Craniofacial Distraction

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Editor

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Foreword

A revision may require an introduction for, as an example, taking the position of a ship at sea. But an original work is self-sufficient; it can stand by itself. It does not need a foreword, which is embarrassing for one to write who is ignorant in the matter.

New ideas—some often ridiculous—are daily occurrences in surgery, but successful clinical applications of them are rare. Moreover, when the applications of a new surgical concept extend rapidly to several areas, the fact deserves to be sharply emphasized. This is presently the case for Distraction Osteogenesis, called the "D.O.G." system by the writer. From the basic principles to animal experiments to quantitative evaluations and the wide spectrum of clinical applications, "D.O.G." is splendidly illustrated and its therapeutic appeals made convincing in this book.

Memories

Ilizarov's concept (1952) for limb reconstruction was born in remote, deep-frozen Siberia. Then Snyder experimented (1973) with the canine mandible, but his work escaped the facial surgeon's vigilance. However, Joe McCarthy made subsequent canine experiments and presented the first applications on the human in Florence in 1989; the "D.O.G." method then exploded within only 6 years. The fact is so much more remarkable when one considers that, in general, it takes *one generation* from the infant's first steps to easy jogging; other examples are the transitions from Medawar's tissue compatibility to current kidney transplantation and from chips to personal computers and the development of safety in lens or total hip replacements.

Paleoconcepts

It also took *one generation* for interceptive craniofacial surgery to be applied to the corrections of the deformities resulting from Crouzon syndrome, Apert syndrome, plagiocephaly, Franceschetti syndrome, hemifacial microsomia, "rare" facial clefts, and hypertelorbitism through the intracranial route. One generation of painful effort for all specialties, but only 6 years for McCarthy's performance in attracting facial and cranial surgical leaders.

Jubilation

The writer of this foreword feels the situation so much more ironic because several of the surgical steps mentioned above have been dramatically short-circuited by a simple "jackscrew" device skillfully used. A mandibular endless screw has opened an unlimited adventure. This is a revolution that has spread to the maxilla in Mexico; then the midface and calvarium in France, Germany, and the United States; and so on.

Panoramic Perspectives

Will an endless screw put an end to interceptive facial and cranial surgical procedures, which can still stand as landmarks and references for treatment goals? The D.O.G. system has been elaborated by Joe McCarthy for the child's mandible, which has a high potential for generating new bone. But D.O.G. has rapidly expanded to other young bones, and the method will probably remain a privilege for children. However, the principles have been already applied to nongrowing bones, such as those in craniosynostosis, and also to older posttraumatic mandibular deformities by the process of "bone transport," which might avoid the need for intraoral soft tissue transfers in adults.

Is it not amazing that the D.O.G. method has already attracted the orthodontists? Is it not encouraging that another gate of hope is now opened to the hopeless microphthalmic patients?

Further applications in the human will no longer be "human experiments," but sound applications of investigative surgeons who had either surrendered or had overwhelmed the problems by other means or other tools at different age groups.

Thank You

For the surgery of the human face, the year 1987 was a fabulous milestone. When Joe McCarthy uncorked the first bottle of "D.O.G." in Florence in 1989, he was continuing a half-century NYU tradition for innovation and education.

Paris, France — Paul Tessier

Reproduced from the 1999 book

Preface

I suspect every author, contemplating writing a textbook, asks himself the obvious question: Why? Is there a need? Will it be worth the effort? For me, the answer is an unequivocal yes.

First of all, craniofacial distraction has been a personal odyssey beginning with our initial canine experiments in 1986. As our experience with the technique increased, both at New York University and other worldwide centers, I recognized the need to collect the relevant material and make it available to interested clinicians. The first effort was a workshop, probably the first ever on the subject, held at the NYU Medical Center in 1994. It was a small, but spirited, meeting with no more than 50 participants from around the world. We shared ideas and learned from each other. At the conclusion of the meeting, we recognized that craniofacial distraction, with many of the techniques first developed in animal models, had a sound research/clinical foundation and had resulted in significant advances in craniofacial surgical treatment.

Ten years after the first mandibular distraction, the first textbook, the forerunner of the current book, was published with multiple authors writing on laboratory research, as well as the clinical experience in mandibular and midface distraction. While there have been many meetings on the subject in the subsequent interval, I now believe, almost two decades later, that a new edition is indicated because of significantly new developments and findings in research and clinical distraction.

In organizing the book outline, I have arranged it according to the anatomic components of the craniofacial skeleton. Following the Introduction, there is a chapter entitled the "Biomechanical and Biomolecular Aspects of Distraction," detailing classic research that harks back to the historic work of Gavriil Ilizarov of Russia. Future research advances, beyond those chronicled in this chapter, will have profound effects on the practice of craniofacial distraction.

The chapter on mandibular distraction mainly reflects the experience and clinical protocols of the NYU team. However, there is a complete review of the international literature and the contributions of other teams are also discussed in the chapter.

I was fortunate to work closely with my NYU orthodontic colleague, Barry Grayson, right from the beginning of the craniofacial distraction project. We worked as a team and I learned a great deal from him. He excelled at preoperative planning, data collection and long-term outcome analysis. I should also note he is the father of craniofacial orthodontics, now recognized as a subspecialty of the American

Dental Association. He and Dr. Pradip Shetye have contributed a chapter entitled "Orthodontic Aspects of Mandibular Distraction" in which the critical role of the orthodontist in the clinical protocol is emphasized, followed by a chapter on midface/monobloc distraction.

I have recruited contributing authors from those areas of craniofacial distraction where they have made innovative contributions and have acquired a large clinical experience. Dr. Cesar Guerrero has a unique experience in intraoral mandibular distraction and has demonstrated inventive skills in the design of devices used to replace traditional orthognathic mandibular procedures.

My former trainee, James Bradley, recognized that cleft palate patients, while they may have a satisfactory occlusal relationship, often lack adequate midface projection or contour; hence, his promotion of Le Fort I level distraction before craniofacial maturity is attained.

Working with my former trainee and current NYU faculty member, Roberto Flores, I have outlined the NYU protocol and practices for midface and monobloc distraction. Our experience is predominantly based on the application of the RED or halo devices. We have shared follow-up outcome data extending out to 20 years postoperative.

David Dunaway and Aina Greig of London have a remarkable bipartition distraction experience in which they simultaneously correct orbital hypertelorism and midface hypoplasia. I have also recruited Jesse Taylor of Philadelphia who has developed new applications of the distraction method to expand the cranial vault in pediatric patients with craniosynostosis.

In my over 40 years at the Institute of Reconstructive Plastic Surgery at the NYU Langone Medical Center, I was fortunate to be a member of a remarkable clinical/research team with many of my colleagues drawn from basic science and clinical disciplines outside the specialty of plastic surgery. They have been collegial and we have spent many enjoyable hours together both in and outside the clinical setting. They have challenged me and also exchanged ideas and suggestions. Candor and hard work in such an environment are the key ingredients for clinical innovation and progress.

I wish to acknowledge those team colleagues and NYU fellows/residents who have been involved in the craniofacial distraction journey with me (and apologize to those inadvertently omitted): Joseph Bernstein, Sean Boutros, James Bradley, Lawrence Brecht, E.J. Caterson, Court Cutting, Wojciech Dec, Roberto Flores, Dale Franks, Scott Glasberg, Paul Glat, Arun Gosain, Barry Grayson, Aina Greig, Geoffrey Gurtner, David Hirsch, Craig Hobar, William Hoffman, Larry Hollier, Richard Hopper, Jordan Jacobs, John Jensen, Hitesh Kapadia, Nolan Karp, Tim Katzen, Jamie Levine, Michael Longaker, Richard Mackool, Susan McCormick, Babak Mehrara, Parit Patel, Norman Rowe, Doug Roth, Pierre Saadeh, John Schreiber, Pradip Shetye, John Siebert, Pedro Santiago, Jason Spector, David Staffenberg, Doug Steinbrech, Eric Stelnicki, Oren Tepper, Charles Thorne, Bruno Vendittelli, Stephen Warren, Katie Weichman, Robert Wood and Barry Zide.

I am also indebted to my colleagues beyond NYU, especially Drs. Fernando Ortiz-Monasterio and Fernando Molina of Mexico City. They early recognized the

potential of craniofacial distraction and collected a large clinical series confirming the efficacy of the technique. Likewise, Drs. John Polley and Alvaro Figueroa of Chicago introduced the halo frame for midface distraction, a device whose reliability greatly influenced me. I must also acknowledge Drs. Diner and Vasquez who organized several meetings in Paris that did so much to disseminate the worldwide clinical experiences with this new technique. The biannual meeting of the International Society of Craniofacial Surgery (ISCFS), likewise, highlighted this subject in their programs.

My patients and their families have been my true heroes. Their spirit and courage continue to inspire and energize me. Their optimism and gritty determination were so impressive as they committed to new surgical procedures and the compilation of long-term clinical data. I must pay special attention to Pat Chibbaro, nurse clinician par excellence, who never lost sight of all details of a large clinical program and, yet, remained so devoted to the interests and needs of our patients and their families. Mary Spano, outstanding medical photographer, made sure our photographic records were of the highest quality to ensure important clinical data gathering. Her work is apparent to all who look at the illustrations in this book. Margy Maroutsis, working with Drs. Grayson and Shetye, saw to it that orthodontic visits with cephalograms and ICAT scans were coordinated.

Sandra Cummings, my executive secretary, was ever loyal and capable. Her organizational and computer skills were critical in this new era of electronic publishing. She has managed to keep my professional life on track, always with elegance and good humor.

Unlike the 1999 edition when I worked with a Springer publishing team working less than 15 city blocks away in New York, this book was developed and processed electronically continents apart. Yet, despite initial misgivings, I quickly realized I was working with highly skilled professionals whose help and cooperation I wish to acknowledge:

Ms. Wilma McHugh, production contact; Ms. Tanja Maihoefer from editorial team; Ms. Mahalakshmi Sathishbabu, project coordinator; and Mr. Rajesh Sekar, project manager

I dedicate this book to three departed mentors—all giants of the world of craniofacial surgery. They had endless energy, passion for surgery, intellectual curiosity and unquenchable commitment to surgical problem solving. Colleagues and friends, we shared many happy and warm times together.

John M. Converse—New York
Paul Tessier—Paris
Fernando Ortiz-Monasterio—Mexico City

My successor, Eduardo Rodriguez, in the Wyss Department of Plastic Surgery has graciously allowed me to continue some of my academic work. I am proud that Dr. Rodriguez is at the helm of NYU Plastic Surgery six decades after its founding.

Roberto Flores, my former resident and fellow, has fortunately been recruited back to the NYU Craniofacial Surgery Center. He has been involved in these chapters and has provided many important insights and ideas.

Most of all, I owe so much to Karlan, my wife of almost 55 years. She shared this distraction journey with me—and a "distraction" in our personal lives it could be. She, however, encouraged me and made it all possible, overseeing so many parts of my personal and family life. She tolerated a work schedule, often too fast paced. I will always be grateful for the joy, love and laughter she brings to my life.

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Joseph G. McCarthy, M.D.

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