This book addresses the many unresolved controversies in sinus bone grafting, bringing together the latest scientific information and clinical experience of international leaders. Successful sinus bone grafting must rely on clear understanding of bone biology and not just advancements in technology. The text addresses the physiologic capability of bone graft healing in the sinus floor and the optimal strategies used to insure vital osseous capacity such that load-bearing osseointegration can occur. Overall, it provides the current state of the art as well as a preview of expected technological advances.

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Table of Contents:
1. The History of Maxillary Sinus Grafting/Philip J. Boyne
2. Indications and Contraindications for Sinus Grafting/Joel L. Rosenlicht
3. Vital Biomechanics of Bone-Grafted Dental Implants/Harold M. Frost
5. Treatment Planning for Sinus Grafts, Ole T. Jensen
6. Use of Allografts for Sinus Grafting/Burton Langer, Laureen Langer
7. Sinus Grafting with Porous Hydroxyapatite/Axel Kirsch, Karl. L. Ackermann, Markus B. Hürzeler, Dietmar Hutmacher
8. Histologic Aspects of Simultaneous Implant and Graft Placement/Lars Sennerby, Stefan Lundgren
9. Sinus Grafting with Calvarial Bone/Jean F. Tulasne
10. Autogenous Free Bone Graft Harvesting for Sinus Floor and Alveolar Reconstruction/Craig Misch, Ole T. Jensen, Rex Cockrell
11. Simultaneous Placement of Hydroxyapatite-Coated Implants and Autogenous Bone Grafts/Michael S. Block, John N. Kent
12. Recombinant Human Bone Morphogenetic Protein-2 for Maxillary Sinus Grafting, Leslie Clark Lilly, Sterling Schow, R. Gilbert Triplett
13. Prosthetic Management of the Sinus Graft Case/Ira D. Zinner, Stanley A. Small
14. Load Factor Analysis for Implants in the Resorbed Posterior Maxilla/Bo Rangert, Lars Sennerby, Hans Nilson
15. Subnasal Elevation and Bone Augmentation, Arun K. Garg
17. Combined Sinus Grafting and Le Fort I Procedures/Ole T. Jensen
18. Complications of Maxillary Sinus Augmentation/Vincent J. Iacono
Index

Preface

While an oral surgery resident in training at the University of Michigan in 1977, I observed a strange phenomenon in a maxillary fracture patient. A unilateral ossification of the maxillary antrum occurred following a Le Fort III fracture that had been treated the year before. I wondered how trauma around the antrum due to an impacted maxilla and the inferiorly displaced orbital rim could lead to an ossified maxillary sinus. The trauma was bilateral, yet only one side responded by ossification. Furthermore, there appeared to be no functional impairment of the sinus. This unusual finding remained a mystery to me for many years.

It wasn't until 1980, when Phil Boyne published the first paper on the sinus augmentation graft, that the mystery began to be solved. He found that preservation of the elevated sinus membrane created a confined space in which bone had the potential to form. Dr Boyne went on to show, in a primate study, that bone would readily form in the sinus floor, but that the newly formed bone would completely resorb over a period of a year unless dental implants...
newly formed bone would completely resorb over a period of a year unless dental implants were placed to help maintain the bone. Many other workers began to experiment with various bone-grafting materials, both in animals and clinically. Remarkably, most of the materials demonstrated new bone formation in the graft sites. Because dental implants were generally used as the measure of bone graft success and since there were very few implant failures reported in the literature, confusion resulted as to which grafting material to use. It seemed they all worked.

To sort this out, a few patients with 5 to 7 mm of available bone were treated with sinus elevation and Gore-Tex over the lateral osteotomy site only. Despite no graft material be used, bone formed. As long as the sinus membrane remained intact, bone formed beneath the sinus membrane that had been tented up by simultaneously placed implants. The need to use any graft material at all appeared to be brought into question.

At the same time, practitioners lined up in two camps: those who placed implants in delayed fashion after graft maturation and those who preferred simultaneous implant placement. Both approaches published a high level of success seeming to substantiate their protocols, but once again the measure of success was hampered by the lack of any human evidence for efficacy. A 5-year implant retrieval study was undertaken using standard titanium mini-implants that had been placed simultaneously with grafting. Interestingly, bone did not form well around these implants in this setting despite positive reviews in animal studies. Could we conclude that the delayed approach was preferred, or was there another factor, such as the implant surface, that could be important?

Hydroxyapatite-coated, titanium plasma-sprayed, and acid-etched titanium implant surfaces seemed to do well in the grafted bone. Could this be the answer for implants placed into sinus bone grafts?

As these developments are progressing, new interest is generated in jump-starting the natural inductive processes of bone formation through pharmacokinetics. Early results of human studies now appear to be favorable for using bone morphogenetic protein as a graft alternative that stands to modify all of the protocols in use to date.

How these various approaches work toward definitive answers to the basic biologic and clinical questions is what this book is all about. The authors attempt to answer the how, why, when, and where of sinus grafting. It is hoped that the state of the art of sinus grafting will be elucidate for the reader in the ongoing quest for scientific knowledge and its clinical application that will ultimately lead to excellence in patient care.