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Foreword

I have known Drs. Patrick Tonnard and Alexis Verpaele since they had meteoric rise to stardom in plastic surgery with their minimally invasive facelift surgery book, *The MACS-Lift: Short-Scar Rhytidectomy*, in 2004 by introducing a full facelift procedure that could be performed under local anesthesia on an outpatient basis with an operative duration of 2 hours. This remarkably effective technique was minimal in every way from a shorter scar to reduced recovery and less morbidity postoperatively. This was a hallmark of the tantalizing, exciting, and innovative career of these two co-authors. I had the pleasure to get to know them in the ensuing decade as cutting-edge leaders and compassionate, caring physicians as well as superb plastic surgeons. Drs. Tonnard and Verpaele have been very introspective in not only looking at their results, but by truly heralding the beginning of a new era in facial rejuvenation from that of “less is more” to “more can be done with less.”

It is not surprising that this new text, *Centrofacial Rejuvenation*, represents the next step in the evolution of rejuvenation, getting more and better outcomes by doing less. This certainly is parallel with the philosophies that have led to more natural results in facial rejuvenation. An enhanced understanding of the science of aging has evolved from the understanding of fat compartments and that centrofacial aging is the hallmark of early facial aging. It followed that the resulting loss of facial shape and structure requires both centrofacial fat rejuvenation in the fat compartments and outer facelift procedures done with traditional superficial muscular aponeurotic system (SMAS)-type procedures.

This book puts all of this entirely in perspective as they describe the role of microfat and nanofat grafting in perioral, centrofacial, and augmentation blepharopecty. These authors really have been the clinical leaders in shining the light on centrofacial augmentation as the way to restore beauty and natural facial youthfulness, which is the hallmark of an excellent facial rejuvenation today. This text also addresses the use of neuromodulators and fillers and how they are incorporated into modern facial rejuvenation practice.

These chapters bring to life both the science and art of plastic surgery with the finest and brilliant authors in the field, including Drs. Val Lambros and Woffles Wu, who have mastered the science and finesse of the use of fillers and neuromodulators. Dr. Richard Bensimon describes the etiology of aging from the skin viewpoint and how the role of modern croton oil peeling truly helps augment long-term results for patients who have undergone centrofacial fat augmentation...
and facial rejuvenation concomitant with skin resurfacing. He also explores the advances and refinements in croton oil techniques.

This book will become another landmark bestseller, illuminating modern concepts in both centrofacial and facial rejuvenation. I congratulate Drs. Patrick Tonnard, Alexis Verpaele, and Richard Bensimon for bringing this tremendous collection of experience and expertise into focus with this excellent book.

Rod Rohrich, MD, FACS
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Preface to Parts I and II

Facial rejuvenation surgery is a young speciality. It has been around for barely 100 years, and it has known some periods of exponential development followed by more or less prolonged times of status quo. Every generation is tempted to believe they have reached the pinnacle of scientific development, but realistically we know that to achieve the ultimate goal of making patients really look more youthful, not just different, we still have a long road ahead of us. Also, our present day “state of the art” techniques will probably be outdated in another 30 years or less.

The latest revolution in facial aesthetic surgery was the discovery of the superficial myoaponeurotic system (SMAS) and the development of a myriad of techniques to make the best use possible of this key facial structure. Results were satisfying, but only to the extent of the understanding of facial aesthetics at that time. Indeed, facial aging was then mainly contributed to a relaxation or elongation of the facial integument, and thus treatment focused on restoring tension and “lifting” structures back into their original elevated position.

We believe that now again we are at the threshold of an era of an enormous burgeoning of innovative approaches. We are in the age of volumetric restoration and at the start of the new era of regenerative surgery and medicine. Both these concepts are disruptive, because they have generated a completely different way of contemplating and treating facial aging.

Surgical techniques will continue to be influenced by public demand and by the ingenuity of plastic surgeons. Our contribution to facelift surgery was to make the procedure safer and simpler and the result more natural looking. The minimal access cranial suspension (MACS) lift concept was gradually developed and published in Plastic and Reconstructive Surgery in 2002. Initially we believed that short-scar facelifting would perhaps be something of a temporary hype, but gradually it became well accepted worldwide, and we published two monographs on the subject in 2004 and 2007. Except for the addition of the temporal lift, there were no great changes in surgical technique. The real change came from adding volume by lipofilling. Pioneered and popularized by Sydney Coleman from New York, we incorporated the procedure in our MACS-lift technique, occasionally since 2002 and routinely since 2004. We tried to define the exact indications and locations for fat grafting in the face. We adapted the instrumentation and technique for the specific indications of grafting the eyelids and superficial rhytid injection. With time we realized the great potential of this procedure and became aware that in some patients this
The concept of “centrofacial rejuvenation” was introduced.

The center of the face involves three zones: the periorbital area, the midface, and the perioral area. In essence this concept covers all the ancillary procedures used for restoring the youthful appearance within the “facial oval.” The actual “facelift” has mainly an effect on the peripheral areas of face and neck and only a limited effect within this oval.

Centrofacial Rejuvenation consists of three parts:

Part I, “Fat Grafting: From Volume Restoration to Regenerative Cell Therapy,” consists of seven chapters and relates our evolution in the use of different fat grafting techniques “from volume restoration to regenerative cell therapy.”

Chapter 1, “The Role of Fat Grafting in Facial Rejuvenation,” clarifies the emerging role of fat grafting in facial rejuvenation: its growing position in the armamentarium of the facial cosmetic surgeon, the synergistic effect when combined with lifting techniques, determining the exact locations of facial deflation and hence the indications for revolumizing, and the correct positioning of the fat grafts. The concept of centrofacial rejuvenation is based on the premise that deflation is a major causal factor of facial aging.

Chapter 2, “Microfat Grafting,” describes the details of harvesting, processing, and injection of small-particle fat grafts with adapted harvesting and injection cannulas. It focuses on the importance of the small size of the fat grafts for the survival of the graft and the predictability of the technique. All details concerning anesthesia, patient safety, recovery, and outcomes are addressed.

Chapter 3, “Augmentation Blepharoplasty,” is based on the hypothesis that periorbital aging is mainly a deflation phenomenon and focuses on the novel concept of adding volume to the periorbital area instead of excision and removal. Much attention is given to the exact positioning of the fat particles with detailed anatomic drawings, and to the finesse of the injection technique.

Chapter 4, “Perioral Rejuvenation,” changes the paradigm of enhancing the beauty of the mouth and perioral area from merely filling to truly sculpting the lip. This involves more than volumetric enhancement, and often a surgical shortening of the lip height with a liplift is required. A short mention is made of resurfacing techniques, which are explained in more detail in Part III.

Chapter 5, “SNIF: Sharp Needle Intradermal Fat Grafting,” describes how microfat can be used as a safe permanent intradermal filler. We elaborate on indications with several clinical cases, and the injection technique is illustrated in detail with video clips.
Chapter 6, “Nanofat Grafting,” narrates how we discovered a method for concentrating the stromal vascular area of the fat tissue through elimination of the adipocytes by simple mechanical emulsification. This highly liquid suspension contains much smaller cellular elements than the native fat graft, hence the name “Nanofat.” This product can be injected in very superficial dermal layers through very fine needles, with the purpose of regenerating several skin conditions such as aging, trauma, and pigmentation. Again much attention is given to the technical details of nanofat preparation and a safe injection technique by means of text and videos.

Chapter 7, “Centrofacial Rejuvenation: Putting It All Together,” presents a great number of case studies in which all the techniques described previously are combined. These cases demonstrate the power of the synergy of using several techniques together and illustrate the importance of centrofacial rejuvenation, because the eyes and the mouth are the key to restoring the emotional expression of the face.

Part II, “The Place of Toxins and Fillers in the Modern Plastic Surgery Practice,” consists of three chapters, each written by world-renowned plastic surgeons with vast experience in the use of nonautologous filler materials.

Chapter 8, “Midface Volume Rejuvenation With Fillers” is written by the international group of Javier Beut (Mallorca, Spain), Glenn Jelks (New York, United States) Christopher C. Surek (Kansas, United States), and Jerome Lamb (Missouri, United States), who are respected anatomists and clinicians. The chapter contains several spectacular videos with unique anatomic details of the injection technique.

Chapter 9, “Filling Temples With Highly Diluted Hyaluronic Acid Fillers,” by Val Lambros (Newport Beach, United States) describes a very elegant technique of filling the temporal hollow, an often overlooked area in the aging face. The advantage of the dilution is the avoidance of the risk of irregularities and lumpiness, and it is very comfortable for the patient. Several cases are described and illustrated with detailed video clips.

Chapter 10, “Aesthetic Contouring of the Upper Third of the Face With Soft Tissue Fillers,” by Woffles Wu (Singapore) describes the use of soft tissue fillers in the nose, periorbital region, and brow. It features a detailed description of the relevant anatomy regarding injection sites and danger zones for intravascular injection.

Chapter 11, “Microbotox,” by Woffles Wu focuses on a novel method of using a very dilute botulinum toxin solution in multiple superficial intradermal blebs to paralyze the superficial layer of the muscle through diffusion, keeping the deep part of the muscle untouched. This results in a superficial skin relaxation
with disappearance of fine rhytids while maintaining the movement and support function of the muscle. It also has an effect on sebaceous and sweat gland secretion.

Part III, “The Art and Science of Croton Oil Peeling,” by Richard Bensimon (Portland, United States) consists of two chapters on the science and art of skin peeling techniques with croton oil dissolved in phenol. Dr. Richard Bensimon is a world-famous authority in this field.

This third and final volume completes the triptych oeuvre that we started in 2004 with *The MACS-Lift Short-Scar Rhytidectomy*, followed by *Short-Scar Face Lift: Operative Strategies and Techniques* in 2007. The concept has remained the same throughout the whole work, with a focus on practical use for the reader; many technical details, tips, and tricks; and thorough illustration with photos, artistic drawings, and video clips.

Our first volume, *The MACS-Lift Short-Scar Rhytidectomy*, was conceived as a clinical atlas, guiding the reader through the basics of the technique and trying to provide a comprehensive understanding of the MACS-lift concept. The second volume, *Short-Scar Face Lift: Operative Strategies and Techniques*, is the natural evolution of the first and is meant to bring the reader who has embraced this concept to the next level of understanding. The contribution of the collaborating authors Daniel Baker, Alain Fogli, Joseph Hunstad, Mark Jewell, Daniel Labbé, Foad Nahai, and Tom Roberts gives a good overview of the possibilities and limitations of short-scar facelift techniques. Short-scar temporal lifting is explained in detail by Alain Fogli, and we discuss a modification.

In this third volume we focus on what we perceived as the “missing links” in comprehensive facial rejuvenation surgery: volume restoration and skin resurfacing. Interestingly, both these aspects mainly apply to the central oval of the face. This led us to the concept of “centrofacial rejuvenation,” which goes hand in hand with the facelift and browlift techniques, which were described in Volumes One and Two.

In our 25 years of experience in the field of aesthetic surgery we have strived toward better and more natural results, and each addition that contributed to this goal was shared in our publications and books. We feel that this third volume is the keystone that has brought our results to an unprecedented level of completion and natural appearance, while maintaining good safety, predictability, and reproducibility.

Although it is our firm belief that Volumes One, Two, and Three together provide the practitioner of facial aesthetic surgery with a very solid technical basis, each of these volumes can stand alone as a teaching guide on its subject and contribute to the reader’s understanding of facial rejuvenation.
In the history of mankind, the search for knowledge and beauty has been ever present. The search for eternal youth and the battle against aging have been fought since the beginning of civilization. Modern facial rejuvenation techniques are an example of how technology and science have come together and influenced our approach to combatting the physical signs of facial aging, but we must realize that we are just at the beginning of this interesting journey. Writing this book was a rewarding but humbling experience, and although it occupied most of our limited free time after busy days spent in the operating room, it is our profound hope and desire that this work will continue to stimulate thinking about facial aging and its treatment in an open-minded way, and that our patients will be the ultimate beneficiaries of this dialogue.

ACKNOWLEDGMENTS

Centrofacial Rejuvenation is the result of a creative and intellectual process that started after the publication of our second volume, Short-Scar Face Lift: Operative Strategies and Techniques. At that time in 2007, we never thought there would be a third volume, but through daily interactions and constructive discussions with many colleagues met at international meetings all over the world, we started to feel the need for writing another volume. We consider this work to be the result of a long series of chances and opportunities in which many people played an important role. First, we cannot thank enough the people who professionally trained us. From our late professor, Guido Matton, we learned that only the best is good enough and that perfectionism isn't as much a quality as it is a requirement. Late professor Fernando Ortiz Monasterio inspired Patrick with his creative imagination and his no-nonsense approach to scientific thinking in plastic surgery.

We should never underestimate the importance of our teachers in reconstructive plastic surgery and microsurgery, professors Stan Monstrey and Phillip Blondeel, and the inspiring Dr. Francoise Firmin, who taught Alex the finesse of ear reconstruction, not to forget professor Moustapha Hamdi, who was the promoter of both our doctoral theses.

Their influence was enormous, and we are convinced that if today we are able to produce the work you are about to read, it is because we are standing on the shoulders of these giants. But even today we continue to learn from other plastic surgeons. First of all, we (Patrick and Alex) learn from each other in our association as plastic surgeons. We are convinced that without the daily discussions and critical feedback, we would never have been able to develop and advance our techniques to this final concept. Our professional association is a typical example of synergy, in which the final result is more than the sum of its components, and our partnership is an ongoing source of creativity, inspiration, and working joy for both of us.

We want to thank several young colleagues, including Assaf Zeltzer, Geert Peeters, and Nicole Lindenblatt, who helped us tremendously with articles on
augmentation blepharoplasty, sharp needle intradermal fat grafting, nanofat grafting, and fat grafting facial profiloplasty, the basis of this text. We also want to express our gratitude to so many plastic surgeons, including Dan Baker, Fritz Barton, Fahd Benslimane, Tom Biggs, Giovanni Botti, Gary Burget, Syd Coleman, Bruce Connell, Claudio Cardoso De Castro, Joel Feldman, Alain Fogli, Raoul Gonzalez, Joe Hunstad, Mark Jewell, Michael Kane, Roger Khouri, Daniel Labbé, Bill Little, Timothy Marten, Bryan Mendelsohn, Foad Nahai, Mario Pelle-Ceravolo, Gino Rigotti, Tom Roberts, Rod Rohrich, James Stuzin, Frank Trepsat, and so many others, who by their pertinent sharp questions and critical remarks stimulated us to reflect about what we were telling and doing, and pushed us to improve to the next level. Their support has given us the courage to persist in presenting and publishing our results, and we greatly appreciate the genuine friendship of all these experts. Special thanks go to the co-editor of this book, Richard Ben-simon, with whom we have developed a special friendship and have organized five very popular workshops in Ghent on fat grafting and croton oil peels over the last couple of years. We also thank the other contributors of the book, Glenn Jelks, Javier Beut, Christopher Surek, Jerome Lamb, Val Lambros, and Woffles Wu; because of their original and sometimes unconventional views on certain problems, their contributions are invaluable to this text. This is also true of the numerous colleagues we have met at international meetings all over the world who shared their comments and critiques on our work. Their input has stimulated us to further elaborate on surgical techniques and the best way to teach them.

Thanks also to the team of Thieme Publishers. Sue Hodgson, Kelly Mabie, and Megan Fennell guided and coached us with patience through the different deadlines.

We would also like to take the opportunity to express our great appreciation to all of our staff: our office manager, Elien Van Loocke; our medical management assistants, Elisa Bultynck and Carmen Van Eeckhoutte; our nurses, Christelle Wullaert, Kateline Gees, Isabelle Breyer, and Klaartje Ongena; and our technical staff, Lieve D’hoore and Nancy De Meyere. They are all irreplaceable in their jobs, and we still mourn the loss of our head nurse Katrien Depoortere, who passed away at the age of 38 in 2014. They all take work out of our hands and support us in every new project, despite increased workloads and pressing deadlines. We feel fortunate to work with such an enthusiastic team.

Finally we want to thank all our patients who consented to the publication of their photographs. This work would not have been possible without their cooperation.

Patrick L. Tonnard, MD, PhD
Alexis M. Verpaele, MD, PhD
Preface to Part III

Throughout my career as a plastic surgeon, the term “comprehensive facial rejuvenation” has been thrown about rather glibly as a potential ideal, as the content of meeting panels, even as the title of entire meetings. Despite the best of intentions, this goal has been illusory, because an entire category of rejuvenation, namely the improvement of deep wrinkles and damaged skin texture, has been largely ignored. We plastic surgeons are well versed in cutting skin and manipulating soft tissue, but ironically, either by history or education, we seem ill-prepared to deal with the skin itself.

During the first decade of my practice, I routinely performed facial surgery, and other than collagen injections and moisturizers, I offered little else for the improvement of wrinkles. I was aware this was inadequate treatment, but I did not feel there were viable options available to me.

In 2000, I was faced with a patient with significant sun damage, elastosis, and smoker’s lines. I knew that surgery would not serve her well; therefore I reluctantly prepared to perform a classic Baker peel despite my apprehensions and with resigned acceptance of the hypopigmentation I expected. Before performing the peel, I serendipitously came across Gregory Hetter’s groundbreaking articles on croton oil peels and everything changed.

I studied Dr. Hetter’s articles carefully, and armed with this new information, I had the confidence to proceed with the peel. The results were a revelation; the patient was rewarded with healthy-appearing, smooth, supple skin—indeed radiating the very essence of youth.

Enthused by this experience, I continued to peel, and in preparation for a regional society meeting, I telephoned Dr. Hetter requesting a photograph for the presentation. Intrigued by my interest, he encouraged me and shared his experience. This blossomed into an ongoing mentorship and a friendship that lasts to this day.

As I became more involved with the peels, I came to realize that there were very few of us performing them, even worldwide. A common impediment was a historical fear of the traditional peel because of the hypopigmentation, difficult recovery, and cardiac toxicity. Adding to this, even today there are textbooks repeating decades-old misconceptions and errors without proof. Hetter’s experiments and my own experience debunked these old assumptions, and I felt a responsibility to empower other practitioners to embrace this technique.
One fortuitous invitation was to address and perform a live peel at Controversies, Art & Technology in Facial Aesthetic Surgery (CATFAS) IV in Ghent, Belgium, in 2013. While there, I became acquainted with the novel process of sharp needle intradermal fat (SNIF) grafting and nanofat espoused by Drs. Verpaele and Tonnard. I noted with interest that these approaches improved the texture of the perioral area, and I believed they could be a significant adjunct to the peels. When Drs. Verpaele and Tonnard saw my presentations and peel, they came to the same conclusion and approached me to organize a workshop to teach both these procedures. This became a reality and now we have held five live surgery workshops that have been the inspiration for this book.

My role with croton oil peels has been to digest and implement Hetter’s teachings, build upon them, and expand the utility of facial resurfacing. An unexpected finding has been that, although the peels were initially developed to treat older individuals with pronounced wrinkles, younger patients can reap great benefits from early peeling that can change the course of aging. An important personal focus has been to simplify the process, attempt to make it less intimidating, and help the student through the early learning curve. In this manner, this remarkable technique can be more widely disseminated and benefit many patients.

Part III of this book is further divided into two chapters. The first discusses skin anatomy, skin aging, and how they fit into facial rejuvenation. The various modalities for resurfacing are considered, and specifically the basis and evolution of the modern croton oil peel is explained.

The second chapter is a very detailed tutorial on how to evaluate patients, prepare the solutions, and safely execute a peel. The details may at times seem extreme, but my purpose was to supply as much practical information and experience in one tome as possible, to serve both as a guide and a reference. The suggestions for the novice are meant to ensure safety so that students can build on early experience and quickly advance into seasoned peelers. Finally, I have endeavored to simplify the entire procedure by providing an alternative method of anesthesia and a different approach to the aftercare that is more user-friendly.

Any plastic surgeon who is serious about providing true comprehensive facial rejuvenation must accept the vital importance of dealing with the quality and texture of the skin. It is my belief that at last we have an excellent option to provide this, and it is my earnest hope that this work will inspire and guide the reader through the process. The science and application of croton oil peels, now free from old misconceptions, is in its infancy and ripe for development. The greatest compliment to me as an educator would be that these words will be read by a future innovator.
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Chapter 1
The Role of Fat Grafting in Facial Rejuvenation
Patrick L. Tonnard • Alexis M. Verpaele

Many things that exist only in the imagination later become real.
Giacomo Casanova

3
Chapter Videos

1-1 Aging-Related Sagging
1-2 Aging-Related Deflation

Additional procedural video and author discussion of technique can be found on Media Center.
Surgical correction of aging-related sagging of facial structures has existed for more than 100 years. Nevertheless, during the aging process much more occurs than just sagging of the skin (Fig. 1-1). There are changes in skin texture and pigmentation and loss of volume in certain areas of the face (Video 1-1). Certain facial muscles contract, producing folds and rhytids, especially in the frontal area and the neck. All these factors must be considered when educating a patient about facial rejuvenation. If the treatment goal is a total and natural facial rejuvenation, the therapeutic plan must be a combination of different modalities individually adapted to each patient's needs.

Sagging of facial skin can be corrected with a surgical facelift procedure. The options range from minimally invasive to deep plane or subperiosteal procedures. Surgeons can treat the eyelids, the eyebrows, the lips, and the neck; perform submandibular gland resection; or remove the adipose corpus of Bichat. The difficulty is not to master all the surgical techniques but to choose the right combination of procedures and to understand the correct indications for the different techniques. The texture and quality of the skin can be altered by skin care products with alpha-hydroxy acids or retinoic acid, light therapy such as intense pulsed light, or more drastically with resurfacing techniques such as dermabrasion, a chemical peel, or CO2 or Erbium laser resurfacing. Muscle hypertrophy or hypertony can be treated with surgical myotomies, selective neurotomies, or less invasive temporary chemical denervation with botulinum toxin. Volume depletion can be corrected with volumetric surgical techniques or by adding volume...
SYNERGY

1 + 1 + 1 ≠ 3 = 10

Fig. 1-2  Synergy can be expressed as “a result that is more than the sum of the components.”

with a heterologous filler or autologous fat. Every patient must be carefully analyzed, and a personal treatment plan must be developed in consultation with the patient. The surgeon is personally responsible for choosing and combining the different treatment modalities according to the patient’s wishes, his or her personal experience, and technical training. For the past 20 years, we have always tried to use a combination of minimally invasive surgical techniques. The magic word in this context is “synergy” (Fig. 1-2).

COMBINING FACIAL FAT GRAFTING WITH FACELIFT PROCEDURES

The combination of fat grafting and surgical facelift is an example of synergy. Performing facial fat grafting alone can produce certain results, whereas surgical facelift procedures have certain other effects. However, the combination of these two can achieve results that cannot be obtained by either option alone. The addition of volume in the routine treatment plan of patients undergoing surgical facial rejuvenation deserves special attention and is the subject of the first part of this book.

Historically, surgical facial rejuvenation techniques have evolved from a skin tightening procedure into a subcutaneous sculpturing and skin redraping procedure. In the late 1980s and early 1990s, some surgeons such as Ramirez et al1 and Little2 focused on “volumetric” facelift techniques; the intent was to preserve or enhance the volume in the midface. However, Coleman3 popularized the technique of surgical fat grafting in the early 1990s. The idea of fat transfer was not really new, because this was already proposed 100 years earlier by the German surgeon Neuber.4 Nevertheless fat transfer did not become popular and was infamous for a high resorption rate and inconsistency of the final result.
Coleman standardized the technique of fat harvesting by using liposuction with specifically designed cannulas, fat preparation by centrifugation, and fat injection with specialized fine blunt cannulas; his technique turned fat transfer into a reliable and efficient tool in the plastic surgeon’s daily practice. Today the introduction of lipofilling in the surgical armamentarium of the twenty-first century plastic surgeon can be seen as a real landmark in plastic surgery, similar to the way breast implants were in the 1970s, endoscopy in the 1980s, and microsurgery in the 1990s. We started to occasionally incorporate fat grafting in facial rejuvenation procedures in 2002 and since 2008 have routinely used fat grafting as an ancillary procedure at the same time as facelift in about 95% of our cases. We routinely use fat to augment the periorbital, malar, and perioral region with different techniques.

Facial Sagging Versus Facial Deflation
Understanding the importance of facial fat grafting in facial rejuvenation depends on understanding the difference between facial sagging and facial deflation. Facial sagging occurs at the periphery of the face, for example, lateral to the lateral canthus and oral commissure, and continuing in the neck (Fig. 1-3, A). Facial deflation takes place in the central part of the face, such as the periorbital region, including the glabella and the eyelids, the malar area, and the perioral region (Fig. 1-3, B, and Video 1-2). This is exactly the region where most mimic musculature is present and most movement occurs in the face. The superficial changes in the skin surface quality are independent from both sagging and deflation and take place on the whole facial skin (Fig. 1-3, C).

Fig. 1-3  Different modalities of aging. A, This patient has a problem with sagging, especially in the lower third of the face and neck. B, This patient mainly has a deflation problem. C, This patient shows marked structural changes in skin quality.
The Hinge Hypothesis

Based on our observations we hypothesized that facial fat atrophy could be caused by a pure mechanical factor; for example, a piece of paper will show atrophy in the region where it is folded over and over again for a certain time interval. In this context we introduced the hinge hypothesis of facial fat atrophy (Figs. 1-4 and 1-5). This hypothesis postulates that fat cells atrophy under high pressure. This can be observed clinically in skin overlying tissue expanders, in which subcutaneous fat atrophy is seen in the expanded flap. This also occurs in the subcutaneous tissue of the skin under an abdominal belt. The only periph-

![Diagram of hinge and facial grooves](image-url)
eral facial area where significant volume atrophy can be observed is the temporal area, overlying the temporal muscle.

**Stability of the Surgical Facelift**

Generally speaking, we use facial fat grafting in combination with surgical facelift techniques for two reasons: (1) longer stability of the surgical facelift result and (2) a more natural result. Our analysis of the long-term results of facelift cases in our early series (1998 to 2003) that used our classic minimal access cranial suspension (MACS) lift technique showed a typical relapse of the nasolabial fold deformity and a lack of correction of the midfacial deflation when simultaneous fat injection was not performed.
For example, the 49-year-old man in Fig. 1-6 underwent an extended MACS lift, lower skin-pinching blepharoplasty with transconjunctival fat resection, and short-scar temporal lifting to correct facial sagging. Ten months after surgery he had good correction of the sagging of the neck, jowls, and temporal hooding. The nasolabial fold showed significant improvement. Four years after surgery he had a stable correction of the sagging facial features (neck, jowls, and temporal hooding) but a degree of relapse of the nasolabial fold and an undercorrection of the midfacial deflation. The orbitomalar groove is still obvious. Surgeons can now offer patients a better correction and longer stability by adding fat grafting to the midface and nasolabial fold.

Fig. 1-6  Left, Preoperatively at age 49 years. Center, At 10 months postoperatively. Right, At 4 years postoperatively.
We now use a multimodal approach, which incorporates fat grafting into the rejuvenation strategy. Thus we can obtain better longevity by simultaneously correcting the deflated nasolabial area and midface as shown in the patients in Figs. 1-7 through 1-9.

**Fig. 1-7**  
A, Preoperative appearance of a 52-year-old woman who had an extended minimal access cranial suspension (MACS) lift, upper blepharoplasty, temporal lift, and microfat grafting of the nasolabial folds, corner of the mouth, and marionette groove. B, The very deep nasolabial creases were corrected by multilayer microfat grafting and subcision, which delivered a much better and longer lasting result after 3 years.

**Fig. 1-8**  
A, This 46-year-old woman requested correction of facial aging. Except for minor jowling the major problem was the absolute absence of soft tissue padding between the skin and malar bone. The postoperative result at 2 (B) and 7 (C) years showed an effective rejuvenation and long-term stability.
Volume-enhancing microfat grafting is even more important in secondary facelift procedures.

For example, a 62-year-old man presented 10 years after a primary superficial myoaponeurotic system (SMAS) facelift that was performed elsewhere (Fig. 1-10). Except for some relapse of facial sagging, his main issue was centrofacial deflation. The secondary procedure consisted of a simple MACS lift to correct the cervical laxity and jowling, a short-scar temporal lift for correcting the temporal hooding, rhinoplasty, and microfat grafting of the upper eyelid sulcus, malar area, nasolabial fold, and marionette groove. The rejuvenating effect of the centrofacial volume correction is by far more important than the surgical lifting of relapsed laxity.

Currently we routinely perform simultaneous fat transfer to centrofacial-deflated areas at the time of surgical MACS lifting (Fig. 1-11). Thus we have longer-lasting results, as seen in our long-term postoperative results.
Fig. 1-10  A, This 62-year-old man presented for a secondary facelift 10 years after a primary superficial myoaponeurotic system (SMAS) facelift. B, One year after an extended minimal access cranial suspension lift, temporal lifting, and fat grafting of the upper eyelid sulcus, malar area, nasolabial folds, and marionette groove, the main rejuvenating factor in the correction is centrofacial volume restoration by microfat grafting, which has turned the triangle of age into the inversed triangle of youth.

Fig. 1-11  A, This 69-year-old patient had a lifting procedure combined with microfat augmentation of the periorbital and midface region. In older patients the importance of correcting midfacial volume depletion cannot be underestimated. B, The patient at approximately 35 years of age. C, The result at 4 years postoperatively, with a stable replenishment of the midface area.
A More Natural Result

We also perform simultaneous fat grafting at the time of surgical facelift, because we can produce more natural results. The goal of a facial rejuvenation procedure is to make our patients look younger and not different. To accomplish this, we must educate them about the difference between facial sagging and facial deflation. For the past 10 years of our practice, we have asked all our facial rejuvenation patients, including those undergoing blepharoplasty, to bring photographs of when they were in their 20s and 30s to the consultation; our goal is to analyze their appearance when they were younger so we can adjust the treatment plan accordingly. Amazingly, almost all patients have lost volume in the centrofacial area during the aging process, even if they have gained some weight over the years, which is often the case. Both surgeons and patients must recognize that a good facial rejuvenation procedure will reconstruct the facial architecture to a younger state (Fig. 1-12).

![Fig. 1-12](image)

*Fig. 1-12*  A, This 70-year-old patient had a minimal access cranial suspension lift procedure combined with microfat grafting of the periorbital and malar areas.  B, At 1 year postoperatively, the importance of the volumetric rejuvenation is evident in the outcome.
Volume distribution in the face plays a very important role in this process. For example, a surgeon can estimate a person’s age from a distance of 20 meters not because one can discern small details such as perioral rhytids or crow’s-feet but based on the information that we receive from the face as a “gestalt.” The distribution of volumes in different regions of the face provides the necessary information to determine a person’s age. The typical changes in the transition from a younger to an older face is the evolution from an inverted triangle with high cheekbones, a full midface, and a well-defined sharp jawline to an upright triangular shape with flat cheekbones, an empty midface, and an undefined heavy jawline. Little made this analysis previously in his description of “the inverted cone of youth.”

A 62-year-old-woman requested facial rejuvenation and correction of a secondary nasal deformity (Fig. 1-13, A). Compared with the photograph taken of her at age 26 years (Fig. 1-13, B), the malar area and the lips are deflated. The treatment plan consisted of an extended MACS lift, short-scar temporal lift, secondary rhinoplasty, and microfat grafting of the upper eyelids, malar area, and lips. The result is seen 18 months after surgery (Fig. 1-13, C). Except for correcting the sagging of the neck, jowls, and tail of the eyebrow, the reconstruction of the facial architecture can be compared with the photograph showing the patient at 26 years of age; the facial ogee curve and periorbital and perioral volume have been restored. This natural rejuvenation result could not have been obtained without restoration of centrofacial volume.

Fig. 1-13 A, This 62-year-old woman was seeking facial rejuvenation for a combination of lifting and volume repletion. The facial architecture of youth (B) was restored by microfat grafting of the periorbital area, the midface, and the lips (C).
CENTROFACIAL REJUVENATION

Every meeting on facial rejuvenation surgery includes a panel discussion on whether surgeons should open the neck. An open approach to the neck involves making a submental incision, complete undermining of the anterior neck skin, and median platysmorrhaphy, sometimes combined with digastric muscle and/or submandibulary gland resection. A closed approach to the neck involves a 3 mm incision with submental liposuction and a vertical suspension of the lateral border of the platysma. This decision depends on the surgical confidence of the surgeon, the degree of neck deformity of the patient, and the surgical risks and morbidity involved in both options.

Although a youthful neck is extremely important in global facial rejuvenation, we need to ask how much cervicoplasty contributes to the rejuvenation of the facial gestalt, especially when considering the power of volumetric centrofacial rejuvenation.

Historically, a facelift was basically a neck lift with or without a blepharoplasty. In facelift publications from the 1980s, most of the preoperative and postoperative photographs are in the profile view. This was because most of the change in the rejuvenated face was in the neck, which was best visible in the profile view. Today preoperative and postoperative photographs are shown in profile, frontal, and oblique views to reveal the changes in the midface and perioral and periorbital areas. Facial expression originates from the eyes and the mouth and not from the neck. Moreover, communication occurs mostly in the frontal or oblique view and rarely from the profile view. Thus perhaps facial rejuvenation surgeons may be slightly obsessed with a perfect cervicomental angle, whereas much information regarding the age of a face is derived from the central part of the face.

The current perspective is that centrofacial aging is more the result of deflation than sagging. Lambros showed in his tridimensional, long-term facial aging study that centrofacial landmarks such as nevi and folds are not displaced downward during aging. This means that lifting the soft tissues in the central part of the face as is done in traditional facelift may not be logical. He concluded that facial deflation, which is present in almost every aging face, mimics descent. Our experience is similar, especially regarding the midface and eyelids. Difficult and invasive midfacelift techniques have been replaced by filling techniques with far better results without the risks of disastrous complications and with less morbidity and a shorter recovery. In our MACS lift experience, placement of the third suture loop to lift the midface has been almost completely replaced by lipofilling of the malar area. The logic behind this is that an empty space does not need to be lifted but rather needs to be filled.
Facial deflation mimics descent. Most facial landmarks stay exactly in the same position. This is particularly true for the midface. The only facial feature that lengthens (descends) is the vertical height of the upper lip (Fig. 1-14). The concept of centrofacial rejuvenation is based on the premise that deflation is a major causal factor. The center of the face involves three zones: the periorbital area, the midface, and the perioral area.

Fig. 1-14  Visual illusion of sagging in an aging face while all the anatomic landmarks (eyebrows, orbitomalar groove, nasal tip, and mental crease) remain in the same position. The only feature that truly lengthens is the upper lip (see Chapter 4).