Simplified Regenerative Procedures for Intraosseous Bo

SIMPLIFIED REGENERATIVE PROCEDURES

for Intraosseous Defects

Edited by

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FOREWORD

It is always a great satisfaction when you are asked to write a foreword of a good book. This is especially true when the book expands our scientific culture and promotes the training of our students and professionals. Frequently, these books introduce new knowledge or new technologies. However, it is less frequent for a book to be purposely focused on training students and professionals on surgical procedures. This atlas focuses on evidence-based education and in acquiring relevant professional competencies in the surgical treatment of specific periodontal lesions (ie, intraosseous defects). The information provided is clear, well organized, and very practical, but at the same time it is rigorous and up to date with current knowledge, comprehensively covering the fundamentals of periodontal regeneration and the use of the different technologies. It particularly focuses on simplified surgical procedures aimed to attain the best possible regenerative outcomes with minimal invasiveness.

The author, Prof Leonardo Trombelli, has dedicated many years of his professional life to studying and researching successful long-term periodontal therapy and specifically the use of regenerative surgical interventions to improve the prognosis of periodontally affected teeth. He has published essential scientific articles that provide the basis for this book. His contribution to this work clearly demonstrates not only his excellent scientific background but also the teaching abilities that are needed to produce a book such as this, with scientific rigor and at the same time with practical relevance for students and professionals. Moreover, the many contributors in this work are not only well respected in Italy but also in Europe and beyond.

In summary, this book is clear and well written and provides very useful and relevant content to support dentists and periodontists in learning how to apply modern periodontal surgical interventions to achieve regeneration in teeth that have lost periodontal attachment as a consequence of periodontitis.

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PREFACE

Man should be as eager to simplify his life as he is to complicate it.
–Henri-Louis Bergson

For 20 years, in collaboration with the whole research group at the Research Centre for the Study of Periodontal and Peri-Implant Diseases, University of Ferrara, we have been making a great effort in trying to find diagnostic and therapeutic solutions that could optimize endpoints while making clinical processes and pathways easier for practitioners and students. We started back in 2007 with a simplified method to access deep intraosseous defects (the *single-flap approach*, or SFA, that will be extensively described in this book). Then, in 2008, we introduced the Smart Lift technique—a simplified, standardized method to perform sinus elevations with a minimally invasive transcrestal surgical procedure (a method that has been extensively investigated and published on for more than 10 years). In 2009, we reported on a simplified method to assess the periodontal risk profile of the patient, based on five straightforward parameters that have been shown to be linked to the progression of periodontal breakdown. And more recently, in 2018, we published on a simplified method for horizontal bone augmentation, which is based on the creation of a periosteal pouch that acts as an osteogenic, space-providing membrane for bone grafting (the subperiosteal peri-implant augmented layer, or SPAL technique).

The development of simplified procedures has been a main focus of my career for two main reasons. First, I want to provide the profession with simple, straightforward, innovative solutions that may bring clinicians closer to procedures that are otherwise neglected because of their potential complexity. In search of simplified diagnostic and treatment procedures, we targeted those that are mostly perceived as successful only when performed by the talented and gifted hands of a few select colleagues. I am well aware that spreading the use of simplified procedures among dental professionals means amplifying the number of patients who may benefit from them. The second reason is related to my mission as a university faculty member. Teaching simple procedures can help the great majority of students to reach a high level of competence in a reasonable amount of time with a fast learning curve.

These two reasons represent the main driving force that brought me to write this book. With the large number of photographs and videos of many different clinical cases, the textbook has been designed as a sort of tutorial for both graduate students and practitioners who want to expand their knowledge and technical skill in the nonsurgical and surgical treatment of deep intraosseous defects, very common lesions in patients with Stage III and IV periodontitis. In particular, the SFA is thoroughly described with a step-by-step approach, starting from the analysis of diagnostic and prognostic patient/defect characteristics to the selection of surgical instruments, choice of flap design, methods for root debridement and conditioning, use of appropriate regenerative technologies, description of suitable suture techniques for different flap designs, and the short- and long-term postsurgery care. A multitude of clinical cases are illustrated in great detail in order to provide a wide range of scenarios and conditions where the SFA can be easily and successfully applied.

In conclusion, I wish to acknowledge all the coauthors who have contributed to make this textbook a unique, up-to-date manual on regenerative procedures: Anton Sculean, Dieter Bosshardt, and Raluca Cosgarea, who have thoroughly described the fundamental principles of periodontal regeneration; Mario Aimetti, Giulia Mariani, and Federica Romano, who described novel nonsurgical approaches; and Roberto Farina for his talented help with the surgical chapter. A special thanks to Anna Simonelli, who spent a great amount of her postgraduate education and PhD program coordinating and monitoring a massive amount of clinical research on the SFA. Without her precious work, this textbook would have never reached such a level of quality and completeness. Also, I want to express my sincere gratitude to Quintessence Publishing, who from the very first moment has strongly and convincingly believed in this challenging editorial project. Last but not least, I want to thank my family: my wife, Cristina, and my children Emma and Andrea for their continuous, silent, and patient support.

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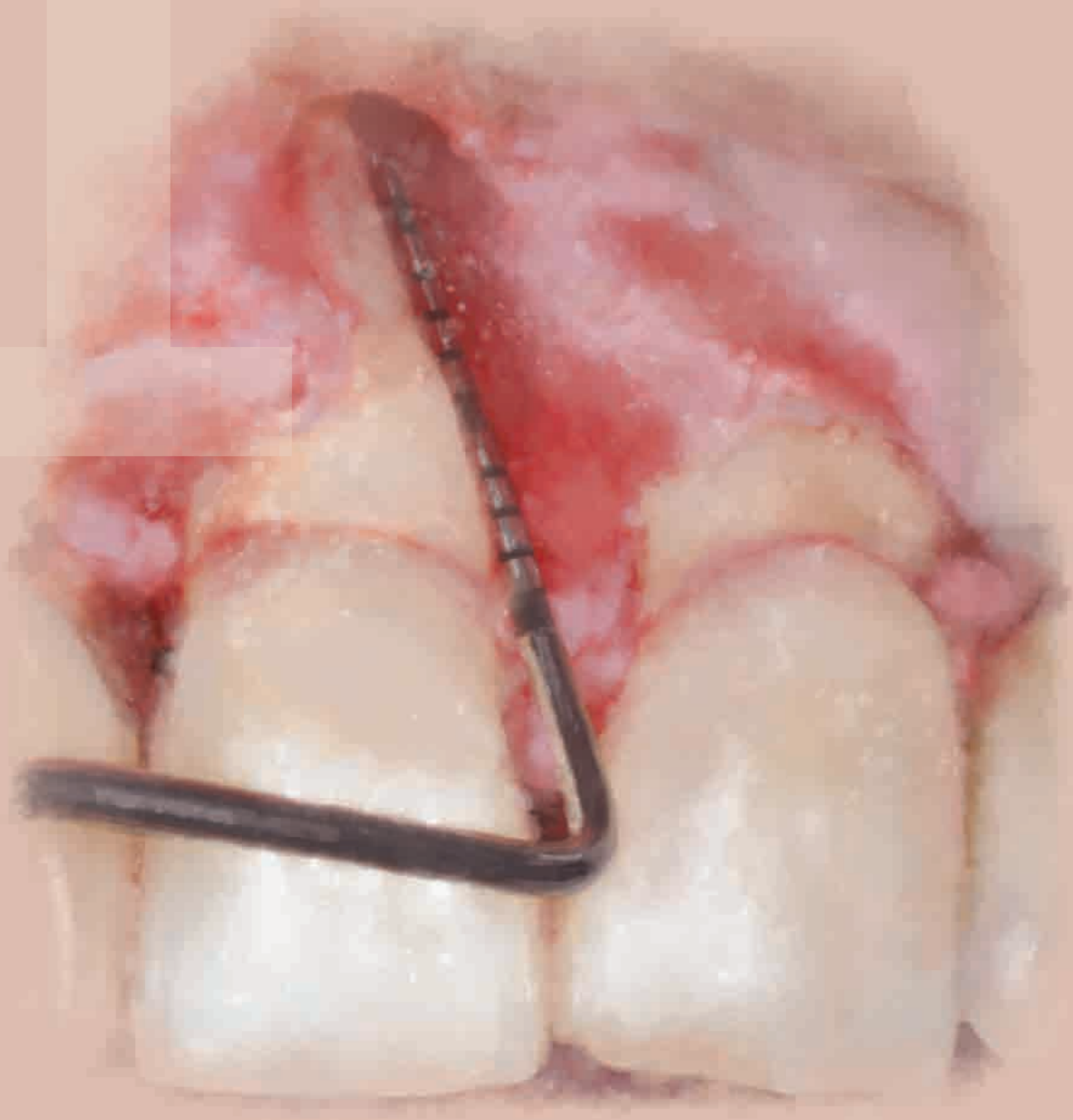

INTRODUCTION

Leonardo Trombelli, DDS, PhD
Roberto Farina, DDS, PhD, MSc
Anna Simonelli, DDS, PhD

WHY A TEXTBOOK ON THE TREATMENT OF INTRAOSSEOUS DEFECTS?

The prevalence of intraosseous defects in adults was investigated on dried skulls[1] as well as through clinical[2,3] and radiographic assessments.[4–8] At the patient level, the presence of at least one intraosseous defect was detected with an incidence ranging between 25.5% and 51% in samples representative of the general population or specific age cohorts,[1,6,7] between 18% and 23% in patients seeking dental care,[4,8] and of 45.1% in a periodontally compromised cohort.[2] A retrospective study revealed that intraosseous lesions are at high risk of further progression, and they may lead to tooth loss if left untreated.[9] Papapanou and Wennström[9] retrospectively recorded the bone level changes as well as tooth loss over a 10-year period at tooth sites with intraosseous defects in individuals not treated with systematic periodontal therapy. The results demonstrated an increased frequency of tooth loss and bone loss with increasing depth of the intraosseous defect. In particular, the proportion of teeth lost between the 1- and 10-year examinations was 22%, 46%, and 68% for teeth with a defect depth of 2 mm, 2.5 to 4 mm, and ≥ 4.5 mm, respectively.

These observations reinforce the need for:

- A proper diagnosis of the intraosseous defect, which represents a common lesion in patients affected by Stage III and IV periodontitis.
- An appropriate treatment of the lesion that may successfully revert those conditions (probing depth [PD] ≥ 5 mm associated with bleeding on probing [BOP]) conducive to progressive attachment/bone loss.

WHY A TEXTBOOK ON REGENERATIVE PROCEDURES?

The ideal outcome of the surgical treatment of a deep intraosseous defect is the regeneration of the tooth attachment apparatus destroyed by the process of periodontitis. From a histologic point of view, periodontal regeneration implies the formation of periodontal ligament fibers inserted into newly formed cementum and bone.[10] Data from human histologic studies have provided evidence that periodontal regeneration may be accomplished by using different regenerative technologies, including membranes and biologic agents[11–15] (see chapter 2).

Extensive clinical data have shown that compared with nonregenerative treatment, the surgical regenerative treatment of deep intraosseous lesions may result in a considerable improvement of probing parameters following the tissue maturation phase.[16–21] From a clinical point of view, periodontal regeneration may result in a substantial increase in clinical attachment level (CAL) gain (of at least 3 mm) and relevant bone fill of the intraosseous component of the lesion together with a maintainable, stable probing depth (ie, PD ≤ 4 mm in absence of BOP).

Sculean et al[22] published the results of a 10-year follow-up after the regenerative treatment of 38 intraosseous periodontal defects with different regenerative treatments: enamel matrix derivative (EMD), guided tissue regeneration (GTR), combination EMD and GTR, and open flap debridement (OFD). After treatment, all patients were placed in a 3-month supportive periodontal care program. At 1 year, a significantly greater CAL gain was achieved in the regeneration groups (ie, GTR, EMD, or combination) compared to OFD controls, and this was maintained substantially unvaried for a 10-year period.

A 20-year follow-up after regenerative treatment of intraosseous defects was recently reported in a cohort of 45 patients.[23] Defects were treated with three different modalities: GTR with modified papilla preservation flap, GTR with conventional access flap, and access flap alone without membrane. All patients were enrolled in a supportive periodontal care program with 3-month recalls. At both 1-year and 20-year reevaluation, a significantly better CAL gain and PD reduction was obtained by the two GTR treatments than the access flap. Moreover, the access flap surgery was associated with a greater disease recurrence.[23]

Collectively, available data seem to support the use of regenerative devices to ensure better short- and long-term outcomes than mere surgical debridement at deep intraosseous defects.

WHY A TEXTBOOK ON SIMPLIFIED TREATMENT PROCEDURES?

Despite decades of well-established nonsurgical and surgical protocols and techniques, the treatment of deep intraosseous lesions still represents a challenge for clinicians. There is a perception that the regenerative treatment of an intraosseous lesion is both technically sensitive and costly, with limited outcome predictability in the hands of the average operator (ie, not specially trained or highly skilled). This perception is likely due to aspects related to debridement of any lesions via a "closed" approach (see chapter 3) and those associated with the difficulty in performing a correct flap design and suturing technique as well as in selecting the appropriate regenerative technology. The purpose of this textbook is to present simplified procedures that may overcome these issues, at least in part, when treating an intraosseous defect.

The term *simplify* means the act of making something less complex. In the present textbook, we define a procedure aimed at improving the clinical conditions of a deep intraosseous lesion (in terms of substantial clinical and histologic attachment gain and bone fill, reduction of the PD to a maintainable condition, and limited to no postsurgery recession) as *simplified* when characterized by more favorable conditions for the patient and/or the clinical operator. Although the terms *simplification* and *minimal invasiveness* may appear as synonyms when referring to periodontal treatment, in our perspective *simplification* implies a substantially broader concept.

For the operator, a simplified procedure has the following characteristics[24]:

- Limited surgical equipment
- An easy-to-learn technique
- Limited need for additional treatments or devices (through the maximization of the inherent healing potential of the treated lesion)

For the patient, a simplified procedure should have a reduced impact on the following[24]:

- Posttreatment daily activities
- Posttreatment pain and discomfort (also reducing the required compliance for posttreatment regimens)
- Preexisting esthetics

For both patient and operator, a simplified procedure should reduce both treatment costs and chairside time needed for both treatment administration and follow-up visits.[24] This also results in fewer treatment costs.

Nonsurgical therapy as a standalone treatment always represents a "simplified" procedure, particularly when compared with surgical approaches. Among the available surgical options, simplified surgical procedures share a common technical aspect (ie, the elevation of a single flap on the buccal or palatal/lingual aspect), leaving the tissues on the opposite side intact. In this respect, this textbook will focus in detail on a novel surgical approach—the single-flap approach—that was first introduced in 2007[25] and repeatedly validated by different randomized clinical trials thereafter (see chapter 4). The single-flap approach was shown to be at least as effective as traditional papilla preservation techniques when evaluated either as a standalone protocol or in combination with regenerative devices.

The main goal of this textbook is to show the effectiveness of simplified surgical procedures to treat challenging intraosseous lesions. The authors' ambition is to teach how clinicians may achieve substantial treatment outcomes associated with minimal esthetic impairment and a more tolerable postoperative course.

Simplifying both the nonsurgical and surgical treatment phases will achieve the following outcomes:

- Reshape the learning curve, thus increasing the generalizability of treatment outcomes
- Improve patient access to care by limiting biologic and economic costs

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