



Editor **Cleft Lip and Palate**  
Samuel Berkowitz

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# Cleft Lip and Palate

2nd Edition

With 478 Figures, Mostly in Color,  
and 46 Tables

 Springer

## Editor

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## Dedication

My professional growth has been nurtured by my understanding wife, Lynn, who made it possible for me to spend endless uninterrupted evenings at my desk, while at the same time encouraging me to “stay with it.” Warm hugs to my two daughters, Beth and Debra, Ruben and Edward, and my eight grandchildren for their endless expressions of support and love.

Last, but by no means least, I cannot say enough for the countless children with various palatal and facial clefts whom I have treated over the past four decades and for their understanding parents. This book is ded-

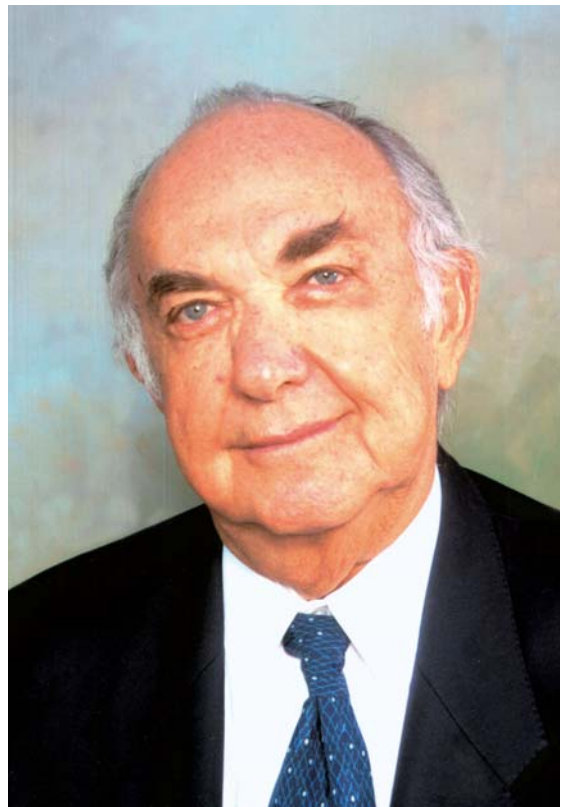
icated to all of them as a token of my appreciation for their enduring perseverance and fortitude. My young patients have taught me much about the human spirit and the joy that can spring from surmounting nature’s adversities.

Finally, my work was made possible by the support of J. Ralph Millard Jr., who appreciated the value of serial records starting at birth. He and I have differed on a few areas of treatment, but we strongly agreed that only through the analyses of objective growth records could progress in treatment be accomplished.

## About the Editor

Dr. Berkowitz, an orthodontist, was a Clinical Professor of Pediatrics and Surgery associated with the South Florida Craniofacial Anomalies Program at the University of Miami School of Medicine. Currently he is Adjunct Clinical Professor at Nova Southeastern University College of Dentistry – Orthodontic Department, and Adjunct Clinical Professor of Orthodontics at the University of Illinois College of Dentistry. His main goal is to develop teaching materials in cleft palate for professionals in plastic and oral surgery, orthodontics, and speech language pathology. He is a past President of the American Cleft Palate Association Educational Foundation, and the Florida Cleft Palate Association, and is currently President of the Miami Craniofacial Anomalies Foundation. Dr. Berkowitz was active in the American Association of Orthodontics, Florida Cleft Palate Association, and The Edward Angle Society of Orthodontists. He has published widely in medical and cleft palate journals and is the author of Volume I and the editor of Volume II of *Cleft Lip and Palate Perspectives In Management* – First Edition; he coauthored *Plastic Surgery of the Facial Skeleton* with S.A Wolfe, M.D, and wrote *The Cleft Palate Story* for parents of a child born with a cleft. Dr. Berkowitz is a popular speaker on cleft lip/palate topics and has presented many workshops and seminars in the USA and abroad.

His research interest focuses on improving surgical-orthodontic treatment planning for cleft lip and palate children as well as those with other craniofacial anomalies. Currently, Dr. Berkowitz is project director of a clinical research program that is studying the long-term effects of various surgical treatment procedures on palatal and facial growth and development. He created a quantitative method for determining when to close the palatal cleft space, based on the 10% ratio of the cleft space to the area of the surrounding palatal surface medial to the alveolar ridges. He is creating a Power-Point lecture series for surgeons and



Samuel Berkowitz, DDS, MS, FICD

orthodontists to enable them to better understand and teach others the effects of surgery on the face from birth through adolescence.

Dr. Berkowitz has been awarded the title “Honoree” by the Edward Angle Society of Orthodontists, and “Honoree” by the First World Congress of the

International Lip and Palate Foundation for his many contributions to the field of cleft lip and palate treatment. His extensive serial clinical records of dental casts, lateral cephaloradiographs, facial and intraoral photographs, and panorex are going to the National

Museum of Health and Medicine (associated with Walter Reed Hospital's Institute of Pathology in Washington D.C), where they will be available for continued study.

## Foreword

It is most gratifying to be able to write a foreword to this latest and most valuable addition to our compendium of knowledge about cleft lip and palate. The field has been close to my heart for over 50 years, even before I became Director of Research at Northwestern University's Cleft Lip and Palate Institute in 1948. It has been my good fortune to be associated with some of the outstanding pioneers in the Team Effort approach – Herbert Cooper, Wayne Slaughter, Sam Pruzansky, J. Daniel Subtelny, Howard Aduss, Jack Thompson, Alan Brodie, Herbert Koeppe-Baker, Harold Westlake, Fred Merrifield, Wilton Marion Krogman, Sam Berkowitz, Robert Ricketts, Margaret Hotz, Rudi Hotz, Arnold Huddart, Sheldon Rosenstein, Bengt Johansson, Hans Friede, Mohammed Mazaheri, Karin Vargervik, Samir Bishara, Donald Warren, Hughlett Morris, Morten Rosen, Charles Kremenak, Bill Olin, Ralph Millard Jr., Ralph Shelton, Ken Salyer, and many others in the U.S. and Europe. These dedicated and knowledgeable leaders in the field built a strong foundation of total service for patients unfortunate enough to develop this congenital defect.

My own research in the growth and developmental aspects and the influence of therapeutic ministrations has been replicated and serves to remind us of the complexities of the biologic continuum and their interrelationships. My maxim always has been, "From the abnormal, we learn much about the normal."

Samuel Berkowitz wrote his master's thesis in cleft palate under the supervision and guidance of Samuel Pruzansky at the Craniofacial Program at the Univer-

sity of Illinois School of Dentistry in 1959. From there he went to the University of Miami School of Medicine to help develop, with Dr. D. Ralph Millard Jr., Chief of Plastic Surgery, a craniofacial anomalies program and clinic (1960–1998). They collaborated in developing an extensive collection of longitudinal records of dental casts cephaloradiographs, panorex, and photographs from birth to adolescence. Dr. Berkowitz's main goal was to create lasting treatment concepts based on a better understanding of the natural history of cleft palate and facial growth and development. This book discusses in detail the resulting treatment concepts, which are supported by in-depth case analyses.

Dr. Berkowitz has drawn on the experience an international array of scholars and practitioners – researchers, surgeons, orthodontists, speech therapists, pediatricians, obstetricians, psychologists, prosthodontists, pediatric dentists, otolaryngologists, audiologists, and others. He has carefully crafted and integrated the important contributions from each field, welding these diverse areas into a multidisciplinary team. These are described in the preface. There is no doubt in my mind that this work will become the standard reference for all who work in the field of craniofacial anomalies, as we move into the twenty-first century.

T. M. Graber, DMD, MSD, PhD, Odont. Dr., DSc  
Editor of the International Journal  
of Orthodontics and Dentofacial Orthopedics

## Preface

In the first page of the first edition of this book, I quoted Samuel Pruzansky [1] who, after participating at an International Symposium on Cleft Lip and Palate held in 1969, and reflecting on what he heard at that meeting, stated, “The same tired questions have been asked as at every similar clinical meeting. And I despair at the general unfamiliarity with the pertinent literature.”

Fortunately, since the 1950s, many clinical investigators in the field of cleft palate have performed excellent clinical studies of the management of cleft lip and palate that have contributed to the intellectual ferment over the last 50 years. To these studies we are indebted, since to know this literature is vital for correct treatment planning.

When selecting significant references for this text, every attempt was made to carry out an exhaustive literature search to include all of the excellent articles on each subject covered. That, however, has been an insurmountable task. To investigators whose research articles were not included, I apologize and I advise readers to conduct their own literature search, which must include papers on the “opposing schools” of thought. There is no doubt in my mind that their final conclusions will be the same as mine when they consider the results of long-term palatal and facial growth studies that involved the analysis of objective records.

To familiarize clinicians with the appropriate literature and its importance to the treatment of cleft lip and cleft palate, the chapters in this book are structured to improve clinicians’ understanding of the natural history of the cleft defect, the face in which it exists, the influence of surgery on palatal growth and development, and equally importantly in developing an appreciation for the heterogeneity that exists even within a single cleft type.

These chapters will show that chronological age is not the parameter that really matters in determining the age at which to close the cleft in the palate. What is

important is morphologic age and physiologic fitness, that is, whether the tissues are adequate in quantity and quality and whether the geometric relationship of cleft parts is favorable or unfavorable for reconstruction. Some questions incident to growth, which date back 25 years, concern the relationship of the malformed palatal segments to the contiguous skeletal anatomy, which, in turn, may be anomalous. These following questions are also addressed: Are the palatal segments static in their deficiency or does the deficiency diminish in time, that is, is “catch-up-growth” a predictable phenomenon? And if so, what surgical procedures (as to age and type) make it possible?

Many of Pruzansky’s thoughts, written so many years ago, still hold true today and are worth repeating. He stated that *whoever sees things from their beginning will have the most advantageous view of them*. To that end, most of the serial cases presented in this volume start soon after birth when plaster casts and photographs of the palatal and facial defect are taken. Serial lateral cephaloradiographs are added as soon as the child is manageable, and again taken periodically through adolescence.

It is hoped that clinicians who are just beginning their involvement in cleft palate will learn the pathology and its natural history of cleft palate from the cases presented in this book and appreciate the need to keep careful records (casts, cephaloradiographs, photographs, and panorex) which are of vital importance to both the processing of knowledge and self-criticism.

One last note of great importance – it is rare that two members of a team, such as I, an orthodontist, and D. Ralph Millard Jr., a plastic surgeon, can successfully work together even when some differences in treatment philosophy exist. We succeeded because we were professionally compatible and because we shared an obsessive need to determine why some procedures are successful and why others fail even when the same treatment procedures were used. Failures, we discov-



ered, occur principally because of misinterpretation of physiological principles and/or a lack of technical proficiency.

Dr. Millard understands the value of serial objective records dating from birth as the essential starting point in determining the long-term utility of any surgical cleft treatment program. Although I was always free to voice a contrary opinion as to what surgery should be performed (and when), our working relationship was based on recognizing the right of the surgeon to reject recommendations and follow his own dictates. And it was my right, as a member of a team involved in growth studies, to document the anatomical changes to the face and palate for future analysis. Respecting our mutual rights and responsibilities was no simple task. Strong emotional and conceptual barriers had to be overcome in the process of communicating with each other.

Our 40-year search for a better understanding of the natural history of cleft lip/palate growth and development and the effects of various surgical-orthodontic treatment procedures ultimately led Dr. Millard to a conservative approach of staged surgical treatment without the intercession of maxillary orthopedics with periosteoplasty, which he tried and found wanting.

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Special appreciation is extended to those who attended my Cleft Palate Seminar and contributed financial support to the Miami Craniofacial Anomalies Foundation.

Immeasurable thanks are likewise due to my many colleagues in the American Cleft Palate-Craniofacial Association and involved in various cleft palate clinics in Europe and Asia for contributing to my understanding of cleft lip and palate management. To them, too many to recognize by name, I shall be forever grateful for their professional knowledge and personal friendship.

## Introduction

The general aim of this volume is to present recognized experts from the clinical sciences of dentistry, medicine, speech, audiology, psychology, genetics, ethics, and biology, so that all aspects of the treatment of cleft palate and other craniofacial anomalies can be scrutinized from a particular point of view: long-term clinical experience.

For the sake of brevity, many variations in cleft type and their treatment alluded to in this book were not presented. Because of the multiplicity of variables, no simple description or classification and treatment plan could possibly satisfy everyone concerned with this problem.

Pruzansky [1] was once asked, "When should the orthodontist's, speech pathologist's, or prosthodontist's interest in the cleft palate child begin?" His response: "The answer is quite clear. Everyone who seeks to serve the needs of the child with a cleft should begin at the beginning". An interest in all events affecting these children is essential to the training and educational experience that each member of the team must obtain. Each specialist emerges not only better informed in his own field, but with an increased perspective regarding the means available for providing an integrated program of care for the handicapped child.

The material presented examines the face with a cleft in all aspects as a biologic continuum from birth through postnatal growth and development to maturity at various stages of treatment. In the past several decades, many advances have taken place in cleft habilitation procedures. Unfortunately, many of these changes have not fulfilled all of their stated objectives, and in some instances, these procedures were found to be either injurious or at best unnecessary. These errors will be discussed in detail.

This book also brings together clinicians and biological scientists from the United States, Asia, and

Europe, each of whom in his or her own way has been seeking answers to the multifaceted problem of cleft palate, regarding its embryopathogenesis, craniofacial growth, maxillary orthopedics, surgery, protraction of the maxilla, dental speech prostheses, secondary alveolar bone grafting, speech, hearing, genetics, psychosocial development, and craniofacial surgery.

Each contributor presents pertinent concepts so that a broad perspective of the entire habilitative process can be obtained. The conclusions the reader will reach will be the result of well-documented literature of selected well-controlled clinical research that has withstood the test of review and re-examination.

Because space limitations prevent thorough penetration of all aspects of each subject, a large bibliography is included for additional source material. In no way could these chapters be expected to cover all aspects of this complex subject.

It is my hope that, through a better understanding of the cleft palate defect and face, all clinicians will be better able to evaluate present-day treatment practices and concepts to better plan their own treatment procedures.

We fully acknowledge the important contributions made by the authors and research programs from the institutions which have strongly influenced much of what has been written in these volumes

All lip and palate surgery of my cases were performed by Dr. Ralph Millard, Jr., except where otherwise indicated; S.A. Wolfe performed all skeletal surgery and secondary alveolar bone grafting. They both performed superior-based pharyngeal flaps. No presurgical orthopedics were used unless specifically indicated.

Samuel Berkowitz, MS, DDS, FICD  
Editor

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