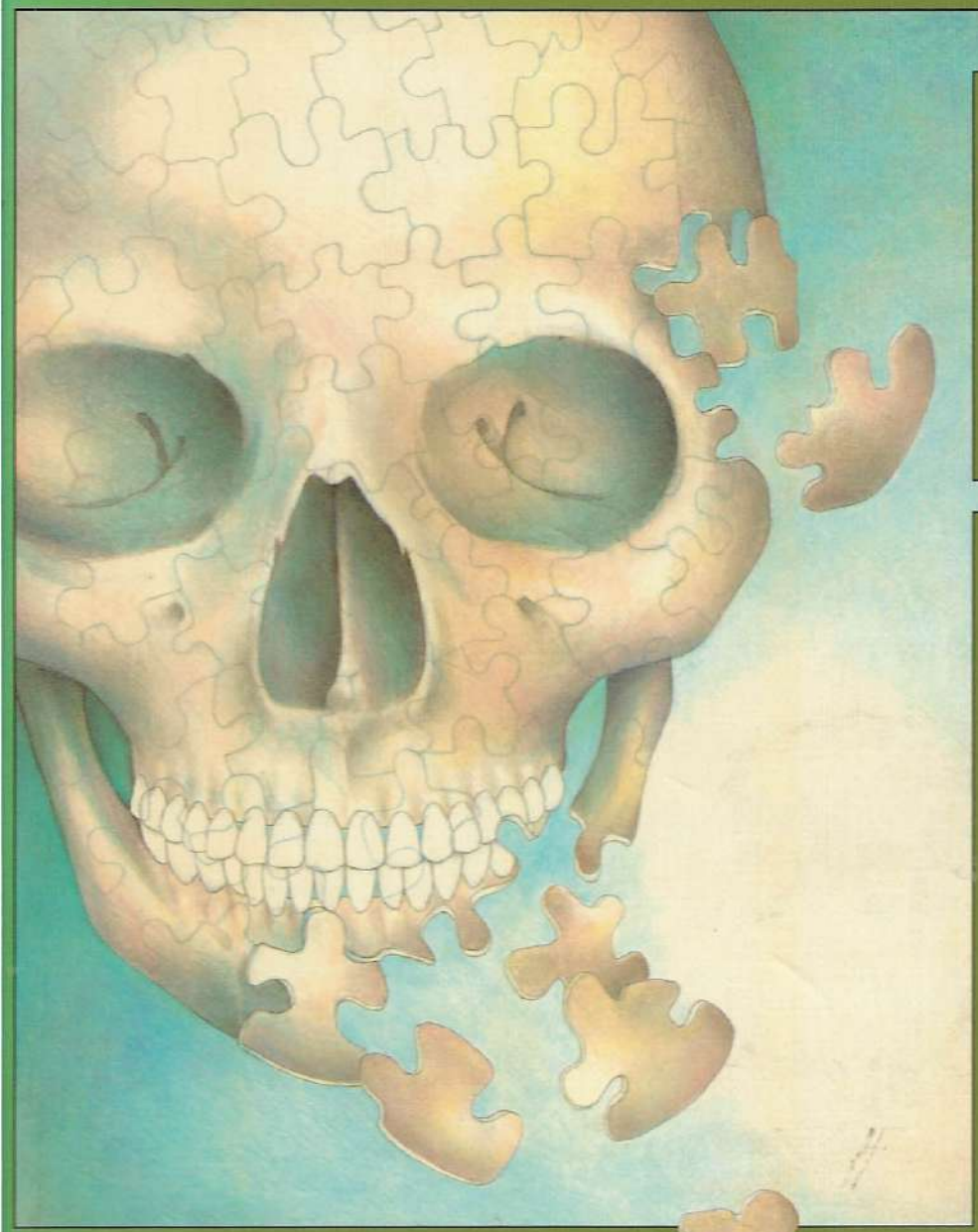

TECHNIQUES IN

AESTHETIC CRANIOFACIAL SURGERY

KENNETH E. SALYER

FOREWORDS BY DANIEL MARCHAC AND FERNANDO ORTIZ MONASTERIO

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This book is dedicated to
the memory of Marie Blankenship
(see Figure 5.2), whose courage, determination,
humor, and love influenced the lives of many.

CONTENTS

FOREWORDS

When I first read the title *Aesthetic Craniofacial Surgery*, I thought that this book was about craniofacial principles applied to aesthetic refinements. Discovering that in fact the whole spectrum of craniofacial surgery was covered, including pediatric surgery, I must say that I was at first surprised and puzzled. Why had my old friend Kenneth Salyer chosen this unusual title?

One usually talks about craniofacial surgery with major skeletal repairs, or about aesthetic surgery—precise, but more limited in its magnitude, yet mixing the two sounds, unusual. After having read his Preface, Introduction, and the book itself, I understand why he has chosen this title and I fully agree. It means that the heroic era of invention of craniofacial surgery is over.

I still remember my amazement when I first saw Paul Tessier in the Hôpital FOCH in the sixties, performing his early facial advancements and orbital mobilizations. It was fantastic to discover that it was indeed possible to mobilize all the bony structures of the face and cranium. This opened the possibility of giving an acceptable appearance to terribly disfigured patients. Now we have to go further, and that is why it becomes aesthetic: We must think in terms of creating beauty and not only in going back to normal. When a young girl comes to a plastic surgeon for a rhinoplasty, we do not only think of taking away the hump or shortening a long nose; we try to figure what modification will be best for this specific face, what will produce beauty for this particular person. Now our thinking in craniofacial surgery should be the same: not only to apply a standard technique, but try to analyze for each patient what modifications, what adjuncts will give the optimal result. The word "aesthetic" adds another dimension to our craniofacial surgery approach, whether we have to deal with an infant or an adult: not only in correcting the abnormality, but in trying to go further, striving toward perfection.

This drive toward perfection requires two qualities specific to plastic surgeons: (1) the knowledge and experience of all the possible procedures that can be performed on soft and hard tissues of the face, and (2) the artistic judgment, acquired through long-time interest and involvement.

As Dr. Salyer pointed out, calculations and numbers as well as dental occlusion are no longer the best guidelines in many cases. It is the eye judgment of the experienced plastic surgeon that will determine the best way to get the "aesthetic craniofacial surgery" result. It is also a sufficient volume of cases. Craniofacial surgery treats many different pathologic conditions and requires complicated instrumentation. I therefore fully agree with Dr. Salyer when he estimates that a minimum of 50 cases a year are necessary to be able to provide the patient with the care of an experienced team. This implies not only an improvement of the quality of the result, but also a diminution of complications.

Craniofacial surgery is often hard work: fighting with difficult dissections, mobilizations, fixations, adjustments. Even if experience has allowed us to cut down on the operative time while doing more precise work, major malformations still require long and tiring operative hours. One is often disappointed with the result: There is an improvement, but in spite of one's expectations the intercanthal distance is still too wide, the junction between the forehead and the midface is not perfect, there is still some assymetry. The patient, as far as he is concerned, appreciates the improvement, but this is not sufficient—we must fight for better results, for "aesthetic craniofacial surgery."

Fortunately, one often has great satisfactions, when a patient presents with a nice face and a big smile, hardly recognizable from the shy and strange-looking person he was before. And, perhaps even more, when in comes a handsome youngster who was operated on for a severe malformation when still an infant or a young child. He hardly remembers that he had a malformation; he has no aesthetic sequalae nor psycho-

logical stigma. Then we have the intense satisfaction of knowing that without "aesthetic craniofacial surgery" he would have been severely distorted and have suffered from psychological disorders.

Dr. Kenneth Salyer is one of the most experienced of the enthusiastic North American plastic surgeons who discovered the pioneering work of Paul Tessier and followed his example. His considerable contributions to craniofacial surgery through papers, talks, and book chapters give him a great authority. The Craniofacial Center that he organized in Dallas is remarkable and allows him to give patients one of the best possible treatments on "aesthetic craniofacial surgery."

This book, with its attractive layout, is easy to read and explains in simple terms overall current concepts of craniofacial surgery. It has something of interest for many disciplines and will stimulate further interest and reading. I am sure that we will find this book in the library of many physicians, who will, I am sure, recognize what a significant contribution it is toward ever-better results for the patient's benefit.

Daniel Marchac, MD

Modern plastic surgery developed mainly during and between the first and second World Wars. The great number of mutilating injuries, many of them facial, resulting from the wars stimulated the imagination of surgeons to devise new reconstructive procedures and improve old techniques. In addition to affecting the soft tissue cover, many injuries involved the facial skeleton and required the participation of maxillofacial surgeons with experience in the treatment of mandibular and maxillary fractures. Great advances were made in maxillofacial surgery, but it soon became evident that soft tissue reconstruction was technically more difficult than the repair of bones. During the following years, the pioneers of modern plastic surgery improved, refined, and invented numerous techniques for soft tissue reconstruction. Bone work was certainly not forgotten, but it was relegated to second place.

Then, twenty years ago surgery of the facial skeleton once again caught the attention of the world. Paul Tessier added a new dimension, extending maxillofacial surgery to the orbits, the forehead, and the cranial cavity and opening the way for the correction of severe congenital and traumatic deformities, which make life in society impossible for many intelligent human beings. Craniofacial surgery is now coming of age. We all understand that achieving a good facial reconstruction requires beginning with repair of the skeletal framework, which provides structural support. But that is not enough. Optimal results can only be obtained when the cover of muscles, ligaments, and skin is restored to its normal condition. The surgeon with the training and experience in, as well as constant dedication to, the reconstruction of hard and soft facial tissues must also have a clear understanding of the aesthetics of the face and the ability to design a comprehensive therapeutic plan.

Kenneth Salyer in *Aesthetic Craniofacial Surgery* presents the general medical profession and specialists in other areas with a comprehensive view of this fascinating field. Drawing a selection of representative cases from his vast personal experience, he covers the whole field of craniofacial surgery in a clear and concise fashion. The diagrammatic illustrations provide an excellent and simplified view of the procedures.

The line dividing aesthetic from reconstructive surgery is no longer valid to the patient. The expectations of a person with a severe deformity or of the parents of a child presenting with a facial cleft are similar to the expectations of a patient requesting a purely aesthetic nasal correction. They may accept the limitations of our surgery, but deep inside they want to look not just normal but beautiful. The understanding of this concept prevails throughout Dr. Salyer's book, which I am sure will be a welcome addition to the library of all plastic surgeons.

Fernando Ortiz Monasterio, MD

PREFACE

We all like to think that beauty comes from within, and at best, it does. But the reality is this: society *does* stigmatize those who look different, those who are "ugly" or deformed. Communication barriers are built and discrimination in employment and in human relationships occurs. Life can be exceptionally difficult. But craniofacial surgery techniques, as defined by Dr. Paul Tessier and now refined, have enabled thousands of people to emerge, literally, from lives of darkness and reclusion into the sunlight. By giving them the boost in self-esteem that even the most attractive people sometimes need, this surgery has given these less fortunate individuals new hope and opportunity.

I believe that the same aesthetic principles revered by plastic surgeons in elective cosmetic change should be applied to craniofacial patients. The only major technical difference between the two fields is that the bony and soft tissue architecture must be altered more radically in the latter. Improvement of the quality of life for people with deformities can mean more than correction, more than movement of a misshapen maxilla, orbit, or of the entire face. There can be, also, improvement upon improvement. There is the possibility that not only can the patient look normal, but that the patient can look attractive. Achieving facial beauty is a goal to strive for.

My interest in, and dedication to, craniofacial surgery has been inspired and influenced by many talented and caring individuals. As I was concluding my training in plastic and reconstructive surgery in 1969, I traveled, supported by the Earl Pagent Fellowship, to meet many fine surgeons who further stimulated my interest in cleft-facial and craniofacial surgery, including Drs. Ralph Millard, John Marcus Converse, and Donald Woodsmith. From my residency at Kansas University under Drs. David W. Robinson and Frank Masters, I went to Dallas, Texas and established the first training program in Dallas-Ft. Worth for plastic and reconstructive surgery at the University of Texas Health Science Center. As Chairman of the Division of Plastic and Reconstructive Surgery, I became a full professor after nine years as Program Director training other plastic surgeons. The residency program I helped establish has continued to grow.

In 1969, as our team was establishing the first plastic surgery clinic at Children's Medical Center in Dallas, I saw many disfigured children for whom no definitive surgical correction was possible. There were many patients with severe facial trauma and congenital anomalies for whom state-of-the-art surgical treatment was inadequate. I had never witnessed or been exposed to craniomaxillofacial procedures as we know them today. In 1970, I observed Dr. Paul Tessier perform, at New York University, the first total forehead advancement and Le Fort III facial advancement in the United States for a young teenager with Crouzon's syndrome. By the end of the day-long procedure, I was convinced that this type of surgery was the answer for many patients with severe skeletal abnormalities. Since that day, I have been dedicated to this field.

In 1971, in Dallas, I performed my first craniofacial procedure, and in September 1972, the first intracranial hypertelorism correction in the Southwest. Since that time we have performed over 3,000 craniofacial and cleft-lip and palate procedures, and still continue to improve and develop the standard of excellence in this field.

We have always advocated and promoted the team approach which is so necessary in complex craniomaxillofacial surgery. Many individuals during the last 19 years have played a significant role in our team in Dallas, as it has evolved into its present configuration at the Humana International Craniofacial Institute. Having been exposed continually to the residents at Southwestern Medical School at the University of Texas, I have been stimulated and influenced by these bright students, whose contributions I greatly appreciate. Of particular note are the contributions made by my research fellows; Drs. Herman Cestero, Richard Toronto, and Ralph Holmes. Since the Craniofacial Fellowship was established in 1979, these out-

standing surgeons have been a major influence in the development of these methods: Drs. Ray Chen, David Billmire, Emanuel Ubinas, David Taylor, Henry Vasconez, Craig Hall, and Edward Joganic.

Major advances in craniofacial surgery, along with the development of microsurgery and myocutaneous flap procedures, have contributed to making plastic and reconstructive surgery one of the most exciting surgical fields today. I am grateful for the opportunity to be involved during this creative period.

A special kind of discipline is required of the artistically-inclined craniofacial surgeon. One must willfully criticize the results of one's work without subjectivity, not settling for the often dramatic differences between "before" and "after" photographs. I have tried to do so in the assessment of my cases, and every surgeon must be willing to become a finer craftsman, who is constantly concerned with the difference between "good enough" and "better." This kind of self-discipline, as well as the ability to evaluate and adapt to new modalities, such as computerized 3D imagery with electronic scalpeling, will significantly improve the results of any craniofacial surgery.

The cost of that "extra effort" is formidable. The cost of a CT scan plus a 3D reconstruction may be $1,500 to $2,000 per patient, and the financial factor should be explained clearly to the parties concerned. But a monetary value cannot be placed on the self-confidence a patient can experience and enjoy from a newly "reconstructed" face. Although the cost of medical care has escalated, can any cost be put on the possibility of improving the quality of one's life? To that end, we have chosen not to turn away any patient, irregardless of their ability to pay. Thus, the Foundation for Craniofacial Deformities was established in 1982 and has now become the National Craniofacial Foundation. Because of the tireless and dedicated work of Marcy Rogers-Salyer and many community leaders, the Foundation has raised more than $3 million for the care of patients with craniofacial deformities. In addition, the Foundation provides psychosocial support and education for the patient's families, and has increased public awareness and understanding of craniofacial deformities.

This book presents the techniques and methods I use in my daily practice to achieve optimum aesthetic results. Surgeons around the world who perform this work have been influential in the creation and development of these techniques. Although some original methods are included in this text, most are modifications of proven methods of other surgeons. A reader who is looking for alternative procedures may seek these in academic books. This book's presentation is similar to a monograph, and is, essentially, a guidebook based on one surgeon's experience. For this reason, references are limited and no attempt has been made to provide a comprehensive review of the literature.

Surgical priority in craniofacial cases should be to construct a normal skeleton because that is the immediate deformity, the pressing malady. Many patients are pleased with that correction alone. For them, it is enough to appear normal, to blend into a crowd without being the conspicious object of gawking, curiosity, and pity. But here is the heart of the matter. More can be done for these people, and since more can be done, it should be done. For patients who desire major change, the best possible results should be attempted by the craniofacial surgeon. I condemn the dental-oriented shift of the facial skeleton. Occlusion should not dictate facial aesthetics, although good occlusion can and should be achieved. But facial aesthetics should be the first consideration and occlusion correction the second. This is why the plastic surgeon is uniquely situated to effect such facial change using craniofacial techniques.

It is my earnest hope that what I have to say may enable those of limited experience in this field to be able to better diagnose and more accurately treat patients with craniofacial deformities. Also, it is my hope that this text will enable others to solve problems by the application of basic principles, and will encourage them to think boldly when planning craniofacial repair or reconstruction. Alternatively, insight into the full panorama of what is involved in this type of surgery may enable a particular surgeon to recognize his or her limitations and to ask for help from someone more qualified in a particular area.

The aesthetic heritage and taste of the surgeon is most important in devising the best facial plan. The planning of most of the cases in this book is not included in detail for two reasons: 1) the practical limitation of the length of this book, and 2) the end result of surgery is more dependent on aesthetic technique than specific millimeter measurements of dental-oriented planning. A young surgeon endeavoring to learn craniofacial techniques can use the specific measurements as a guide only. The final surgery at the operating table depends upon the experience, skill, and, particularly, the aesthetic sense of the surgeon.

I have worked for 20 years with Dr. Edward Genecov, an orthodontist surgeon, who has been an invaluable colleague and associate. Without his detailed dental planning and perioperative orthodontic treatment, the excellent results achieved here would not have been possible. The type of planning dictated by sample cases is indicated in the *Appendix* by Dr. Genecov. The full details of planning, however, is a separate book itself.

Though this book delves into the practical aspects of surgical instruction, I hope the reader will be inspired to alleviate some of the heartache so pervasive in craniofacially-deformed patients. It is an immense responsibility to know one can make a difference and then to actually try to do so. I hope this book facilitates that endeavor for those surgeons who are willing to assume that responsibility.

Kenneth E. Salyer, M.D.

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I am greatly indebted to my colleagues who have contributed to craniofacial and cleft surgery by stimulating my interest in new developments in this field. Although too many to mention by name, I would like to especially acknowledge Drs. Hans Anderl, Janusz Bardach, John Converse (in memory), Jacque Dautry, David David, Antonio del Campo, Ian Jackson, Henry Kawamoto, Daniel Marchac, Joe McCarthy, D. Ralph Millard, Wolfgang Muhlbaugher, Ian Munro, Jack Mustardé, Sam Noordhoff, Hugo Obwegeser, Fernando Ortiz-Monasterio, Doug Ousterhout, Paul Tessier, Jacque van der Meulen, Linton Whitaker, Tony Wolfe, and Donald Woodsmith.

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K.E.S.

INTRODUCTION

"The most imaginative people are the most credulous, for to them everything is possible."
Alexander Chase, Perspectives (1966)

More than any other surgical form, plastic surgery appeals to a surgeon's creativity. But therein lies the difficulty: The aesthetically-inclined craniofacial surgeon must weigh his or her personal perception of beauty with a patient's particular needs and the limits set by human anatomy and craniofacial surgical technique. Current sophisticated technology allows efficient and accurate visual documentation which, with input from several scientific disciplines, allows a thorough analysis of a patient's deformity. But, perhaps more than any other surgical field, plastic surgery demands creativity as well as technical skill. Nonetheless, the creative surgeon, as any surgeon, must also do his or her homework, and carefully plan *in advance* for optimal results.

There are two important points about the "aesthetic" planning process. First, the entire facial structure and facial proportions must be analyzed in deformed patients. This may seem obvious, but can be difficult to remember when a particular deformity, such as a distorted nose or displaced orbit, predominates. Correction of a patient with a cleft deformity often requires reconstruction with pharyngeal flap, lip and nose surgery, maxillary advancement, or related cleft surgery. It should also entail creating an attractive face that minimizes or removes the stigmata of the cleft palate. The long-term goal is to achieve the best proportioned face possible for the patient. This goal should be given as much importance as the short-term goal of correcting the patient's gross facial disfigurement, speech deficiency, or other problems. The challenge to the surgeon is to develop a sense of the individual staged procedures needed and to also visualize the whole, when addressing the most severely deformed patients who will require at least two or more operations.

The second point of aesthetic planning is equally important. Because no two patients have the same combination of facial measurements or proportions, no two surgical plans can be alike. Creativity, combined with the surgeon's insight and skill, is the needed response to each patient's face or canvas. While there are standards in the field of craniomaxillofacial surgery, they serve as a guide, not as a set of laws. For instance, Bolton's standards define certain proportions and relationships for the maxilla, mandible, chin, and the nasal root. These standards, including "The Golden Rule of Proportions," cephalometric tracings, and cultural perceptions of beauty define what is considered normal measurements for "normal" faces. But if a surgeon adheres to these standards alone, the same stereotypes of "normal" will be sculpted over and over again. These stereotypes will not only lack the surgeon's personal artistic touch but also will yield only ordinary results, not results that highlight a person's unique proportions that reflect his or her individual character and beauty. The surgeon is thus challenged to translate the standard

measurements, perceptions, and goals into a functional and aesthetic "change of face" that is individual and pleasing to the patient.

For the conscientious reconstructive/aesthetic surgeon, surgical change is a serious responsibility. Society's expectations of plastic surgery continually rise and so does the surgical challenge. The goal is the best possible aesthetic result. The philosophy inspires every part of the planning process from the initial assessment of a patient's problem to the choice of the surgical procedure with its many variations of perception and execution.

The craniofacial surgeon must understand what constitutes an unacceptable appearance. The patient, of course, does understand this but in a less technical way. That is why the surgical consultation is so important and why direct communication between the surgeon and patient is vital. The surgeon must determine what the patient wants and, also, what is realistically achievable in the operating room. In this meeting of the minds, the patient's desires are understandably emotional and not specific. "I want my nose to look better," the hyperteloric patient might say. Nine times out of ten, such a "better nose" may require major osteotomies of the orbits, repositioning of the canthi, redraping and refinement of the nasal structure and even an intracranial procedure which may be necessary to provide adequate exposure as well as to harvest split cranial bone. The clinical perceptions of the patient are general; the craniofacial surgeon, however, considers the entire face and cranial structure and must translate the patient's feelings into a concrete surgical plan.

A severe deformity inspires the surgeon to create a normal face at the very least. But merely correcting a deformity on a grossly unattractive face still leaves an unattractive face. An artistic appreciation of what constitutes an attractive face and the desire for perfection also inspires the surgeon to create the most beautiful result possible. This is the philosophy that has guided many of the surgical plans and procedures described in this book.

ALL SURGICAL PROCEDURES (1969–APRIL 1988)*

	1969–77	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	APRIL 1988
CRANIOFACIAL	181	59	70	96	92	124	110	165	130	139	145	34
RECONSTRUCTION	1421	118	109	170	116	183	163	124	129	68	89	61
COSMETIC	568	92	52	59	81	122	71	92	70	48	30	14
CLEFT LIP/PALATE												
Primary	404	40	42	76	85	74	63	67	41	77	74	25
Secondary	580	105	105	115	98	93	92	69	82	90	116	16
TOTAL	3154	414	438	516	472	596	499	517	452	422	454	150

*These procedures were performed by K. E. Salyer, MD.

CRANIOFACIAL PROCEDURES (JANUARY 1986–APRIL 1988)*

	CASES	
	SUBTOTAL	TOTAL
Intracranial Surgery		111
Infant Frontocranial Remodeling (under one year of age)	34	
Craniosynostosis Correction (over one year of age)	9	
Hypertelorism Correction	13	
Fibrous Dysplasia Cases	7	
Posttraumatic Reconstruction	10	
Other Congenital Anomalies	38	
Extracranial Surgery		273
Maxillary/Mandibular Osteotomies	106	
Orbital Osteotomies	39	
Orbital Reconstruction	74	
Forehead Remodeling	23	
TMJ Reconstruction	7	
Genioplasty	24	
Nasal Reconstruction		214
with submucous resection	49	
Bone Grafts		200
Rib	88	
Cranial Bone	72	
Cancellous Iliac Bone	40	
Canthopexy		47
Cleft Lip and Palate Reconstruction		398
Primary	169	
Secondary	229	
Complications		29
Infections (Major and Minor)	27	
Deaths	1	
CSF Leak	1	

TOTAL: 1026 patients
1303 procedures

*These procedures were performed by K. E. Salyer, MD.

FACIAL APPROACH

Access to the retromaxillary area, as described by Hernandez-Altemir, can be obtained with modifications as needed. In the unilateral facial approach, external skin incisions are necessary around the nose on the contralateral side, over the dorsum, and below the eyelid, hinging open the maxilla on its soft tissue attachment. The vertical incision of the vestibular mucosa must not coincide with the palatine alveolus osteotomy.

The osteotomies may vary, but most commonly extend through the zygoma, along the edge of the orbital rim, above the medial canthus and through the nasal bone, down through the hinged alveolus between the lateral and central incisor on the side of the initial incision. The incision through the palate begins directly behind the lateral incisor on that side and goes through the pterygomaxillary junction. This allows the entire maxilla to be hinged out on a subcutaneous pedicle (Fig. 1.10).

Such wide exposure of the retromaxillary area offers the opportunity to reach such structures as the base of the cranium, orbit, pterygomaxillary area, nasal area, cavum, clavius, sphenoid sinus, and temporal zygomatic region. This is particularly advantageous in tumor resection as well as in reconstruction of traumatic and certain congenital deformities.

SPLIT LAMELLAR TECHNIQUE

This osteotomy introduces a new technique in which the facial skeleton is split between the internal and external bony lamella. This osteotomy allows a quantifiable translocation of the external table against the native position of the internal table (Fig. 1.11). This interlamellar osteotomy has led to improved aesthetic results in the orthomorphic reconstruction of congenital deformities.

The split orbitofacial osteotomy was developed by us from performing over 400 orbitofacial osteotomies and from technical improvements in surgical equip-

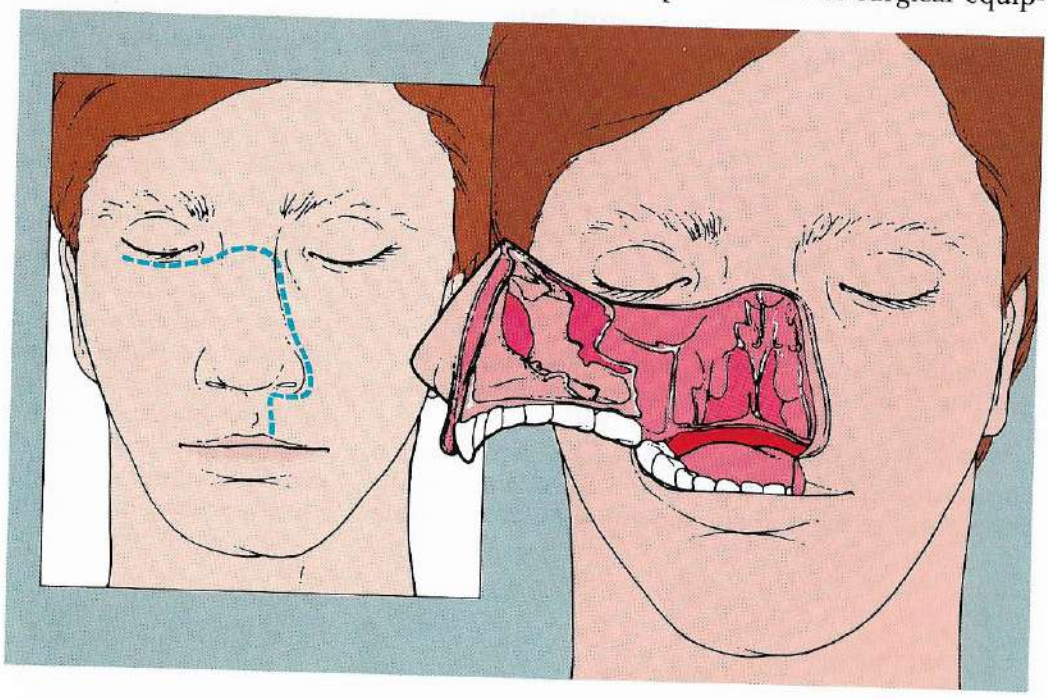

Fig. 1.10 This approach to the retromaxillary region, which was described by Hernandez-Altemir, gives good intrafacial access for tumor resection. The maxilla is hinged open on a pedicle of the facial soft tissues after osteotomies are made as needed, and the palate is incised through to the pterygomaxillary junction.