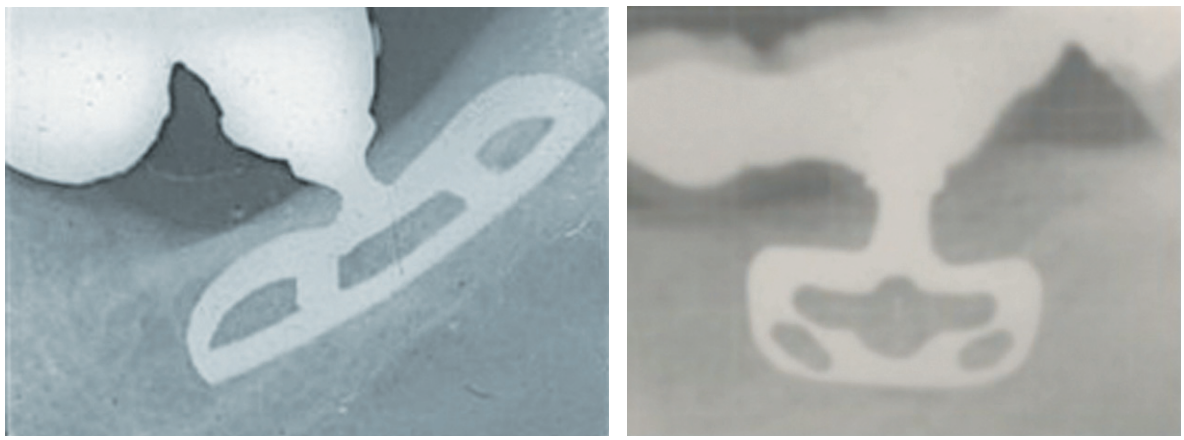
Before yesterday all that implantology had to offer were screw implants.
Dr. Linkow will glide you thru the many developments created.

The very first self-tapping screw implant called the vent plant was introduced by myself in 1963 and was always immediately loaded.

The immediate loaded endosseous blade/plate form implant was also introduced by myself in 1967.

In 1984, one of the greatest implants of all time, the mandibular tripodal subperiosteal implant was introduced to the profession by myself.

The many other implant designs and developments such as the reentry bi-blades, the DNA reentry endosseous implants, the horizontal basket implants, the pterygoid extension maxillary subperiosteal implants, the scissor endosseous implants and many more, all developed by Dr. Linkow can be easily studied by going to http://linkowlibrary.org which contains thousands of implant designs and procedures with legends beneath as well as dozens of live surgical operations with Dr. Linkow giving you blow by blow descriptions of each procedure. This library was created by the head medical and dental librarian of the New York medical and dental universities and is free to all those around the world.



Two radiographs of two differently designed Linkow endosseous blade implants.

BOOK REVIEWS

THE JOURNAL OF
PROSTHETIC
DENTISTRY
MARCH 1981 VOLUME 45 NUMBER 3

A Dynamic Approach to Oral Implantology, (2 vols). Leonard I. Linkow, BS, DDS, FAGD, FAAID, FICOI, clinical professor, Temple University, School of Dentistry, Philadelphia, Penn., North Haven, Conn., 1980, Glarus Publishing of Connecticut, Inc., Maxillary Implants, 262 pages, illustrated, indexed. Mandibular Implants, 354 pages, illustrated, indexed. Price $195.

This monumental two-text encyclopedia is impressive in its scope and detail. It encompasses the morphology, general principles, review of anterior and posterior implantations, and a glossary of treatment outlines of edentulous and partially edentulous patients.

The line drawings, placed in an innovative manner strategically around, within, and on the sides of the narrative, add a unique method of illustrating the written words. The drawings are concise, clean, clear, and explicit. They are the best this reader has seen in narrative illustrations.

The black-and-white photography is generous and of superior quality. Each phase of clinical treatment is clearly documented, leaving nothing to the imagination of the reader. The radiographs are superb in the clarity of duplication and the completeness of exposition.

The organization of the tremendous mass of clinical patient treatment outlines is comprehensive and complete. The outlines include all conceivable clinical situations in which dental implants are provided edentulous and partially edentulous patients.

The text is well printed on high-quality paper. The author succeeds in correlating the basic sciences to the clinical techniques he describes by the excellent sections on morphology in both books. His techniques, described in an orderly and understandable manner, modestly avoid extravagant claims for effectiveness, thus permitting the reader to be the judge of what is presented. The narrative is well organized. The major divisions of the texts are distinct and arranged in logical succession.

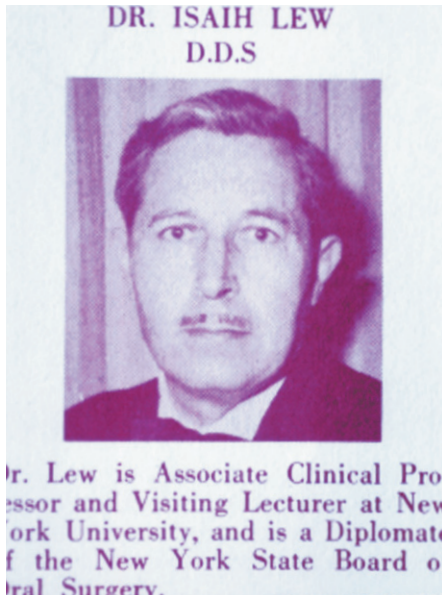
The criticisms offered are the absence of references, use of terminology that is not consistent with the Glossary of Prosthodontic Terms (VI edition) in isolated instances, and the lack of prosthodontic correlation of the restorations applied to the dental implant, particularly materials used, design, and rationale. However, these deficiencies pale in contrast to the magnitude of the scientific contribution to the field of dental implants.

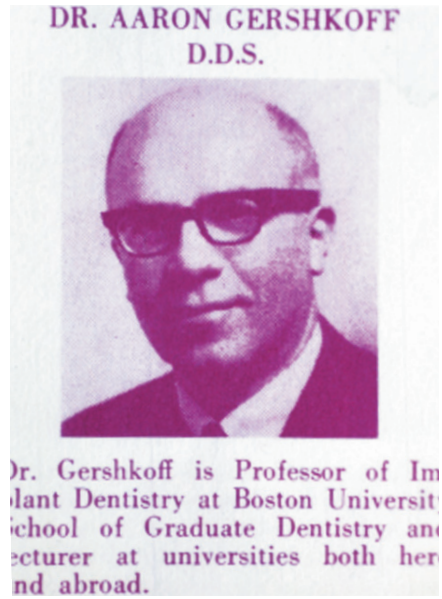
Dr. Linkow has succeeded in establishing the clinical validity of the dental implant in prosthodontics. This staggering and prestigious scientific and literary work is indeed a living monument to a unique, controversial, innovative, and inspirational dentist who is simultaneously a practitioner, clinician, author, researcher, and teacher. He epitomizes the classic concept of all great revolutionary movements in history:

"First, they are ignored.
Second, they are criticized.
Third, they are fought.
Fourth, they are accepted as a way of life."

Dr. George Painter.

I. Kenneth Adisman, DDS, MS
Professor and Chairman, Department of
Removable Prosthodontics
New York University College of Dentistry
New York, NY 10010





Private Practice AOC lecture: Implantology
Lecturer Dr. Leonard I. Linkow, DDS, DMSc
November 2, 2005
Sang Hoon Pack and Erica Coe

As dental students, we are exposed to a large array of ideas and are taught to question them rather than accept them blindly. An opportunity to exercise our independent thinking was made possible through our area of concentration at Dr. Dorfman's practice. We had the honor of having an exclusive talk with Dr. Leonard I. Linkow, considered by many as the father of implantology. It was an invaluable learning experience, opening our eyes to a completely different idea in that field. In fact, it was knowledge gained that no dental school can offer.

Unfortunately, private corporations largely dominate the world of implantology. Through their efforts in marketing, their "screw" implants have become the mainstream among patients, dentists, and universities. Thus, it was to our surprise to learn that an "alternative" implant exists. Furthermore, it was baffling to learn that this "alternative" implant could actually be more beneficial to the patient.

Dr. Linkow has developed a series of different implants. He discussed a few of them, mainly his blade implants, tripodal subperiostcal implants, ventplants, and implants with "fins." The blade implants are, as their name implies, like a razor blade that is inserted into the alveolar ridge horizontally. By covering a larger area, the blade implant offers more support. In addition, an edentulous arch requires no more than four of these implants, compared to six or more of the commonly used implants today. Also, this implant works well with knife-edged alveolar ridges, without the need for bone grafts. The subperiosteal implants are founded upon prosthetic principles, similar to partial and complete dentures. They are indicated for use in patients whose alveolar ridge has been almost completely resorbed, leaving strong cortical bone for the implant to rest on. The ventplant is the most similar to today's implant of choice as being a single "screwlike" unit. However, the ventplant has, again as its name suggests, a vent along the length of the "screw" to allow bone chips and debris to clear from the implant. Similarly, the implant with "fins" is a "screwlike" implant with small projections, or "fins" that lock into the surrounding bone. All of Dr. Linkow's implants are alternative treatment plans for a patient. Yet they do require more skill, both in the surgery as well as in the diagnosis. With a solid diagnosis of each patient's condition and needs, these implants work as good, if not better, than the implants marketed today.

However, as aforementioned, the influence of private corporations has led to almost an extinction of these alternatives. Financial rewards and the relative case of placing the individual "screw" implants are strong factors for ignoring the alternatives. The advancement of bone graft material further contributes to a robotlike approach by dentists to every implant case. Yet it is clear that these alternatives should not be ignored but rather, embraced and used according to each patient's case. After all, a key principle in dentistry is to not further harm the patient and to provide the best treatment option available.

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Dr. Linkow and Dr. Lew staring at a Panoramic radiograph deciding what to do 1969

Linkow's painting as it appears in the hallway of the New York University at the clinic of Implantology.

SPECIAL ANNOUNCEMENT

THE PUBLICATION OF *THE LEGENDS OF IMPLANT DENTISTRY*
by Leonard I. Linkow

Dear Friend,

After much anticipation, you may have gathered by now that Dr. Leonard I. Linkow's book, *The Legends of Implant Dentistry* has been published. Indeed, Lenny is a pioneer, an innovator, a gentleman, and a scholar.

Most importantly, your name and your photo, along with your accomplishments, are now part of the dental implant history.

Enclosed is a special order form for the innovators mentioned in the book for $96. Please fax your orders to (718) 464-9620.

Personally, I would like to ask that you make this publication a success by purchasing this beautiful book and passing on the history and the knowledge to future generations.

Kind regards,

Maurice Valen
President
Director of R&D
Impladent Ltd

Various views of myself.

IMPORTANT FACTS TO BE UNDERSTOOD REGARDING SUBPERIOSTEAL IMPLANTS

1. Difference between subperiosteal and tripodal implants
2. How to treat a failing subperiosteal implant
3. How to add to a partially failing subperiosteal implant
4. What type of occlusion with a full mandibular or maxillary subperiosteal implant?
5. What type of occlusion do you use in a partially edentulous subperiosteal implant?
6. What type of teeth are used?
7. What type of inclined planes are used?
8. Do you ever use porcelain teeth?
9. Do you ever do fixed bridgework over a full subperiosteal implant?
10. How to take a bone impression for a totally edentulous case
11. How to take a bone impression for a partially edentulous case
12. How to obtain a vertical dimension
13. How to obtain a centric occlusion
14. How about taking the bone impression, vertical dimension, and centric occlusion all together with no trays?
15. What is the ideal time to wait between the first and second surgical impression and why? Twenty-four hrs, one week, two weeks, three weeks . . . ?
16. When done correctly it takes only two surgical visits three weeks apart for the patient to receive his/her subperiosteal implant and his/her completed overdenture.
17. Where does the peripheral border of a subperiosteal overdenture end? Against the underlying tissue or away from the tissue and by how much?
18. When if ever do you augment a subperiosteal implant with nonresorbable bone?
19. When would you use any kind of bone grafts beneath a subperiosteal when it doesn't fit snuggly to the underlying bone?
20. Where do the necks of all subperiosteal implants (uppers and lowers) protrude from the framework of the implants?
21. In the severely atrophied maxillae and mandibles, where can you find any attached gingivae?

22. In designing a subperiosteal implant when do you include only four posts with four circumferential 360 degrees clasps in the overdenture?
23. When would you prefer to use a continuous bar with o ring attachments, internal gold clips, or Lew passive attachments and why?
24. Why do you not do subperiosteal implants when ample alveolar bone still exists?
25. If you can avoid immediate extraction sites, would you consider doing a subperiosteal implant?

Salagary (Spain) Linkow
Chercheve (Paris, France)

Ronnie Cullen (Great Britain)

Dr. Massimo Corradini and I.

THE MAXILLAE AND THE MANDIBLES

1. Never load the posterior buccal surfaces of the edentulous maxilla with excessive struts.
2. Never design a narrow solid strut along the palatal surface of the crest.
3. Never design a strut to pass over a morphological pattern of bone that displays a right angled corner.
4. Never have a secondary strut (a strut between the peripheral struts) be thicker than ½ mm and narrower than 2 mm.
5. The peripheral struts (primary) in mandibular subperiosteal implants covering the external oblique ridges, buccal aspect of the rami and symphyseal areas should be fenestrated and should be 3 to 4 mm in width and ½ mm in thickness.
6. Never extend the peripheral struts in the mandible into undercut areas, except those going into the digastric fossae.
7. Never leave undercut areas in the custom impression trays.
8. Never allow the necks of the implants to protrude through anything except attached gingival or keratinized tissue.
9. Never exceed the minimal amount of struts for implant support.
10. It is no longer advisable to include the hamular notch and pterygoid process of the sphenoid bone as posterior supports in the implant design.
11. If at least 5 mm of bone does not exist along the palatal surface of the maxillae it would be advisable to contraindicate a subperiosteal procedure.
12. It is not advisable to design the implant with palatal struts that will engage the hard palate.
13. If an implant does not fit properly because of impression distortion, it should not be used.
14. After suturing, the patient should not be dismissed until all dehiscences of any underlying struts are sutured closed.
15. Deep mattress sutures as well as interrupted sutures should always be introduced along the protruding necks of the subperiosteal implants.
16. The tissue-bearing surfaces of the overdenture should never be tissue borne.
17. Porcelain teeth should not be used with subperiosteal implants.
18. Full-arch fixed prostheses should most often not be used with subperiosteal implants.

19. Never include teeth with more than 15 degrees inclined planes in a maxillary or mandibular overdenture.
20. When severe labial and buccal undercuts exist in the edentulous maxillary arch the author's two-piece bisectional interlocking implant design has proven to be very successful.

Jack Wimmer (Park Dental Laboratory), Professor Carlo Sirtori (Milano), Moro Greco (Naples), myself, Giorgeo Gnalducci (Milano).

I am signing a very important document at the Carlo Erba Institute in Milano, Italy.

September 20, 1999

Dear Dr. Linkow,

Just a few brief notes to convey my admiration and gratitude for your extraordinary skills which, for the second time now, have given me a new mouth and, in so doing, a new life.

I remember vividly that day almost twenty years ago when I left my dentist's office with several of my upper teeth so loose they seemed about ready to fall out of my mouth almost unassisted. To say that I was depressed would be a gross understatement. However, that very same evening, as was my wont, I listened to Barry Farber's late night talk show and, as luck would have it, you were his special guest.

As I listened to you talk about the business of dental implants my depression soon evaporated. Your direct and confidently delivered words, brimming with revelatory knowledge, were like a message from heaven. I now had hope that something could be done to solve my dental problem, something I knew intuitively ordinary dentists would be unable to accomplish. The very next day I called your office for an appointment, and the rest is history.

How well I remember that morning when, with extraordinary speed, you extracted teeth and inserted your world famous blade-vent implants. And recently, when those implants failed after functioning for 20 years, you once again came to my rescue with the insertion in my upper jaw of one of your uniquely designed subperiosteal implants—whose fit and feel, I must say, spell perfection.

I have often wondered what would have happened had I not been fortunate enough to listen to Barry Farber's show that evening. Perhaps somewhere along the line I would have learned about dental implants, but it is not at all clear to me how I would have reacted. You see, it was hearing you, yourself, speak about the subject that was so impressive; so I'm not at all certain that had I merely read about dental implants I would have acted so quickly. Or if I did, that things would have worked out for me in quite the same way.

Certainly my dentist would not have encouraged me to see an implantologist. He was convinced dental implants did not work—or so he told his patients. Then too even had I learned about them and decided to visit an implantologist, it may not, who knows, have been you. And that, as I've since learned, might in the long run have made my condition even worse: I might have had the misfortune to hook up with an implantologist who took a two week course with Dr. Linkow but who, to my considerable detriment, lacked the experience and skill successfully to implement that knowledge.

Let me now move closer to the real reason why I'm writing this letter to you. Beyond merely telling you how happy and grateful I am for what you've done for me is my far more compelling need to inform you of what impresses me the most about you, what I consider to be your unique and amazing talent.

And what is that talent? It is, quite simply, the fact that you are a performing artist of spectacular proportions. True, your knowledge and experience of dental implantology are, by any measure, enormously impressive, but they are to my mind merely at the service of your true art.

For it is when the patient is lying prone in the chair, mouth opened wide, that you are in your true element and reveal your true genius. What instantly comes to mind is the absolute speed and surety with which you use the instrument at hand, the fact that there is never a scintilla of tentativeness in whatever you are doing, and the often direct and truly mesmerizing manner in which, as you work, you describe your every action. All of which—and particularly the last—are not only fascinating but also infinitely reassuring to both patient and assistants alike.

To give only one recent example, the thirty or forty minutes in which, prior to taking an impression, you worked at reconfiguring my upper bone (which I've been told would have taken any other implantologist some six hours to accomplish) will forever remain in my memory as the work of a true master. I can still hear your young male assistant (as I understand it, a dentist, who wishes to learn the finer points of implantology at the side of his mentor) exclaiming, "I see what you're doing, but I still don't believe I can do it," as well as one of your female assistants stating in somewhat accented English, "Only you, Dr. Linkow, only you." As the silent yet acutely aware recipient of your wizardry, I too wanted to proclaim loudly and clearly, "Yes, I know exactly what you're trying to say. Isn't he great? Truly great?"

Am I being carried away here? Not for a moment. No, you are without question, without hesitation, the Fred Astaire, the John Gielgud, the Horowitz, the Enrico Caruso of implantologists. Like each of these great artists who readily come to mind, you reside alone at the summit, with very few, if any, even close. Someone once said, "There are many kings, but only one Caruso." "There are no doubt many implantologists, but there is only one Leonard Linkow."

God bless you! What more can I say?

Sincerely,

Anthony Zegarelli

SOME OF MY EARLIEST ARTICLES WRITTEN AND PUBLISHED

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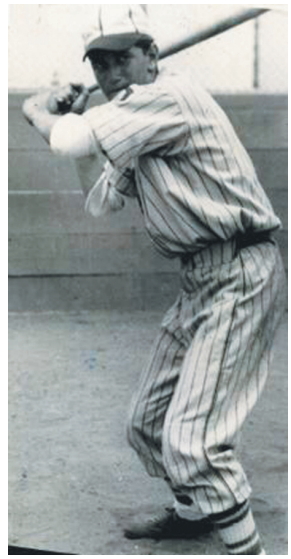


Before I ever dreamed of implantology, I was the captain of my high school baseball team, James Madison in Brooklyn and in 1944 we won the city championship.

PROFESSOR RACQUEL Z. LEGEROS NAMED TO LINKOW CHAIR IN IMPLANT DENTISTRY AT NEW YORK UNIVERSITY COLLEGE OF DENTISTRY

Racquel Z. LeGeros, an eminent research scientist in the field of calcium phosphate materials, has been named the inaugural holder of the Dr. Leonard I. Linkow Professorship in Implant Dentistry at the New York University College of Dentistry.

Professor LeGeros is nationally and internationally recognized for her leadership and scientific contributions in the areas of calcium phosphates in biological and synthetic systems, calcium phosphate bone-graft materials, and coatings on dental and orthopedic implants, areas that have special relevance for the field of implant dentistry.

The Linkow Professorship in Implant Dentistry has been endowed through the generosity of Dr. Linkow's colleagues worldwide, in tribute to the person they call the "father of implant dentistry." Leonard I. Linkow, a graduate of the NYU College of Dentistry, is credited with pioneering the development of modern implant dentistry, a technique to prevent bone loss and toothlessness which is widely regarded as one of the most significant oral health innovations for the twenty-first century. The Linkow Professorship is the world's first endowed chair in implant dentistry.

In announcing Professor LeGeros' appointment, Dean Kaufman said, "Through the formulation of a research agenda, seminars, and the dissemination of newer knowledge, Professor LeGeros, the Linkow Professor of Implant Dentistry, will help the College to fulfill the crucial missions of facilitating transfer of technology from basic research to clinical applications and advancing clinical investigation and application of dental implants and bone-graft materials within a highly-respected, interdisciplinary academic setting. She also will help the College to create a global forum for the exchange of scientific and educational information in the field and to become the authoritative resource for practicing implant dentists and the profession at large, as well as for the public."

Professor LeGeros earned her PhD in biochemistry from New York University after receiving a master of science degree in organic chemistry, also from New York University, and a bachelor of science degree in chemistry from Adamson University in the Philippines. The recipient of numerous significant research awards from the NIDR/NIH and from industry, Professor LeGeros has lectured and held visiting positions at research institutions throughout the world. She has published 105 research articles and 155 abstracts and is the author of a

book entitled *Calcium Phosphates in Oral Biology and Medicine*. She has served on the National Advisory Dental Research Council for NIDR/NIH and as a member, for two terms, of the Oral Biology and Medicine Study Section of the NIH. Professor Legeros currently serves on the editorial boards of the *Journal of Biomedical Materials Research*, the *Journal of Hard Tissue* (Japan), the *Journal of Cells and Materials*, and as a consultant to the *Journal of Oral Implantology*.

Ronnie Cullen (Great Britain),
myself, Hans Grafelmann (Bremen, Germany), Paul Glossman (USA)

SIXTY YEARS! THE REESTABLISHMENT OF THE TRUE HISTORY OF IMPLANT DENTISTRY

OR

IMPLANTOLOGY IN THE SIXTIES AND SEVENTIES AND EIGHTIES—HAS ANYTHING REALLY CHANGED?

Leonard I. Linkow, DDS, DMSc.

INTRODUCTION

The art and science of modern day oral Implantology can be said to have begun in the early 1950s and it continued into the middle 1980s by only a handful of courageous, intelligent men with dreams and ambition they made come true despite the overwhelming odds that were always against them from their peers.

This manuscript is more of a representation of the facts as they occurred giving those pioneers the credit rather than a dissertation of flattering words with little meaning from present day articles written more recently totally deleting the shoulders of the true pioneers that they have to climb over.

The early pioneers should never be forgotten.

1. E. J. Greenfields's original patent was filed in 1909 for the Greenfield Cage.
2. Gustav Dahl from Sweden cast the first subperiosteal implant in 1941 and was granted a patent in 1942. He also introduced mucosal inserts to the profession in 1942.
3. The Strock brothers from Boston reported on screw implants placed on dogs and humans respectively in 1938 and 1939.
4. The Italian Manlio S. Formiggini from Italy in the mid-1940s originally devised a prototype for some of the most successful screw-type root form implants used today. The Italian Zepponi, who made the first casting of a spiral implant in 1955.
5. Raphael Chercheve from France developed the double helix vitallium implant in 1956. It required first tapping the bone. In 1962 he developed the two-piece "sleep-away" implant.
6. Benhaim introduced the two piece tubular implant in 1958.
7. Jeanneret introduced his three piece screw implant in 1960.
8. Jacque Scialom, from France in the late 1950s, developed the needle implants.

9. In 1963 a great many pioneers from different countries developed their own designed screws.
   A. Stefano Tramonte from Milano, Italy, introduced his modified orthopedic screw implant which he often placed into open sockets. It first required the use of a tap.
   B. Giordano Muratori from Bologna, Italy, introduced a helix type of screw implant with internal threads going down their shafts so the prosthesis could be screwed over the shafts. The procedure first required the use of a tap.
   C. Sami Sandhaus from Lausanne, Switzerland, was the first to develop a nonmetallic screw made of synthetic sapphire (aluminum oxide). The procedure also required first using a tap.
   D. Linkow from the U.S. developed the endosseous ventplant screw which was the very first self-tapping screw-type implant. In 1963, he also introduced the hollow basket implant (patent filed Aug. 17, 1965, granted March 10, 1970). In 1967 he introduced the endosseous blade implant and in 1984 he introduced the mandibular tripodal subperiosteal implant.
10. Michel Chercheve, in about 1963, developed the narrow ridge implant which the MTI implant of today looks very much like it.
11. Isaih Lew of U.S. introduced in 1965 the Lew Screw. It also required a tap.
12. Ugo Pasqualini from Milano, Italy, was the first one to truly realize the close adaptation of the bone to twenty three various shaped hollow screw and basket type implants placed in dogs in 1962, which showed direct bone to metal contact which years later was called "osseointegration."
13. Linkow, in 1964 fabricated internally threaded self-tapping ventplant screws for screwing the prostheses and for their easy retrieval.
14. In 1964 Linkow prefabricated full-arch fixed prostheses for immediate loading at the same visit the endosseous implants were inserted. (1964 over the ventplants and 1967 over the blade-vent implants) (*Theories and Techniques*, CV Mosby Co., 1970)
15. Tripodal needle implants of Scialom (1959) and techniques and procedures for circumventing the maxillary sinuses in anteroposterior directions (Linkow, 1961).
16. Harvesting bone from the symphyses for use as bone grafts for ridge augmentation, periodontal defects and for overzealous apicoectomies where too much of the roots were removed was first reported by Linkow in 1968. (*The Journal of Prosthetic Dentistry*, Vol. 20, No. 4, Oct., 1968)
17. Linkow, in 1977 was the first to show how a blunted apical surface of a blade implant could separate and lift-up the mucosal lining of the maxillary sinus from its bony components. (*Maxillary Implants a Dynamic Approach to Oral Implantology.* New Haven, CT: Glarus Publishing, 1980.) Tatum soon after developed and introduced

the lateral approach to the maxillary sinus for sinus lifts and sub-antral bone augmentation.

18. Linkow introduced the endosseous blade-vent to the profession in 1967.
19. Harold Roberts placed only two flat (nontapered) type disc implants into two patients also in 1967. Years later, his brother, Ralf claimed they were placed in several years before. However, Linkow applied in 1965 for an early blade patent.
20. In 1970 Harold Roberts developed the one-piece Ramus frame implant which had much success.
21. In 1972, Roberts introduced the Ramus blade implant.
22. In 1969, Cranin introduced the vitallium endosseous anchor blade type implant.
23. Cranin also introduced the Brookdale Bar for full-arch mandibular subperiosteal implants in 1973.
24. Cranin was the very first to establish a full-time two-year hospital based training program in Brookdale Hospital in 1969.
25. Branemark, from Sweden, introduced his submergible screw-type implant in 1965, and the design is basically the same today as it was then.
26. The use of transparent acrylic guiding templates for proper positioning and angulations of root form implants was first reported by Tramonte in 1969 (*Theories and Techniques*, St. Louis, MO: CV Mosby Co., 1970)
27. In 1970, Linkow was the first to report on the use of permanent gold guiding templates, which also became an integral part of the prefabricated full-arch fixed prosthesis which was placed into immediate function. (*Theories and Techniques of Oral Implantology*, St. Louis, MO: CV Mosby Co., 1970)
28. Drilling directly thru the mucosal tissues and into the bone to insert the early designed implants was called "flapless surgery," mostly used with his ventplant implants, thus eliminating the incisions and reflections of the tissues was first described by Linkow. (1963)
29. The use of the endosseous blade type implants for posterior anchorage in Class II Division II cases of adult female orthodontics when no posterior mandibular teeth were present and patients refused to wear extraoral head bands was first introduced by Linkow in 1970, which allowed the blade implants to act as anchoring abutments. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)
30. Zygomatic endosseous implants were first reported by Linkow in 1970. They were introduced in cases where the alveolar bone along the posterior quadrants was so completely resorbed bucco-palatally that the original ridge crest was so far lingual to the lower ridge that the maxillary teeth were completely palatal to the mandibular teeth with no contact. Thus, occlusion of both arches of the restorations was made

possible by repositioning the teeth to rest on the zygomatic arches of the mouth (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)

31. Linkow reported on his own Classification of Bone in 1970. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)
32. Linkow was the first to report on the stabilization of fractures using endosseous blade implants in 1970. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)
33. Garbaccio, Italy, in 1970 introduced his transcortical screw.
34. Linkow, in 1975, developed the "five-piece Ramus system" (R2S5).
35. Charles Weiss in 1976, introduced the Ramus frame assembly system. He was the first to talk about avoiding metal transfer by manufacturing all the instruments that come in contact with the blade implants to be titanium tipped.
36. Weiss was instrumental to have the ADA grant full acceptance of the Oratronics standard blade system. He also did the original research on the" precompacting and coining" of CP titanium "tissue tac" interface.
37. Hans Orlay, from England developed endodontic stabilizers in 1953. However, Malaquisy Souza, a Uruguayan, developed them in 1947 and Jorge Bruno in 1952 and Juan De Alsina continued the studies started by Souza followed by Bertolini in the late 1960s and Isaih Lew in 1968.
    Norman Cranin in the late sixties and in 1973 Weiss and Judy created a coordinated system of instrumentation for endodontic stabilizers.
38. Reentry procedures which required incisions and reflections of the mucoperiosteal tissues as early as three months postoperatively to view the regeneration of new bone growth over the shoulders of blade-vent implants were done by Linkow in 1968 and 1969.
39. Endosseous blade type implants were introduced into the knife-edge ridges of children due to anodontia by Linkow in 1970. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)
40. Linkow had lectured and reported on nerve repositioning with the rearchitecturing of the mandibular canals and mental foramina without destroying the buccal plates of bone as early as 1975.
41. Linkow introduced the pterygoid extension subperiosteal implant with its continuous mesobar in maxillary jaws in 1970.
42. Linkow in 1970 (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970) traced locations of 186 inferior alveolar canals in both sides of 93 mandibles with their relationships to wires representing the center of the atrophied ridge crests.

43. Linkow introduced the use of sterile Plaster of Paris as barrier membranes to cover bony lesions and sockets around endosseous implants as early as 1970. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970)
44. Linkow introduced needle implants that transfixated a maxillary full-arch denture to the jaw immediately following surgical vestibular extensions as early as 1960. (In 1970 reported in *Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970) These needle implants transfixated the denture to the underlying maxillary soft tissue anatomy by going thru the denture buccally and thru the bone and thru the palatal side of the denture until final healing would take place. He also used the same transfixation procedures immediately after mucosal inserts were processed into the tissue bearing surfaces of the dentures.
45. Linkow, in 1977 did photoelasticity tests and studies at the Eastman Kodak laboratories.
46. Linkow introduced the placement of endosseous blade type implants into maxillary ridges he restored with nonresorbable HA nine months post operative in the late 1970s and early 1980s. He also placed maxillary subperiosteal implants successfully over healed HA ridges.
47. Isaih Lew in about 1968 introduced the "Passive Lew Attachments" for the stability and retention of the overdentures over maxillary and mandibular subperiosteal implants.
48. The surgical and radiographic procedures for placement of Chercheve screws and Linkow ventplants were exactly as they are today taking radiographs of the various burs and implants during the surgical procedures.
49. Full-arch and partial-arch subperiosteal implants are still very much the same in design as they were in the early 50s and 60s.
50. Gershkoff and Goldberg from Providence, RI, started doing subperiosteal implants in 1949 in the US after visiting Gustav Dahl.
51. Isaih Lew from NYC and Nicholas Berman from the state of Washington almost concomitantly started taking direct bone impressions for the custom cast subperiosteal implants in 1951.
52. Luigi Marziani from Rome, Italy, did the first meshed maxillary and mandibular tantalum subperiosteal implants in 1958.
53. In 1953 Bodine designed a subperiosteal tooth butterfly implant.
54. Linkow in 1954 introduced his cast vitalium unilateral subperiosteal implant and improved on its design with added "lingual fingers" in 1956.

55. Improvements for design and surgical procedures continued for the next fifty years by pioneers such as Roy Bodine, Norman Cranin, Paul Mentag, Leonard Linkow, Isaih Lew, and Gershkoff and Goldberg and many others.

56. In 1984, Linkow introduced the mandibular tripodal subperiosteal implant for severely atrophied mandibles where often a portion of the inferior alveolar and mental nerves were dehiscent, but the surgical protocol and design bypassed these areas.

57. A critical reevaluation of the endosseous blade/plate form implants (Linkow 1967) and their advantages such as:
    a. immediate loading
    b. simplicity in parallelism
    c. instantaneous patient acceptance was once again discussed and illustrated by Linkow.

58. Linkow advocated full-arch fixed bridgework for bilateral stabilization, especially with root form and blade type implants as early as 1964 and 1967 respectively. (*Theories and Techniques of Oral Implantology*, CV Mosby Co., 1970 and many articles written prior to that)

18 East Fiftieth Street
New York, NY 10022

Some of the audience.

Dr. S. Winkler and I.

Dr. Luca Del Carlo, Dr. Massimo Corradini and myself.

With Paul Mentag

Dr. Moro Greco (Naples) and I

BIOGRAPHY FOR MY NEW BOOK AND THE EVENTS THAT LED ME TO CREATE THE MANY IMPLANT TECHNIQUES AND DEVICES

As I look back over fifty years of the past, my thoughts become concentrated on the courage and uniqueness that helped create my early and original accomplishments.

The reader must realize that when I started my early attempts at implantology in 1952, when I completed a mandibular unilateral subperiosteal implant for the posterior support of a five-unit fixed prosthesis, the dental profession was totally hostile to even the thought of implantology.

Looking back into so many past years, I can only come to the realization that it was my burning desire to replace the archaic contraptions of removable dentures (or "pocket teeth" as I so often called them) with something far more advanced. The answer was to introduce implants to the dental profession. How did I have the courage to choose this untraveled route? It was because of my continuous dreams, my belief in the principles of implantology, my confidence in my own surgical and prosthetic ability, and my frustration with what I considered a very backward profession of dentistry with all of its unnecessary extractions and with the replacements of removable "gadgets."

The New York University College of Dentistry during the last two years of the four-year course required the students to obtain 2,000 clinical points from doing various dental procedures on their patients. Unfortunately, most of the students could not acquire more than 1,670 points, and they had to go two summers to ever obtain that amount. Of course, because of this, the school had to lower the requirements. I played semipro baseball during those summers and made a few dollars on the side. I had all my credits. In fact, at the end of my junior year, I had 2,700 points, which was more than any other senior.

So during my last year at school, all I had to do was attend two lectures—one at eight in the morning and one at four or five in the afternoon. In between, one other student and I were allowed to do full-arch fixed bridges in the crown and bridge department. But further than this, I insisted on sitting in on the postgraduate courses given to dentists who paid for them so I could learn how to fabricate removable dentures or plates. It made me sick to my stomach to such an extent that I shouted out numerous remarks in such a way that the professors or instructors said, "Linkow, you're out of line." I said, "I won't be out of line for long." And everyone knows the history that followed. How many people are learning about dentures today compared with those learning about implant dentistry?

To say it was easy would be an understatement. The roads were never paved for me. I had to plough through every inch of the way. The arrows were being aimed at my back from every single direction. I had no allies. I was considered a charlatan, a butcher, and someone who should not be allowed to practice dentistry. It was far from easy.

Some of the very early articles that I wrote in the early 1950s caused more animosity, envy, and enragement from many of my peers.

I can vividly remember the very first lecture I presented in 1954 to the Central Queens Dental Society in Forest Hills, Queens. I was extremely nervous, and I can remember Dr. Edward Kaufman, who later became dean of New York University College of Dentistry, calming me down and telling me not to be nervous because I knew more about subperiosteal implants (which I was lecturing about) than any of the older professionals that were present. Of course, at the end of my lecture, I was bombarded by aggressive and negative sarcasms.

Years went by before I was invited by any dental society to give any lectures or courses. Finally, about twelve years after I graduated, the First District Dental Society asked me to give a one-day lecture (eight hours) on subperiosteal, needle- and screw-type implants. I was thrilled. The day before the seminar, I called the headquarters of the First District Dental Society from my basement office in Kew Garden Hills and said, "I am Dr. Linkow, and I would like to know how many doctors signed up for my course." She said, "Wait a moment, and I will let you know." I was convinced that I would have a sold-out lecture. Her next words knocked me for a complete loop. She said, "Nobody signed up." I nearly fell through the floor. Finally, I said, "How many participants would I need to give the course"? She said, "A minimum of five, and then it is up to the lecturer." I pleaded with Dr. Old Man Weiss, whom I allowed to use one of my offices for several years already, to get four more of his old friends to participate for free. Dr. Weiss, at one time, was the top gnathologist in his heydays; but due to a very negative personality, he never had a decent practice, and his private life was disastrous. His wife had recently divorced him, and his eighteen-year-old daughter had recently taken her own life. I was at the funeral. To make a long story short, Dr. Weiss (then over seventy years of age) was successful in getting the four other dentists, and I paid the First District Dentistry $250, which represented $50 for each dentist attending. This is God's honest truth. The course, I thought, was very successful; but still, I was never asked to give another one. Instead, one of the old dentists who attended started giving the seminars for

the First District Dental Society mainly because he was the program committee chairman for the ethics society, which made him part of the "powers that were." When I angrily called the program committee doctor and asked why I was not the one to give the courses, he said, "You are much too controversial, and we can't take a chance with you."

I hadn't heard anything for at least another eight or ten years when NYU College of Dentistry invited me to lecture one evening with Dr. Louis Blatterfein, who was a senior professor in removable dentures.

He went on first and actually buried himself for his unusual fear that I was going to undermine the work he had been doing his entire lifetime on removable dentures. I never had any such intention.

After I calmly completed my implant lecture, an extraordinary turn of events for me took place. Dr. Blatterfein was bombarded by questions from the audience who sided with me so strongly that in the middle of one of the questions, he just stormed out of the lecture hall. This was finally a turning point for me.

During the early sixties, I couldn't even get myself arrested. Implantology was still in the Dark Ages. No universities accepted me to give courses. Fortunately for me, Dr. Mac Lieb—who was the head of a very popular orthodontic school called the Institute for Graduate Dentists, located on West 67 Street in New York City—asked me to give a three-day lecture. It ended up with me giving four of these three-day seminars each year for more than a span of five years, from about 1968 to 1973. They always took place on Fridays, Saturdays, and Sundays. For the first two days, I would lecture nonstop between eight and ten hours, showing hundreds of slides. In order to save time, I had lunches brought to the participants into their seats so I could go on lecturing. On the third day, I would invite twenty-four of my patients to appear carrying their individual panoramic x-ray, mirror, and explorer. Being that the clinic had twelve chairs in a circular fashion, I would first seat twelve patients, and the dentists would check them out radiographically and clinically. Then the next twelve patients were seated. In the afternoon, I would do live surgery over closed-circuit TV.

The lecture room held only fifty people, but there existed a back sliding wall, which allowed another fifteen doctors to attend. I kept the school alive for the next five years or so from going bankrupt since the school charged $350 per doctor, which was considered "good money" in the 1960s. I say going "bankrupt" because in the middle 1970s, finally, the universities started accepting me to be part of their continuing education programs, and I couldn't find any more time to lecture for the institute. There was a time where I was giving these courses in twenty-four or more American universities.

I would just like to bring out an anecdote during one of my lectures at the Institute.

There was a real wise guy, a periodontist, who was sitting in the very first row just to the left of me. He was looking at me in a sort of disgusted manner. I knew that he was out to give me a hard time, but I would be ready for him. Finally, during the first afternoon of one of my lectures, he looked at me with a smirk on his face and said, "You have shown hundreds and hundreds of slides all day. But what work, if any, did you do on research?" I thought a moment and said, "That is a very good question. Do you see all those slides on those patients?

Well, that was my research. And do you know that once I realized they worked, I started placing implants on dogs"! Well, he went berserk while the entire class became hysterical. He stormed out of the room, got his money back, and that was the last we saw of him—just another character that thought he could cut me down.

For the next ten years, I remained on the continuing education program of at least twenty-four universities: the University of Detroit, University of Louisville, University of Tennessee, University of Chicago, Pittsburgh University, Temple University, Tufts University, Boston University, University of Indiana, University of Alabama, University of Mississippi, Louisiana State University, Albert Einstein College of Medicine, Yeshiva University, Emory University, Ohio State University, University of Buffalo, Washington University of St. Louis in Missouri, University of Maryland, University of Oregon, University of Puerto Rico, San Juan, Puerto Rico. There were several more that I do not remember. Notice, however, that I had never been on the continuing education program of New York University College of Dentistry.

Speaking about Emory University, one lucky day around the year 1970, I was the Hyman recipient at the fabulous Atlanta Dental Convention. They had it all arranged for me by the minute. For example, at 6:15 a.m., the doctors would knock on my room and take me to breakfast. Thirty minutes later, I would be walked across the street to the roof of a large condo apartment and seated into a helicopter. Fifteen minutes later, the helicopter would land on the front of Emory University, where the dean and two other doctors would greet me. About thirty minutes later, after changing into my surgical gown, gloves, mask, etc., I would fulfill the rest of the morning schedule by completing a few surgical cases under closed-circuit TV, which would be fixed into the building where the meeting with thousands of participants was being held. At the end, the helicopter flew me back to the roof of hotel that was the venue for the meeting; and with a loud round of applause, I lectured for about another thirty minutes. It was a sensational day for me and an eye-opener for the participants.

During the early years, I was building a very strong reputation in Europe by giving courses in Italy alone, which included the University of Milan, University of Rome, George Eastman University in Rome, University of Bologna, University of Pisa, University of Turin, University of Bari, University of Pavia, Carlo Erba Foundation, Reggio Emilia.

There was a time in the late 1960s and early 1970s when I would fly to Italy and teach in all of these universities. I made at least seventy-five trips to Italy. Every six weeks, I would do major surgery at the office of Dr. Georgio Gnalducci. I would leave my New York office on Thursday nights, arrive at Malpensa Airport in Milan at about eight in the morning, be escorted by a waiting car directly to Gnalducci's office. By nine thirty, I would be performing all kinds of implant surgery. It would end around ten in the evening the same day when we would have a massive three-hour dinner with many dentists who would be watching the surgery one-on-one and by closed-circuit TV. The next day, I would start at seven in the morning till about six or seven in the evening, then a three-hour dinner, then a trip to Paris at midnight, with sleeping on the train. I would arrive in

Paris at about seven or eight the following morning and wait to board a supersonic plane called the Concorde, which left Paris Airport at 11:20 a.m. and would arrive in Kennedy Airport at 8:30 a.m.—only three hours and ten minutes. So I had the entire Sunday to recuperate and get ready for my own practice on Monday. They were hectic but wonderful years. My adrenaline was on its highest level.

During the 1970s and early 1980s, the German Society of Implant Dentistry called the DGZI was formed. I was part of it from its inception, and during those years, I delivered twenty-three-day seminars in the same amount of years. During those twenty years, the DGZI developed into one of the largest and most prominent implant societies in the world. My seminars took place many times in Munich, Hamburg, Berlin, Bremen, Frankfurt, Cologne, Kappel-Grafenhausen, Heidelberg, Dusseldorf, and Travamünde.

Because of the twenty years of my important lectures throughout Germany, a street in Kappel-Grafenhausen was renamed as Leonard Linkow Strasse. It was an unbelievable day and night for me. At noon, a forty-eight-piece band made up of young boys and girls in their late teens and early twenties played all day long with a two-hour break at about four in the afternoon to six in the evening. They then continued playing in the town's largest and best restaurant until about two in the following morning. I have only to thank Dr. Holger Burkel, my devoted student, who lived on the street and was instrumental in having it changed. I was the very first in Germany to have a street named after me.

During that afternoon, several hundred people who lived along the street and surrounding areas appeared for cocktails and hors d'oeuvres as well as to meet me. The burgomaster (mayor) delivered a speech; many newspaper people interviewed me along with a TV team. It was a splendid experience for me.

I had lectured in many more cities in many more countries during those years. These included Madrid, Spain; Copenhagen, Denmark; Mexico City, Mexico; Athens, Greece; Paris, France; Rotterdam, Holland; Brussels, Belgium; Tokyo, Ube, Nara, and Niigata, Japan; Bogotá and Medillín, Colombia, London, England; University of Sydney in Sydney, Australia; Abidjan, Ivory Coast; and University of Zurich in Zurich, Switzerland.

Many of my books were published over the years. These include the following:

1. *Full Arch Fixed Oral Reconstruction: Simplified*. New York: Springer Publishing Co., 1962.
2, 3. Linkow, L. I., and Chercheve, R. *Theories and Techniques of Oral Implantology*. Vols. I and II. St. Louis, MO: CV Mosby Co., 1970.
4. *Mandibular Implants a Dynamic Approach to Oral Implantology*. New Haven, CT: Glarus Publishing, 1978.
5. *Maxillary Implants a Dynamic Approach to Oral Implantology*. New Haven, CT: Glarus Publishing, 1980.
6. *Dental Implants Can Make Your Life Wonderful Again*. New York: Robert Speller and Son Publishers, 1983.

7. *Without Dentures*. Miami: Frederick Fell Publishers, 1989.

8, 9, 10. *Implant Dentistry Today: A Multidisciplinary Approach*. Vols. I, II, and III. Padua, Italy: Piccin Nuova Libraria Publishers, 1990.

11. *Color Atlas of Implant Techniques and Implant Prostheses*. Padua, Italy: Piccin Nuova Libraria Publishers, 1998.

12. *How Green Were My Mountains? An Autobiography*. Xlibris.com, 2002.

Regarding this very interesting book, the following press release went out to the public.

With Barry Farber (famous talk show host in the United States) - seen together in Kappel-Graffenhausen, Germany where a street was named after Dr. Linkow.

With Holger Burkel - the doctor who was responsible for naming the street, Leonard Linkow Strasse

The dinner that followed. Notice the number of youngsters in the orchestra.

Barry Farber (N.Y. Journalist) and I in Kappel-Graffenhausen. Germany.

Dr. Minichetti and I.

Dr. Holger Burkel and myself standing below the Leonard Linkow Strasse in Kappel-Graffenhausen, Germany.

Dr. Lo Bello and myself.

Sometime during the 1980s, I was approached by Dean Kaufman from New York University College of Dentistry stating that he wanted to create the very first and only chair of implantology in the world with me as the recipient. I showed a great deal of anger, stating, "Why are you choosing me for this wonderful occasion when I was never asked to lecture in your university over all of these many years when I was accepted in universities and dental societies all over the world?" He returned my angry question by remarking that whenever his students and doctors attended lectures throughout the world, they reported that only the name Linkow was synonymous with "implants." I then said, "Don't expect me to pay for this so-called chair because I don't have that kind of money, nor will I pay for it even if I had the funds." He said, "Don't worry. We will get the money from your loyal students throughout the world by holding dinners, conventions, letters, etc." I said, "It would never happen."

Well, it did happen; and in the year 1989, the Leonard I. Linkow Professorship of Implant Dentistry was created in perpetuity.

Now that I have written a bit about my many experiences in life during my happy and difficult times, I will now try to discuss how I came to develop so many different implant systems and how, through trial and error, I finalized my implant armamentarium and so many of my devices.

As I mentioned previously, in 1952, I did my first unilateral mandibular subperiosteal implant. It lasted seven years, which I considered quite good since it was my very first one. I had very little experience, and the impression material was far from being accurate or correct compared with what we use today. I used a heated shellac base, which was molded over the exposed bone, and then an Opotow wash was placed inside it for the final impression. Fortunately, it was accurate enough to obtain a fairly accurate impression, but it took me another thirty minutes or so to remove all of the broken pieces of the Opotow paste from the bone.

Being that there was very little literature in the early 1950s, I had to design most of my cases myself. Aaron Gershkoff, Norman Goldberg, Issaih Lew, and Nicholas Berman, as well as Gustav Dahl from Sweden, had done a few. But the designs at this time were taken from soft tissue impressions, and then referring to the radiographs, the master models would be whittled down to try to duplicate the underlying bone—a procedure that was doomed from the very onset.

It wasn't until the tissues were incised and reflected to expose the underlying bone so a direct bone impression could be taken did I jump in on the bandwagon with my own techniques and designs.

I did many unilateral posterior mandibular subperiosteal implants and kept changing the designs to compensate for the numerous failures I first had. For example, I originally crossed over the mylohyoid ridge into the submandibular fossa, thinking I could obtain more retention. Buccally, I crossed over the external oblique ridge but had not at that time utilized the very dense bone along the buccal side of the ramus. Anteriorly, I never joined my lingual peripheral strut to the buccal peripheral strut because alveolar

bone existed there due to the proximity of the nearest tooth, which would, through its periodontal ligament, stimulate the bone to prevent it from resorbing; and I did not prefer to have any struts from a subperiosteal implant resting on anything other than atrophied cortical bone.

Of course, the lingual peripheral strut always caused the bone to resorb, thus exposing the mylohyoid ridge and the entire metal strut itself. I tried eliminating the strut entirely and replacing it with individual lingual fingers, which went below the mylohyoid ridge and into thin channels made along the lingual surface of the bone so the very thin and fragile lingual tissue would not be stretched, which over time would cause the dehiscences of the metal fingers.

Finally, I realized that the lingual peripheral strut should never engage the mylohyoid ridge, but instead run slightly buccal to it. Extending the external oblique strut way onto the buccal surface of the ramus and then creating a framework that extends a good way along the buccal surface of the ramus but always slightly above its undercut area had given the unilateral subperiosteal implant all the retention it needed. Another great advantage to this design was my including the entire anterior surface of the ramus, which is often concave and joins with the external and internal oblique ridges. Finally, the ideal design was born.

Speaking of maxillary subperiosteal implants, I did not know how to truly design them in the early 1950s. It wasn't until the 1970s when I introduced my maxillary pterygoid extension implant that I finally had learned how bone truly resorbs in the maxilla.

For example, when the maxillary bicuspid and molar teeth are present, their roots seem to hold up the mucous membrane of the maxillary sinus.

Once these teeth are extracted, certain physiologic mechanisms take place.

a. The mucous membrane starts to drop inferiorly.
b. The underlying bone starts to resorb toward the membrane.
c. The maxillary sinus balloons buccally to almost wipe out the remaining fragile buccal bone.
d. Often, the sinus also migrates distally to often wipe out the maxillary tuberosity.

In the beginning, I was placing many buccal struts over the fragile remaining posterior buccal plates, which caused numerous failures.

I immediately redesigned my framework by placing two or three very tiny vertical stems with a tiny flower design over its superior aspect along the posterior buccal surface—all independent upon one another. In this manner, if any bone should resorb beneath a single flower, it could independently be removed.

In designing maxillary subperiosteal implants, the framework should rest on the densest bone, which include the *anterior nasal spine*, the *canine eminences*, and the *palatal surface of the alveolar crest*. These are the most important areas for support since the sinus expansion practically never includes the palatal surface. I have designed the strut

to be fenestrated and as wide as possible superior—inferiorly leaving about two to three millimeters short of the crest itself. This broad palatal strut is the most important strut in a maxillary design because it resists the anterior and lateral thrusts of the tongue and the eccentric movements of the mandible. How much bone height remains along the palatal surface will determine if only the anterior nasal spine and canine eminences would be enough for a successful framework. Otherwise, I added on the flowers.

I will not delve too deeply into the previous design of the mandibular subperiosteal implants even though it is probably the most important and longest-standing implant barring none.

Instead, I will go into the perfect design of today using some of the thoughts and designs of Bob James.

Today my design for full mandibular subperiosteal implants consists of gaining support from the following:

a. external oblique ridges
b. buccal aspects of the rami above the undercut areas
c. symphysis menti
d. genial tubercles and digastric fossa
e. avoiding the mental neurovascular nerve bundles
f. anterior surface of both rami
g. posts must always protrude from the lingual peripheral struts because in severely atrophied mandibular ridges, the only attached gingivae is on the lingual side of the crest.

Even with the design, I had seen certain cases fail due to the resorption near the mental nerve areas and also underneath the posterior framework of the implant, because posteriorly, where the bone is more porous than the anterior symphyseal area, there exists as much as 250 lb of pressure per square inch of biting force. Anteriorly, where the bone is most dense, there is only 25 lb of pressure per square inch of biting force.

So I came out with an entirely new concept for the subperiosteal implant design:

In order to avoid the fragile areas near the mental nerve bundles, which very often were dehiscent and ended up with paresthesias due to the scalpel or aggressive impression techniques, I created an entirely new surgical protocol. Three isolated incisions were made—two along the midsurface of the anterior surface of each ramus, five to eight millimeters below the coronoid neck and ending in the retromolar pad area to be done on both rami. The third incision was made along the lingual surface of the anterior crest between each mental neurovascular bundle. Before the labial tissue was released from the bone, a midline vertical incision was made from the crest to the inferior border of the mandible. This was done so there would be no pulling on the mental nerves when the labial tissue was reflected. Then the lingual tissue was carefully reflected from the bone, making certain that the entire digastric fossa was exposed because the metal struts of the implant must rest along those undercut areas to prevent anterior drifting of the implant

once it was seated. Individual heavy silicone impressions were taken of each of the three isolated areas of bone and left in place one at a time. They must contact all of the vital anatomical landmarks that I previously mentioned. Another heavy moldable silicone impression was placed over all three isolated impressions, and the patient was brought into a proper vertical dimension and centric relationship. When the material hardened, the impression was removed. Being that the buccal peripheral impression material would be extremely thin, a very loose mix of fast-setting plaster of Paris was carefully placed over the thin areas to stabilize them so they would not distort when the stone model was poured. When the stone mix hardened, it was separated from the impression material and removed from the already-articulated mount. The design was then drawn on the master model and then sent out to a top laboratory. In just a few weeks, the lab returned the fully cast subperiosteal implant in titanium or cobalt chrome, whichever the doctor preferred, and a finished acrylic over metal overdenture. So if everything was done correctly after only three weeks' time, the patient received his/her subperiosteal implant and his/her overdenture. An incredible procedure.

There were some patients who complained to me that they felt fine except that when they opened their mouths, they would feel a tightness near the condyles. Often, just incising through the anterior bar of the implant released this tight feeling. There were some others, however, where it didn't help. So I realized that many conditions—such as too rigid a framework, too powerful or weak the rami were in relationship to the body of the mandible, whether the patient was a male or female—were all factors leading toward these complaints. So I realized that in some of these cases, the rami framework was not moving in unison with the condyles when the patient opened or closed his or her mouth. Thus, I created the "ramus hinges," which allowed the condyles and posterior framework to move in concert, and no more symptoms existed any longer.

When I first was introduced to screw-type implants, I was lecturing in Miami Beach on subperiosteal implants in about 1961. Raphael Chercheve was the other doctor who shared the podium with me. I saw for the first time screw-type implants that were screwed directly into the bone. I was amazed and ready to go to France to learn his technique and purchase his kit.

His courses were held at Lariboisier Hospital in Paris, and he had hundreds of students attending.

His implant was made of Stellite, a form of cobalt-chromium and molybdenum, and his implant had a double helix design along his spiral threads. It required using first a tap to create an osteotomy into the bone to make it easier to screw in the implant with a ratchet. The osteotomy was created by drilling the twist drill directly through the mucosal tissue and into the bone, and then he left the square shafts of the implants remain exposed above the soft tissues and sent the patients home.

I left Paris with enough information and knowledge along with his kit so I would be able to immediately insert these implants in my own patients' mouths.

For about six months, I inserted anywhere between three hundred and four hundred

of his implants. It takes a great deal of experience and repeated surgeries before one could sit back and analyze advantages and disadvantages of various procedures. It didn't take me that long. I came to the following conclusions:

a. The spiral double helix portion of the implant made of Vitallium was much too brittle.

b. Despite first having to use a metal tap to tap a corresponding osteotomy, many of these implants would snap along the spires.

c. A square shaft perforated through the mucoperiosteal tissues covering the bone, which irritated these tissues very badly because of the four sharp line angles of the square shaft.

d. The shafts were not connected to any other implant shafts or existing teeth to stabilize them during the early catabolic stages of metabolism.

e. The implant still needed a special tap to create an osteotomy before the implant could be inserted.

f. Even worse than this was the fact that when doing flapless surgery, a hollow mill trephine must first be used to "scoop out" a plug of epithelium directly from the soft tissue crest to the underlying bone, which will undoubtedly prevent epithelial rests from being pushed into the osteotomies if this was not done. These epithelial rests would prevent normal bone regeneration from occurring, which often would lead to loosening up of the implant with eventual failure.

Flapless surgery became a very important procedure when performed with many of my implant designs, especially those of my blade- or plate-type designs.

NEEDLE IMPLANTS (Scialom)

After many years of using needle- (pin) and screw-type implants with flapless surgery procedures, I started experiencing many more failures that I did not expect to see. So on these cases, I started to incise the tissues and reflect them buccally and palatally to expose the underlying bone. To my dismay, disappointment, and unbelief, I saw for the very first time the disastrous results from using this method. I saw needle implants approximately flaring between thirty and forty degrees from one another, as I had always placed them, and perforating through knife-edge ridges of bone that were camouflaged by the overthickening of the soft tissue anatomy.

While dealing with these tantalum tripodal needles, there came a time when I realized that locking the three tantalum ends that protruded out of the tissue to form a tripod had distinct disadvantages. For example, in order to join the loose ends together, liquid and powder acrylic were painted over and through these needles until they were completely covered. This immediately created an immediate stable tripod. The core of acrylic was then prepared for a full crown restoration, and all cores were made parallel to one another. However, cold cure acrylic remained in contact with the underlying tissues.

In order to improve the retention of the needle implants in the bone, I developed a

full-arch maxillary scalloped gold template. It was highly polished on its tissue-bearing surface so it would be much more tender to the underlying soft tissues than the original cold cure acrylic that fused or locked the protruding ends of the needles together.

The other side of the gold template allowed a number of tiny holes the size of the tantalum needle implants to be driven through the template and into the bone, making sure they would circumvent the lowest septal floor of the antrum mesiodistally and ending into the dense palatal cortex. However, sometimes, the acrylic cores would separate from the gold template. In order to be certain that the needle implants would not loosen from the gold template, I had included a series of tiny mushroom-shaped projections no longer than five millimeters, which locked the protruding ends of the needles to the template once the acrylic was delivered using the paintbrush technique to include the tiny mushroom projections. In this manner, I was able to obtain bilateral stabilization as well as the gold template acting as a stress-distributing bar.

These templates were also used in unilateral situations but were restricted only to the maxilla.

By opening the soft tissues and observing the underlying bone, I saw the destruction, resorption, and perforation of the screws and their exposure of themselves buccally, lingually, and palatally from the shallow and knife-edge ridges that were beneath the overlying mucoperiosteal tissues that completely camouflaged the much narrower and shallower anatomy of the underlying bone. I saw these severely obliquely flaring bony ridges that resembled nothing like the oversized and extraordinarily thickened soft tissue ridges.

I realized right then and there that implantology had to do a complete 360 degrees turnabout in order to prevent implantology from dying in the early 1960s.

Something had to be created to be designed uniquely enough so that it could be placed into these extremely knife edge ridges, and something had to be created to be able to be placed into these shallow ridges, and something had to be created to be inserted into these extremely obliquely flaring ridges and be designed in such a way as to have necks that can be bent so that each and every one of them can have their post be made parallel to one another just by bending, and it must be designed to have open vents to allow bone regeneration to take place inside the vents. Thus was the creation of the blade implant.

Why did I come to the conclusion of immediate load (which I first realized with my self-tapping immediate loaded vent plant screw in 1963 and the subperiosteal implants in 1952)?

Because from the very moment a blade implant is tapped into a properly executed channel in the bone, it cannot be inserted more than a fraction of a millimeter into it. However, knowing that the channel was made as deep as possible below the neck and blade body itself and that the channel was made as long as the blade mesiodistally or slightly longer but never shorter, the blade can then be easily tapped into the bone so that its shoulders are at least two to three millimeters below the alveolar crest. The bone

that immediately flanks the body of the blade both buccally and lingually is so close that they nearly join on each side of the body of the blade. So the cut vessels, which were cut during the osteotomy, can just continue through the vents of the blade body to join with the bone on the other side—so that bone regeneration is minimized, and therefore all of these implants were placed into immediate function. The big advantage of immediate function is that the bone regenerates as lamellate bone as compared to implants that were used in two stages by first submerging the implants from three to six months before adding the prosthetic post to it. In these two-stage procedures, the only type of bone that forms is bundle bone.

How did I come to the conclusion that my self-tapping vent plant (the very first self-tapping screw implant in the world) could be placed into immediate function?

As I previously mentioned before in my textbook, all implants that immediately preceded my own vent plant needed a tap to tap into the bone to create a preformed osteotomy for the easier insertion of their screws.

I mention all those who immediately preceded me by giving them a great deal of credit because it was just about 1962 and 1963 when all of these implants came to be. The implants of Stefano Tramonte from Milano, Ugo Pasqualini from Milano, Giordano Muratori from Bologna, Sami Sandhaus from Lausanne, Switzerland, all first needed a tap.

By my first using these taps, I was able to see the big faults and disadvantages when using them.

For example, just after you screw a tap into the bone, you can easily cross-thread or destroy the threads that were made with the tap when the tap is removed. But let us say that one was careful enough to unscrew the tap without destroying the threads made inside the bone. Then an implant must be screwed into the osteotomy, making sure that the metal threads of the implant can be carefully placed between the bony threads made by the tap. This procedure is almost impossible. So as the implant is screwed into the osteotomy, it destroys all or most of the bony threads. Thus, the fit of the implant in the bone is compromised. Also, most screw or root form implants are designed with no or very little vents, so those same cut vessels created from the initial osteotomy must first encircle the entire peripheral border of the implant to get to the other side—the end result—a two-stage root form implant that must first be buried for three to six months before attempting to place it into function.

The self-tapping vent plant screw implant came into being in 1963 after doing hundreds of most of the other screw-type implants and seeing their many disadvantages.

I improved greatly the flimsy fragile implant of Chercheve made of Vitallium with its square shaft and fragile helix which did not allow for the ingrowth of new bone. I included in my implant a rounded rather than a square shaft which was much more tender to the soft tissues. I changed from Vitallium to pure titanium which was a much more acceptable material and changed from the small tiny openings of the double helix spirals to one large vent which would definitely allow bone regeneration. Most of all, and the

most advantageous of all, was the transformation of my implant (the vent plant) into a self-tapping mechanism which had great advantages.

There were several long sluiceways running vertically and at right angles to the threads of the implant from near the coronal portion of the implant along the entire length. One edge ran at a sharp right angle to the nearest threads while the other end just smoothly sort of fluffed away.

So it worked like this. An osteotomy with a twist drill was first made to represent the entire length of the implant itself. The osteotomy was approximately one-half to one millimeter narrower than the implant's threads. Then the implant was carefully placed a millimeter or two into the osteotomy. This was made possible because the apical three or four millimeters of the implant was always unthreaded and slightly narrower than the threads. So if the apical nonthreaded portion of the implant had a three-millimeter diameter, the twist drill would also have the same diameter. As the implant was ratcheted into the bone, the right-angled edge of the sluiceways would cut apically along the surrounding bone and deposit the bone slivers into the apical vent. If there still existed more bone and the vent was completely filled, then the remaining bone would fill up the sluiceways.

So in this manner, the implant would be close to 100 percent in contact with the bone; and because of the large open vent that was already filled with bone, the histogenesis of bone was never delayed. Thus, all of these implants were always placed into immediate function.

But to place these into immediate load or immediate function, I had to develop the concept of prefabricating the fixed prostheses.

I did these procedures in two different ways. First, a complete laboratory fabrication of an all-acrylic or acrylic-over-metal prefabricated prosthesis; or in some smaller unilateral cases, I would sometimes do it chair side.

In any event, a full upper and lower tray filled with an alginate material one at a time would be used to take impressions of the maxilla and mandible followed by a vertical dimension and centric occlusion.

On the articulated master model, I would prepare the remaining teeth that were present and that were to be part of the finished prosthesis for full crown restorations. I would construct the fixed prostheses to have wide buccal-lingual or labio-palatal pontics so when the implants are inserted into the bone, their posts would contact some area of the pontic. Once this was established, the pontics would be hollowed out enough so nowhere would they interfere with the seating of the prosthesis. In many cases, I even went further by further hollowing out the pontics so they could "pick up" prefabricated gold copings with retention pins which became an integral part of the prefabricated prosthesis so that there would be metal-to-metal contact instead of merely acrylic-to-metal contact. Most of my bridges created the phenomenon of bilateral stabilization.

Why all the designs for blade implants? When I first invented the blades, I was very often drawing directly on the panoramic x-ray the design I needed for each specific

anatomical and morphological situation. I would then make up these implants and superimpose the one that best fitted the radiological puzzle. Of course I made many more designs that were necessary, but not those many today are needed to be able to be used nearly everywhere.

There was also the problem of the size of the vents in the body of the blade. At first I thought that the larger the vent, the more bone would grow inside. This was far from what I first believed. By making a blade with just a peripheral border along its superior, inferior, and mesial and distal border with one large vent, the results were just a small amount of bone forming in the center and all acellular fibrous connective tissue attaching from the bone to the peripheral struts.

I came to the conclusion that making many smaller vents allowed the bone to grow into its centers while restricting the length and amount of connective tissue to grow between the bone and the struts because with very small vents, the bone that grows inside restricts the length of growth of the surrounding connective tissues.

Bi-Blades

A reentry system of endosseous implantology was designed to replace the destruction of bone due to overretained periodontally involved teeth and overretained failing root form and blade-type implants.

After practicing for over fifty years of dentistry mostly involving implants, there came a time when I realized the tremendous destruction of bone that took place because of the failure of the dentists to know when to address failing conditions.

When removing multiple periodontal teeth next to one another or removing long-term failing groups of endosseous screws as well as failing blade/plate form implants, the original osteotomies after curetting out all of the granulation tissues left much to be desired.

Through my overwhelming experience, I developed what I still believe today was the ideal reentry endosseous implant which I named the "bi-blade." It consisted of two blade portions of various heights but all of them not much thicker than a fraction of a millimeter. These blades were separated into three millimeters, four millimeters, or five millimeters from each other depending on the base that was located between them which supported the post.

The technique which was rather simple required any remaining alveolar bone that existed to be removed directly to the inside of the buccal-lingual or buccal-palatal cortices of bone which were then carefully drilled to have an even surface from its mesial to distal extensions.

A proper-sized bi-blade was then brought to the surgical site. It should be slightly wider than the new osteotomy. As it was brought to the surgical site, both its mesial and distal ends were squeezed slightly together so it could fit into the narrower osteotomy. The bi-blade was then tapped into its proper depth which should have both shoulders between three and five millimeters below the remaining alveolar crest. The squeezed ends of the bi-blade immediately sprung outward to tightly hug the inside of the buccal and lingual cortical plates. Synthetic

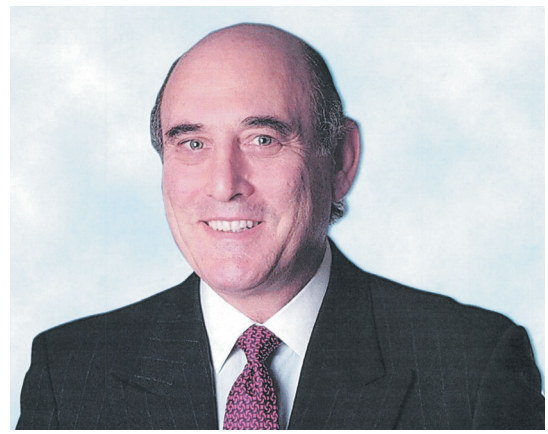
bone such as osteogen was introduced to fill the entire osteotomy, and the tissues were sutured together. Most of these bi-blades were placed into immediate function. However, I did include some of them to be used as a two-stage implant to satisfy some of those non-believers.

Charlie English - a very respected implantologist

With Sami Sandhaus of Switzerland. He developed the very first nonmetallic screw implant called the CBS (crystal bone sapphire)

Dr. Raphael Chercheve

Sebastian Lo Bello (Italy) and Gerhard Heim and wife (Germany)



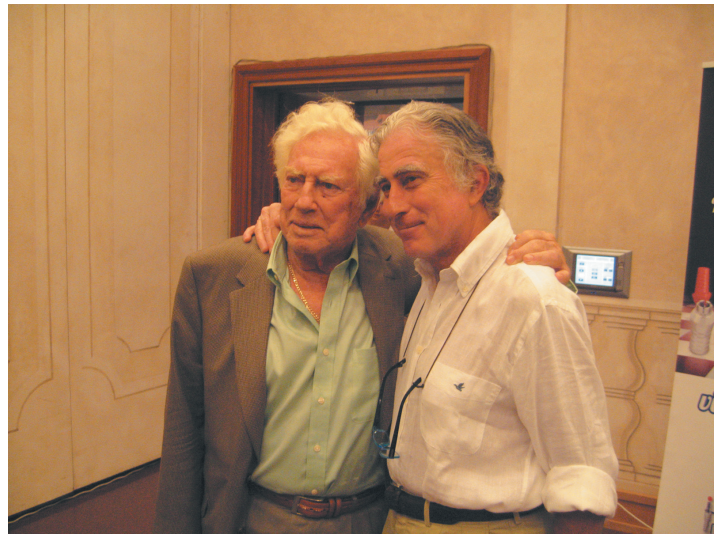
David Hoexter - you and I have always been great friends. Even as being a periodontist, I still love you.

FROM IMPLANT NAIVETY AND STUBBORNESS TO LINKOW

Professor, NYU, College of Dentistry, Department of Implant Dentistry, New York, New York; Clinical Professor, Department of Fixed Prostheses, Pittsburgh University, Pittsburgh, Pennsylvania; Associate Professor, Department of Oral Surgery and Implantology, Lille University, Lille, France.

Dr. Linkow, in 1954, appeared in a period of dental upheaval, denial, and antagonism of the dental profession as regards to the science and art of implant dentistry. For most of his life, he had to fight the profession almost single-handedly—but over a course of more than forty years, he had won the battle, as all of you now know just how far and advanced the field of implantology has developed.

Pierre Domns (Belgium) prepared many histological sections around implants. Jean Marc Julliet (Paris) introduced 3D blade implants.



Dr. Marco Pasqualini and myself.

It is strange the way life catches up with us. Here I am in my eighth decade of life and the days starting flying away from me faster than the months used to fly

Although there is very little we can do about it we must try to keep our candles burning without flickering. We all must give every second of every minute one hundred percent of our energy to build upon what we have always strived for.

Once the candles stop burning it's all over.

So, upon ending this short version of my book, *My Life, Times, and Legacy*, I want to wish all of you the very best of times and may God bless all of you.

Len Linkow

My protege, Dr. Michael Shulman, Cliffside Park, N. J.

Dr. Belotti and I.

I will always remember our friendship. Jack Wimmer Park Dental Research.

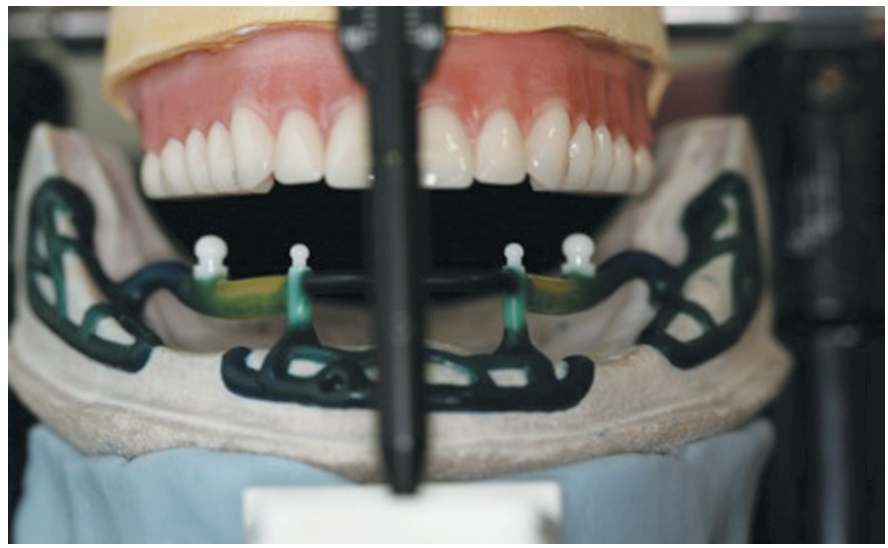
Myself and Dr. Luca Del Carlo (Venus, Italy)

1981 – PRESENT
20,000 SUBPERIOSTEALS

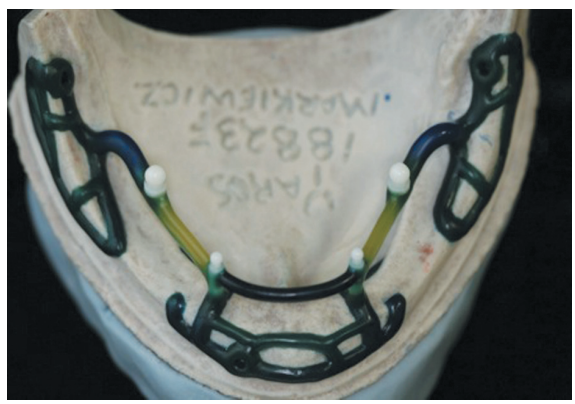
RESEARCH
DOCUMENTATION
30 YEARS OF BENEFITS

Dan Root laboratory has been storing over 20,000 models of subperiosteal implants since 1981.

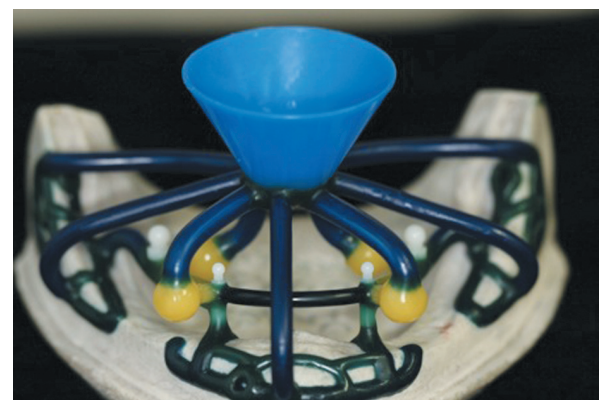
A magnificent maxillary and mandibular removable prostheses with the lower model that was supported by a mandibular tripodal subperiosteal implant.



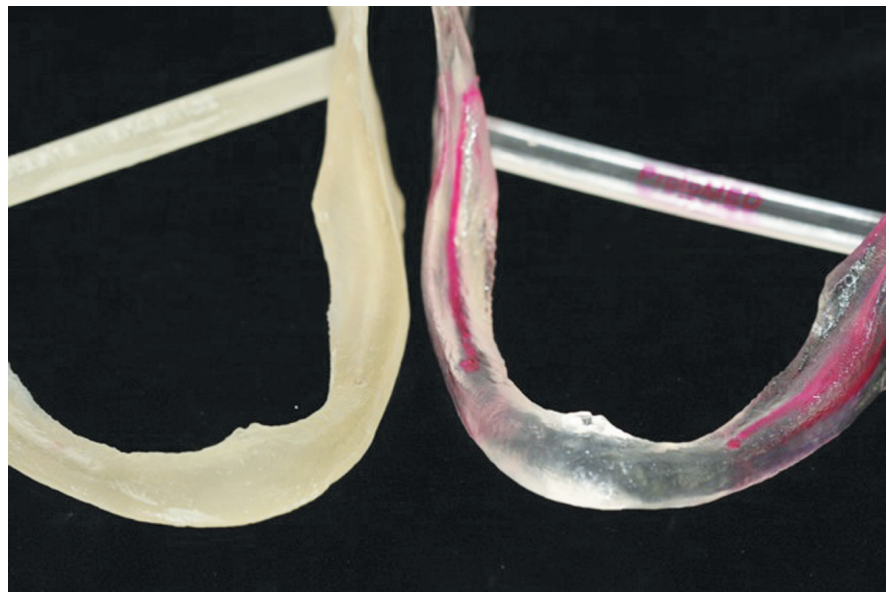
The same maxillary denture opposing the wax-up of the mandibular tripodal subperiosteal implant.



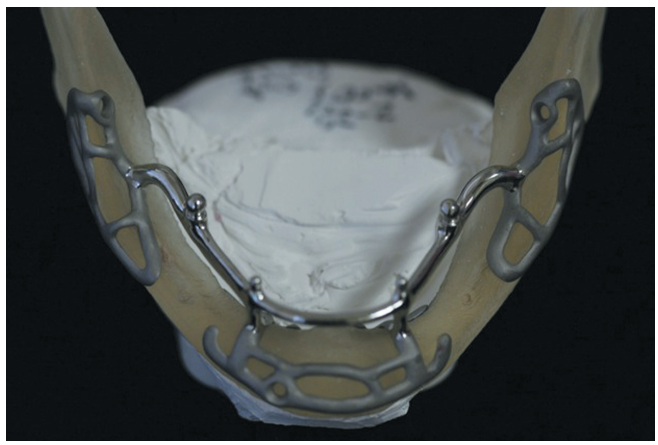
Another tripodal mandibular wax-up.



The spruing prior to the casting of the mandibular implant.

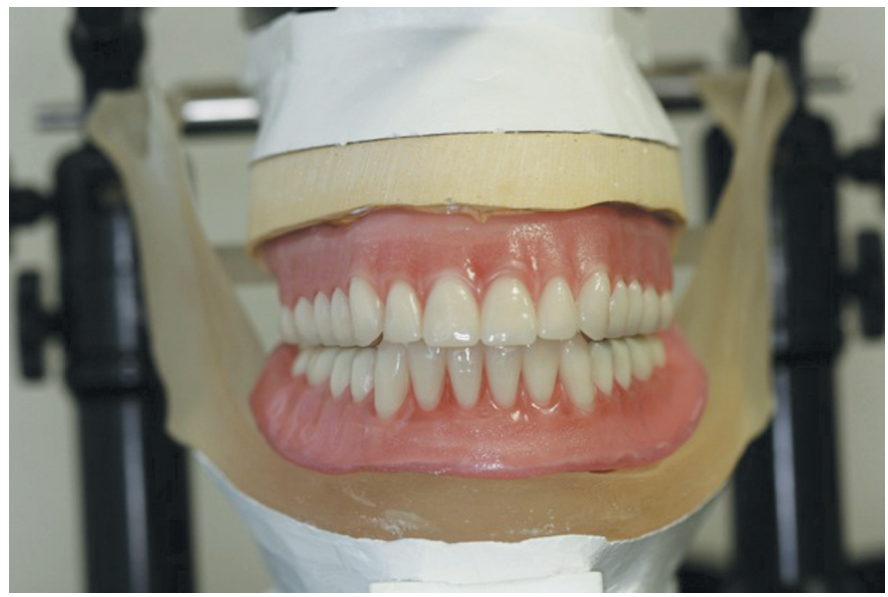


The models created by a C-T process.

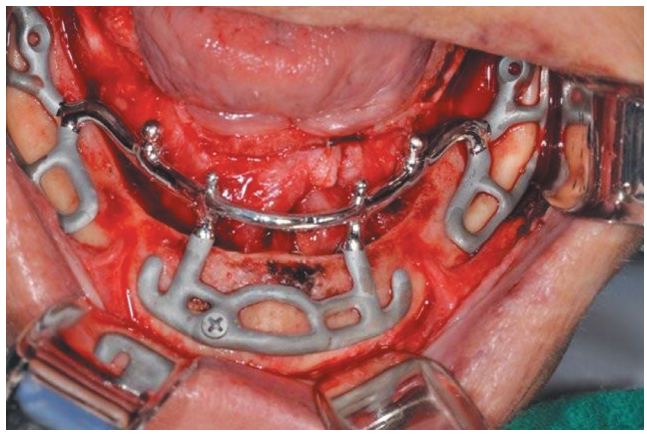


A finished vitallium tripodal subperiosteal implant.

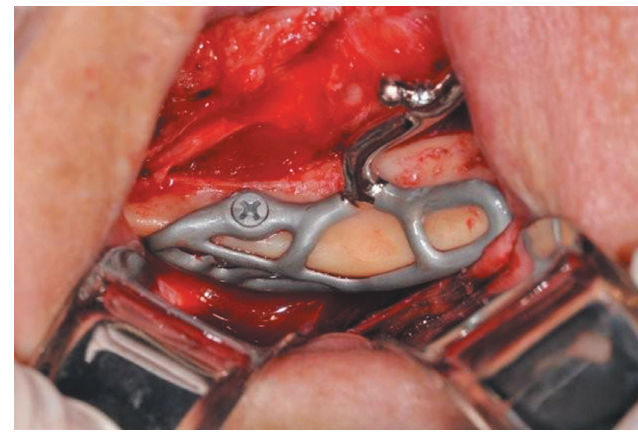
The implant denture supported by the underlying tripodal subperiosteal implant.



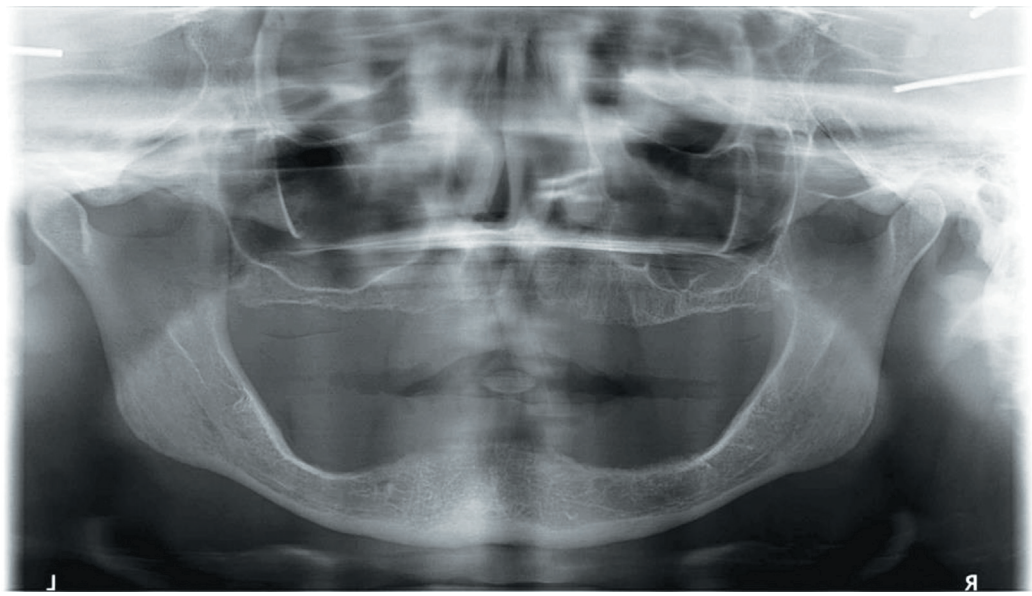
The final occlusion.



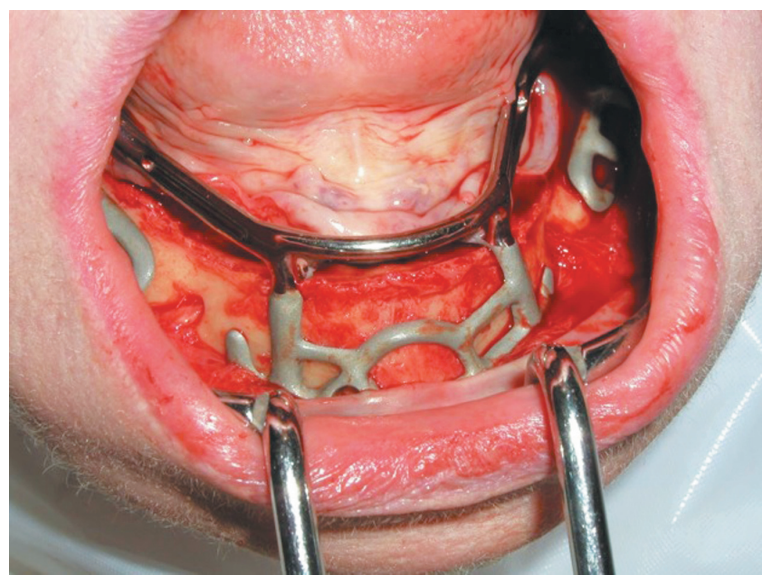
The accurate fit of the implant over the patient's bone.



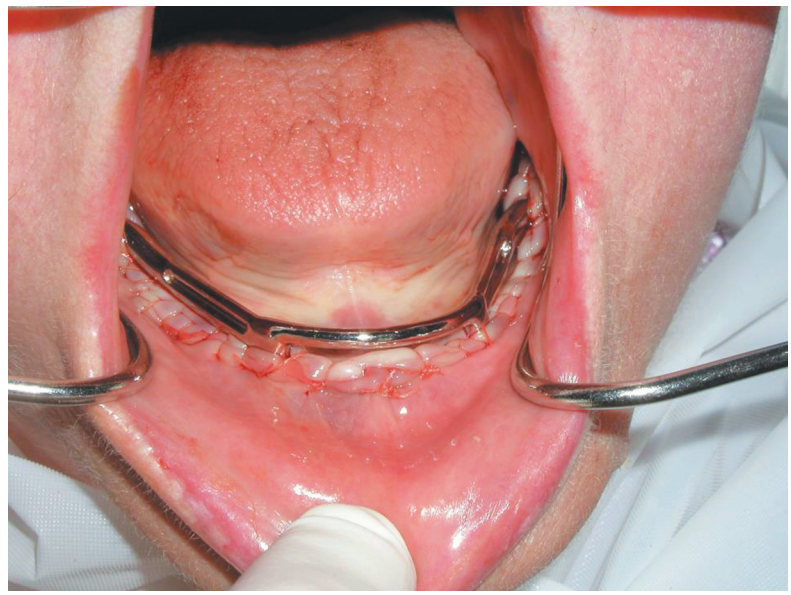
Some doctors still believe in using tiny screws to stabilize the implant.



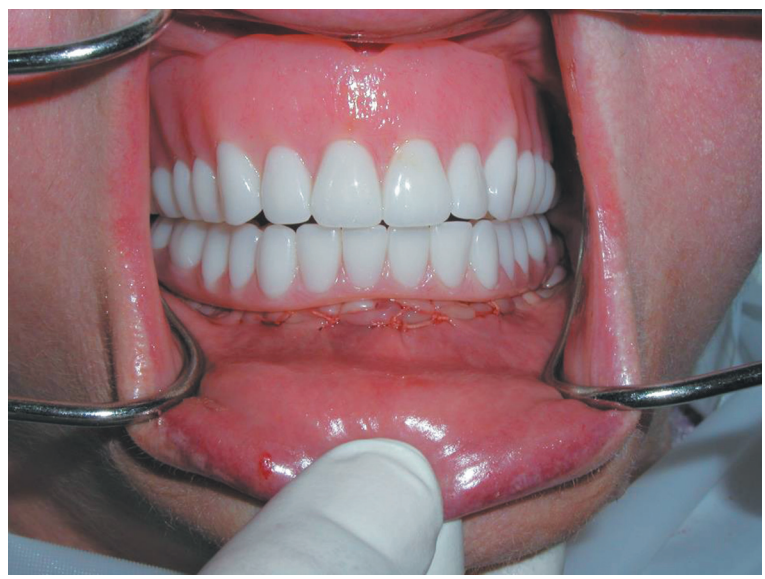
A pre-operative panoramic radiograph.



The implant in position over the bone.



The moment the sutures were removed.



The lower denture is entirely implant supported.
Its peripheral borders should never compress the underlying soft tissues.

Dan Root (left) and General Norman Schwarzkopf.

Hey! Wait a moment! Do you all think the book should end here? No Way! There are just too many devoted colleagues that have stuck by me and believed in me who should be mentioned and be part of this book.

The overall education including my many techniques and procedures have been carefully followed out by many of the colleagues I am about to mention. Because of these men my implant education has been spread all over the world.

Take Dr. Misch for example. To me he is one of the most brilliant implantologists in the world. But much more than a great doctor, what he did for me will never be forgotten. In 1983 I was knocked off my feet with a quadruple bypass surgery. It happened when I started to vacation in Florida. It had not been easy and my recovery period was lengthened to three months because I needed several blood transfusions.

Carl Misch who had been practicing in Detroit, Michigan insisted on keeping my practice alive for three solid months, coming three days a week and refused to be compensated with a single penny. I will never forget what you did for me, Carl, and to this day I am so very proud and fortunate that you were the finest student that I had some influence in your career.

Dennis Tarnow - I want to sincerely thank you for the wonderful preface you had written about me in one of my books titled "The Legends of Implant Dentistry, with the History of Transplantology and Implantology." I am thrilled that after leaving New York University College of Dentistry you have settled down in Columbia University and continuing on with your great reputation.

To my dear friend, colleague and co-author **Sheldon Winkler** I can only say I have been very fortunate and proud to be considered one of your good friends.

To my dear friend for so many, many years **Jack Wimmer** I cannot express to you in enough words just how much I love you.

To Marco Pasqualini - Marco- you have proven to be a great follower of your internationally known uncle, Ugo Pasqualini and you have become a leader just as he was. I am proud of you.

To Stefen Fabel - I want to thank you again for the excellent job you did on your final term paper written about me and my practice and legacy. Thank you so very much.

To my dear friend and patient Anthony Zigarelli I wish to thank you for all those wonderful letters you had written me over the years expressing your extreme emotions over the difficult work I had been fortunate enough to accomplish. Your deep emotional words you had written on paper also were written directly into my heart.

Thank you very much.

To Dr. Richard Hughes - you have climbed thru the floor boards in your rapid climb in implant dentistry. To me you will definitely be one of our great leaders in the near future.

God bless you Rich.

To John Minichetti and **Shanker Iyer** for your exceptional friendship and help when I needed it. Thank you so very much and may your practices continue to grow.

To my dear friend **Maurice Valen** from the moment I hired you to work as a dental technician for me you were just a kid. However, your skills didn't take a long time to be appreciated by many people especially by many of my patients. You have grown in leaps and bounds and have made great progress, especially with your research in bone matrix material.

To Jack Hahn, you are one of the few guys who have stuck with me all these years and in doing so you made a big name for yourself. I am very proud of you.

I can so clearly remember how you traveled with me all over the world in the late sixties - especially to Italy. We traveled so very much in those early days bringing implant dentistry to so many parts of the world. When I often think back over those days my eyes tear and I always seem to get lumps in my throat. God bless you Jack and may you have many more years of peace and happiness.

To my dear friend, **Chuck Mandel** - you have been so very devoted to me and have always given me credit for just about everything. I want you to know that I think of you as a very close brother whom I love very much.

To Raul Mena - you are also one guy that will always be close to my heart. I know how hard you have been working trying to get your excellent root form implants accepted but unfortunately you must understand that in this profession of ours marketing is the name of the game and that is what costs a lot of money. The implants that we see on the market today are the ones that have millions of dollars behind them. They are not by far the best ones. So Raul be at ease and be proud of what you have already accomplished.

To Michael Pikos - you know that I was the one who proposed you for the Aaron Gershkoff award and you certainly deserved it. I am very happy over the fact that you are becoming involved with blade implants and tripodal subperiosteal implants. Keep up the excellent work.

To my dear friend **Giordano Muratori** from Bologna, Italy. You were a very true friend and we spent many happy days together in many cities of Italy. We all miss you Giordano, and think of you and the great things you had accomplished in oral implantology. May you rest in peace.

Georgio Gnalducci - Georgio, you were some fantastic human being. I met you under very unusual circumstances. Let me first go back in time before you entered my life.

Dr. Jacque Scialom from France in the middle and late 1960's was the number one implantologist along with Raphael Chercheve from France also. Scialom developed and introduced the needle implants made of tantalum.

They were designed to be used three at a time to form a tripod by locking the coronal ends with acrylic which gave the individual needles immediate stability. Scialom knew how to make thousands of dollars selling the implants by setting up companies all over Europe. He even had some of his expert "needle doctors" place them into various offices for exorbitant fees and then honor these offices with a large plaque that would be placed just outside of the special offices. The plaques would read "needle implants of Scialom with the doctors name included in the plaque." This would cost the doctor at least $ 25,000.00. But then he could go out and place the implants into someone else's practice for a large fee.

Then came a time when Scialom contacted me from France and made an appointment with me to meet him in the Plaza Hotel which was on the same street as my practice.

I remember coming into his room in the hotel. I had brought about twenty large x-rays showing my blade implants which I wanted to show to Scialom.

Scialom was seated in a large rocking chair smoking which I would describe as a ten to twelve inch large cigar. He brought another colleague whom I knew as Jean Marc Juillet.

He eventually told me he wanted to make me the president of his needle company and I would receive 20% of every implant sold. I knew that Jean Marc Juillet was the president so I asked him why he was now trying to make me president. He said that Juillet did not have enough "clout" to move the company to the heights that he desired. I was only interested in showing Scialom my x-rays of the blade implants which he simply refused. So I ran out of his room aggravated especially after he told me if I would keep my blade implants a complete secret for the next three years he would make me the world leader. He was ten years my senior but I still ran out.

About a year later I received an uninvited visitor. He was a huge person with a raw and deep voice. I was doing some research in one of my back room offices when one of my secretaries brought him to me. With no words said he threw down a ten by twelve inch x-ray showing the tripod needle implant. It greatly antagonized me so I threw it right back to him. Then I sat him down in front of one of my Carousel projectors and placed in one of my dozens of carousels filled with blade implant slides and I left.

Every few hours I would leave my surgery offices and peek into the back room where Gnalducci was staring at the blade implants with his mouth wide open. At the end of the day this big strapping guy threw his arms around me and said he never saw these implants and he now wanted to represent me in Italy. I said I do not need to be represented anywhere. He then told me the truth which revealed that he was sent by Scialom to visit me and talk me into being his needle implant president which would give me 20% of every implant sold

as well as 20% for Gnalducci. In any event, I never accepted it but Gnalducci and I became very close friends.

I started going to Milano (Gnalducci's office) every six weeks or so to do dozens of implants.

He had a tremendous practice with three waiting rooms and eleven excellent dental technicians. Gnalducci was suffering from severe kidney disease and had to be on dialysis at least three times a week.

Those years in the late 1960's and early 1970's I made the greatest waves in implantology. I had lectured in almost all of the Universities in Italy including the University of Milan, Rome, George Eastman in Rome, University of Bologna, University of Pisa, University of Torino, University of Bari, and many more.

There came a time when I was "set up" and I say set-up because that's how it ended, to give a live surgical course in the main ball room of one of the most magnificent hotels in Rome called the Cavalieri Hilton.

Siemens Company had supplied the entire area with magnificent surgical equipment and full dental equipment.

I started to work on the first patient who was a woman in her early 70s. There was a microphone next to my mouth and I was told over and over to slowly remove a tripodal implant from her mouth. I told Gnalducci that I could pull it out in less than one second but they said no. So every time I would touch the implant the poor lady would scream. The anesthesia was purposely filtered down with water so it had no effect. It was all a scam at my expense. Gnalducci wanted the audience consisting of over four hundred dentists to believe that needle implants were no good and everyone should switch to blade implants. I finally jerked out the implant and relieved her of all her pain. The microphone certainly helped the audience hear her crying.

I continued working on a few other patients when I noticed that in the back of the large main ballroom I saw a number of men pushing the exceptionally tall wooden doors inward while the doors were being pushed toward them from the outside. I was about to ask questions when Gnalducci pulled on me to immediately leave my patient and run with him. At first I refused but then realizing that something real wrong was going on - I ran with him. He grabbed a taxi cab that took me to the train station where I was placed on a train headed for Zurich, Switzerland and told me my clothes will be sent later. He finally told me what and why the event had occurred. Tambura Da Bella was Scialom's number one man and he found out about my surgical course. He immediately informed the police of the situation and they stormed to the hotel where I was doing surgery to place me in prison because I had no license to practice in Italy - something that I was completely unaware of. Well anyway I finally flew to the United State and thinking I would be discovered when I went through customs. Things finally went well for me and I came home undetected.

Several times in my life I was accorded astonishing recognition. In 1972 on one of my frequent visits to Milan I was invited by Carlo Sirtori, a renowned professor at the Carlo Erba Foundation, to give the first of what became a semi-yearly lecture series in the foundation's

magnificent headquarters. The main hall was extraordinary, what I believe was Baroque-era architecture and art-work. The vaulted, gilded ceiling was painted in a sequence of radiant frescoes. Ornate chairs, upholstered in embroidered cushion, had been set out for the large audience. This was a site more befitting heads of state and coronations. For all I knew, the site in the past had hosted such a function.

Professor Sirtori was a brilliant medical research doctor who specialized in cancer. He was one of the elite who had earned the privilege to nominate candidates for the Nobel Prize. Just after I had completed the vibrant and rewarding weekend seminar, he called me to the podium along with Gnalducci and began making a speech in Italian. I presumed it concerned me, or else why would I be standing there? Not speaking Italian - except a few standard phrases, like "you are a beautiful woman" or "what is the weather report?"- I had no idea what Sirtori was saying.

Indeed, I had few skills in the language of any of the nations I visited. German, Japanese, Italian: my knowledge of implantology was far wider than my glossology. First, there was seldom time to learn. Language is best studied in a versatile, casual social atmosphere. But I did little socializing outside of the seminars. And many of my international colleagues frequently knew sufficient English. Those who did not, when visiting the US for seminars, obtained translations through the provided headsets. Similarly, every audience member was supplied with a headset for my lectures in Europe or Japan. My English became German, Italian, French and whatever language was spoken by the remaining majority of the attendants, be it Spanish, Greek, Portuguese or Japanese.

From time to time, the audience burst into applause. Once they rose to give a standing ovation. What was the Professor declaring to cause such a stir? I turned to Giorgio and asked him to translate. He was wearing the broadest smile I had ever seen on his face. Then he astounded me, "Professor Sirtori", he said, "has just informed the audience that he is going to recommend you for the Nobel Prize for Medicine."

The Nobel Prize! I couldn't control my emotions. I started to cry and had to turn away from the audience. Italians, being such a sensitive people, were so moved that their applause only grew louder. Someone snapped a photo of that unforgettable moment. It still hangs in my conference room.

I was especially heartened to also have my dear friend Jack Wimmer as a witness. He was so touched that he cried along with me. A concentration camp survivor, Jack was an exceptional man for who the American dream came true. Early in his career he established himself as a technical pioneer in implantology, and became the owner of Park Dental Laboratories on East 34th Street in Manhattan, one of the most distinguished labs in the country. Before Jack sold it in 1977, Park Dental had fabricated the subperiosteal implants I used. Their work was precisely tooled to specification, made from finest materials and always delivered on time. In short, the best.

Jack's innovation and integrity had been very influential in advancing the science of implantology and gaining its acceptance by the dental community. We became very close friends. The two of us were often on the road together, in the States or abroad, spreading the

gospel. So here we were, in Milan, as I basked in the applause and considered the prospect of a nomination for one of the most distinguished awards in the world.

I considered that my work on the cardinals of Milano had played a part in the discussion of a nomination. During my surgical visits they, quite elegant in their red robes, would come for the implants. I was honored to perform as their chosen specialist and never charged for the service.

I did not get the Nobel Prize or a nomination that year, nor did I ever think I had a real chance, given the nature of the competition and the nominees who won, absolutely brilliant people like Gerald Edelman and Rodney R. Porte. The gesture, however, was fabulous. It's truly the thought that counts. I was further honored by Professor Sirtori when he requested that I sign a special book he kept for the signatures of great men in medicine, titans like Dr. Albert Schweitzer, Sir Alexander Fleming, Dr. Christian Barnard and Dr. Michael DeBakey. Giorgio and Jack stood by as I proudly added my signature to those of my legendary contemporaries and predecessors.

In these months and years I was showered with honors. The mayor of Milano received me at a special commemoration. I was officially knighted as a Knight of Malta; I, a Jew joining a centuries-old circle that is traditionally Christian, and Catholic. Nor was I overlooked by the Roman Catholic church; I have a magnificent citation from Pope Paul, a very prestigious memento honoring me for being a father of implantology, and for my gratis care of many cardinals. Additionally, several world-renowned Italian universities wanted to bestow citations upon me for having taught the highest caliber implantology to their alumni.

Another of my biggest thrills also caught me completely unawares. Professor Hoffer, also of the University of Milano, was not just a knowledgeable teacher, but a very accomplished musician and conductor as well. He invited me to an evening concert he was conducting at La Scala, the magnificent, world famous opera house. The occasion certainly promised to be pleasant on itself. But then he announced to the full house that the concert was being played in my honor! There I sat, front and center, applauded by the audience. I was dazzled and elated as the Professor lead a 21-piece philharmonic orchestra to the majestic works of Beethoven and Bach!

There is another story that I must tell about my dear friend and colleague Georgio Gnalducci. It was like an Italian comedy as tragic as it was.

The only two week vacation I ever had while practicing dentistry was spent on Georgio's seventy five foot yacht off the island of Ibiza. The vacation was fabulous and during our dinner at one of the open plazas located in the middle of the town he made me promise to take one solid month off during the next summer. I very reluctantly accepted his proposal but I could never picture myself away from my office for an entire month. So I finally flew home.

But I would never get to take that cruise. Just before Thanksgiving Day, on November 23, 1978, less than three months after the vacation in Ibiza, his elder son Marco called me. There was a sad, terrible urgency in his voice. "Dr. Linkow" he said, "Father morteo". Please come immediately to Milano.

I asked my secretary to call Alitalia Airlines to reserve my seat on the evening flight to Milano, and to contact Georgio's office to inform someone on his staff that I would be on it. I left the office at once. I didn't even take the time to go home to pack. The only clothing I carried was the suit on my back.

The plane arrived at Malpensa airport early the next morning. It was not unusual that rain was drenching Milano. The airport almost always seems to be under a sea of rain clouds, which if they turned violent could cause a diversion of planes to other cities. Thankful, not this time. When I deplaned someone from Giorgio's office was waiting to take me to the church.

About an hour later we arrived at the Church of San Pietro in Sala, a Milanese neighborhood. Giorgio's body was lying in state. Now I was overcome with grief. I realized that the day he died was also the date he had been born. It struck me that this would be the last time I would look at my friend. True friendship is so precious. Life is so fleeting. I had lost my best and most trusted friend. True friendship is so precious. Life is so fleeting. I had lost my best and most trusted colleague. Those sentiments together weighed on my heart like a cold, black mass. While I had certainly known that sooner or later Giorgio would fail from his poor health, I never dared to expect it would happen at his age. He was only fifty-two years old.

The church was so crowded it was almost impossible to move, but other than his technicians and his close associate, I saw only a few whom I knew from my wide travels with Giorgio. While I stood by the coffin, transfixed by the sight of his body, I felt a tap on my shoulder. I turned to see Marco, now a pre-med student with the goal of following in his father's footsteps as a dentist. He threw his arms around me and we both wept together.

His wife, Titi, from whom Giorgio had been separated the last three years of his life-making way for the Russian girl who spent his money with his consent, as if the Warsaw Pact might invade at any time-then appeared at my side with her younger son, Massimo. Dressed in black, her face was obscured by a dark veil which wasn't so opaque that it could hide her tears.

As if I were immediate family, and the most aggrieved, the three of them led me toward the doors of the church and the limousine at the curb. I sensed that we were being observed by a thousand eyes. Finally we were outside. We climbed into the limousine behind the hearse that bore Giorgio's body. I was already drenched by the relentless rainfall.

Giorgio had always wanted to be buried in the hills near the small town of Montepoulciano, on the Arno River, in the lovely province of Toscana, very near the border with Umbria. He had lived there as a young boy, and his younger sister and her husband owned a hotel-the Marzocco-just a few hundred yards from the cemetery.

Suitable to the sorrowful occasion it rained hard all day, not once relenting during the two and half hour drive to Montepoulciano. Titi sat in the front of the limousine with the driver while I sat in the back with Marco and Massimo. She cried and wailed and grieved the entire trip. Titi really took Giorgio's death hard, even though she had been fighting with him terribly during their years of separation.

At last we arrived. The rain had become a deluge. Soaked to the skin, we were made even more uncomfortable by a sudden chill at the higher elevation. The cortege proceeded a block

or so to the small cemetery, Santa Chiera. I and several men from the village served as pall bearers. We gathered around a solid, cement - lined crypt. Giorgio's mother, his sister and Titi were clustered together, a tableau in black, while his father, brother-in-law, and others from the village stood to one side. What happened next was almost like a scene from an Italian comedy, although a very wary and macabre one.

We surrendered the casket to the men of the cemetery staff, who with rope began to slowly lower it to its resting place inside the cement crypt. But the rite stopped short. Everyone was puzzled. We realized why. The casket wouldn't fit! It was at least three inches too long! This catastrophe brought even more weeping and anguish from the women. And near-panic among the men. A sudden death. Dismal weather. The body of a beloved one that could not be interred. How tragic! Quickly conferring, two of the cemetery fellows ran off, leaving the casket perched obliquely over the crypt. They soon returned-not with a shovel to somehow enlarge the grave- but with a two-man lumber saw! What, exactly, were they going to shorten? More screams echoed over the headstones as they sliced hastily into the rich wood. I stood there, stunned and disbelieving. After some minutes of vigorous, rain-soaked activity before our silent, suffering huddle, enough length was removed from the casket, at the foot end. I thought they were going to cut off Giorgio's toes!

The casket crudely but finally reduced to the proper size, was once more lowered into the crypt. It fit snugly but without a problem.

Then the men began to shovel wet earth over it. Thump! Thud! The image and sounds conveyed the finality of the ritual and of life even more than the funeral at the church.

We straggled away from the cemetery, a solemn group if there ever was.

My clothes and shoes felt as if I had just emerged from the nearby lake. Every thread clung to my wet body so tightly that it was difficult to move.

We first entered a very small church, located several hundred yards from Giorgio's final resting place. It was named Saint Agnese, after the martyr who lived during the fourteenth century. When Saint Agnese died she was beautified by Caterina de Siena-who herself was proclaimed a saint after she died in 1380. Caterina was proclaimed patron saint of all Italy together with San Francesco, or St. Francis of Assisi.

I sat near the back of the tiny church, recalling the unforgettable and happy times I had enjoyed with Giorgio. That was my instinct to dwell on the joy, because death is a part of life and the person we choose to celebrate is best memorialized as they were when most engaged in living. The priest began his sermon. There were only about two rows of seats and I had a good view of the altar and chapel wall behind the priest. I noticed a peculiarly shaped structure there, covered with what looked like a purple curtain. This probably would otherwise not have attracted my attention but for an event which almost shocked me and my clothes into instant dryness. As the priest concluded his sermon he either banged the podium with his hand or yanked a chord which activated a mechanism of some kind. It set off a heavy echo. As if on cue the curtain rose to reveal a glass structure housing what appeared to be a woman's body. This was strange theatre. As the congregation knelt to pray I edged closer for a better look.

Yes, it was definitely a female form, dressed in a lacy gown, her face was darkened to almost the color of mahogany. She had been dead and preserved for a very long time. The most unnerving aspect of this grotesque sight was the position of one of her legs, which was elevated and stretched out at an angle of at least thirty-five degrees. She/it appeared to be frozen in motion. Death had been animated.

I later heard the explanation for the mummy's contortion.

According, to legend, Caterina visited the remains of Saint Agnese and paid homage to her by prostrating to kiss the saint's feet. But in honor of Caterina's own saintliness the spirit of Saint Agnese actually raised the foot of her corpse's leg to spare Caterina the need to stoop. Since then, the foot of the remains of Saint Agnese has remained perpetually extended.

The service concluded, I joined the family members as they proceeded to the small hillside hotel owned by Giorgio's sister. By now I was frozen stiff, shivering unbearably, and couldn't wait to take a hot bath and go to sleep. It was only seven in the evening but it was already a dark, wet November night.

For the time being I banished my memories of lavish evenings in Milano and Rome, feasting and laughing and at talking teeth and culture with colleagues. Giorgio was almost always among the cast, and I couldn't bear to think of life without him.

As soon as I got to my room I turned on the tub faucet and made the unhappy discovery that there was no hot water! I panicked. I was frigid to my core; my fingers and toes were numb. I felt vulnerable and went in search of someone who could help, but the hallway and tiny lobby were dark and desolate. It seemed like time had warped to 3:00 AM. At this time of year, the hotel was usually closed, and had opened only for Giorgio's family. There were few or no staff members on the premises. I was reluctant to disturb anyone, in their private grief, over the relatively trivial matter of no hot water. I realized that this would be a miserable night. Plodding back to my room and its cold white marble floor, absent even a throw rug for my bare feet, I made do with two thin bathroom towels. But there was nothing at all to be done about the bed; upon it was one white sheet. No blanket. I looked in all the drawers, and again plodded back into the hall in search of a closet, but had no luck. I felt uncomfortable poking around in someone else's home, so I returned to the room, removed my damp, rumpled suit and fell upon the bed. Sleep would not embrace me. I tried to conjure up the rigors of my army days, of weapons training and long marches in the heat, of parachuting from a plane and kitchen patrol. Mind over matter, I thought. But the discomfort was insurmountable; I felt I must have been a lot colder than my poor friend Giorgio. Sleepless all night, I could hardly wait for daylight.

At dawn, zombie-like, I donned my wet clothing. To warm up, I ran back and forth in the early sunshine. In the lobby, I found the chauffeur hired by Giorgio's family. No one was around to bid me arrividerci. I prevailed upon the man to drive me to Rome, where I could catch the next flight to Kennedy Airport and resume the momentum Giorgio had helped me attain. I never had a chance to purchase a new suit. At no point in the journey did my clothes ever dry. It was a minor miracle that I did not contract pneumonia. But this torture probably

was of some use, after all; at least for a time it distracted me by focusing my attention on the distress that wasn't overwhelmed by grief for my dear friend.

I now wish to mention a number of very important professionals who I hold very dear to me.

Francesco Mangini - you are a diamond in the rough. You are one great person full of ambition, but most of all honesty. I can remember the very first time I set eyes on you. It was during a lecture I was presenting in Torino. You were in the audience wearing wide rimmed glasses and you could not have been older than thirty five or thirty six. Immediately after my lecture you introduced yourself to me and said you wanted to follow my teachings in spite of the fact that the Italian Dental Association probably didn't accept me at that time and so they did not allow you to continue as part of the Association. However, you accepted it and instead formed the **Linkow Implant Institute** which is still alive today. For the past twenty five years or so the Linkow Institute became alive every June where great implantologists from all over Europe would be invited to lecture. It was not only for learning, but so much friendship and camaraderie was born there. Francesco, you have done a magnificent job. God bless you.

Luca del Carlo - Luca, you have only become known to me less than two years ago, but from the unbelievable magnificent work you have been doing I feel I have known you all my life. I respect you so very much for the fact that you have proven to be the biggest proponent of a multimodal approach in implant dentistry.

Stefano Bertone - I am very proud of you for your book on subperiosteal implants and your dedication to implant dentistry.

Marty Altman - You were a great dental technician. We had such great times together flying to places and universities all over the country and Europe. In those days I did a great amount of lecturing while you were teaching the audiences how to reconstruct atypical situations. You did a great job Marty and I am very proud of you.

Oleg Surov from Litva - Oleg was the number 1 implantologist from the USSR. He had been present at five Russian seminars I had given over the years and developed his own subperiosteal implant design. He was very well respected and loved by all who knew him. May he rest in peace.

Michael Shulman - Mike, you have more than ever proved to be devoted to me. You are not only a magnificent implantologist but you can quote practically every sentence from all of the eighteen books I already had published. I want you to know that I am very proud of you and in consideration I have labeled you as my protégé.

So now I feel more content to end this short version of my book, "My Life, Times and Legacy". I want again to wish all of you the very best of times and may God bless all of you. If you wish to see how I looked 86 years ago, the pictures will reveal it. Now I can close.

My mother and dad holding me as their baby 1927

How I looked 86 years ago

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