30 MINUTES TO

Sinus Floor Elevation

Part 1: Indications, basics, and standard procedure

Markus Tröltzsch
Matthias Tröltzsch

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INTRODUCTION TO THE "30 MINUTES TO" SERIES

As we recognize the value of your time, we have crafted our books with a focus on optimal time efficiency. Thus, they are aptly named "30 MINUTES TO" and enable you to quickly and efficiently acquire the vital knowledge and skills you need.

In the dental practice, the integration of oral surgery procedures is increasingly becoming a necessity rather than a luxury. As the field of dentistry evolves, so does the expectation for comprehensive care. For dentists, the ability to perform a variety of surgical procedures not only enhances the quality of patient care but also significantly broadens the scope of their practice. This book is part of a series of small and easily accessible books that aim to be an indispensable resource for dental professionals seeking to elevate their surgical skills with confidence and precision.

Oral surgery encompasses a wide range of procedures, from basic tooth extractions to more complex interventions such as apicoectomies, bone grafting, implant placement, and the management of impacted teeth. While these procedures may seem daunting, our goal is to demystify them, providing clear, step-by-step guidance rooted in the latest scientific research and best practice. Each book is meticulously designed to offer practical insights, detailed protocols, and a wealth of clinical tips that are easily applicable in a general dental practice setting.

One of the key features of this book series is the emphasis on making the literature visible. For this reason, we have given it more space than simply a list at the end. Advances in dental materials, technology, and techniques are rapidly transforming the landscape of oral surgery. By keeping abreast of these developments, practitioners can ensure that their methods are not only effective but also minimally invasive and patient-friendly. These texts synthesize cutting-edge research and translate it into practical advice that can be seamlessly integrated into your practice. Simplicity was one of the key features we had in mind when designing these books.

Furthermore, as complications are an inherent part of any surgical procedure, a portion of each book is dedicated to troubleshooting and managing potential complications. Each surgical procedure is accompanied by an approach to solve complications, helping you to anticipate challenges and respond effectively. This proactive approach aims to enhance your decision-making process, reduce patient anxiety, and improve overall outcomes.

To further streamline your daily routine, we have included comprehensive checklists for the dental practice. These checklists serve as quick-reference tools to ensure that every aspect of the surgical procedure is meticulously executed, from material selection through patient preparation to postoperative care. By incorporating these checklists into your daily routine, you can enhance efficiency, minimize errors, and maintain a high standard of care.

Additionally, the books are peppered with practical tips designed to facilitate the implementation of surgical procedures into your daily practice. These tips, garnered from experienced practitioners, address common pitfalls and offer creative solutions to everyday challenges. Whether optimizing your operatory setup, improving patient communication, or mastering new techniques, these insights are designed to empower you to deliver exceptional care with ease.

In summary, these books are more than just reference books – they are a comprehensive toolkit for the modern dental practitioner. They bridge the gap between theory and practice, providing a solid foundation in oral surgery that is both accessible and actionable. By embracing the guidance within these pages, you will be well equipped to expand your capabilities, enhance patient satisfaction, and achieve new levels of professional fulfillment.

We invite you to delve into these books with curiosity and confidence, knowing that each chapter in each book is a step toward mastering the art and science of oral surgery. Your journey to becoming a more proficient and versatile dentist begins here.

HOW TO USE THIS BOOK

Welcome to the first book in the "30 MINUTES TO" series. This book is designed to be user-friendly, with a clear organizational layout to facilitate your learning and implementation of oral surgery procedures. The double-page layout ensures that you have all the essential information at your fingertips, making your learning experience more efficient and effective.

Part 1 is divided into four chapters. Chapters 1 and 2 should be read first as they give you all the structured information, in the nature of a textbook. Chapter 3 provides guidance on how to deal with your patients. Chapter 4 gives a step-by-step description of different cases, focusing on the practical implementation of the knowledge you will have gained in the earlier chapters. Part 2 (a separate publication) looks into advanced procedures and complications of sinus floor elevation and provides checklists for the implementation of the knowledge gained throughout the book into your daily practice.

TO UNDERSTAND THE LAYOUT

The "text only" sections

In these sections, the content is presented on both sides of the double-page spread in the usual manner, with the difference being that the literature is not referenced with superscript numbers and presented as footnotes or a list elsewhere in the book. Instead, the literature, key references, and sources are listed in boxes within the text to make them user-friendly, enhance visibility, and facilitate further reading. The type of study is mentioned, ie, meta-analysis/guideline, randomized clinical controlled trial, cohort study, case control study, cross-sectional study, case report (arranged from highest to lowest in the scientific hierarchy). Pertinent findings are directly cited in quotation marks under the references.

The "image and text" sections

In these sections on procedure, the content is presented across both pages and is meant to be read as a double-page spread. This design is structured to provide comprehensive and practical guidance, ensuring that you can easily follow along and apply the information in your practice. The content is presented as follows:

Main (pictorial) content (right-hand side): Each page contains photographs and radiographs providing a guide to the core content. The images are often labeled with relevant details and explanations pertaining to the procedures described.

Accessory (text) content (left-hand side): The left-hand side of each page serves as an accessory section, designed to complement the main content and explain the case and procedures in more detail. Here you will find:

- Materials, instruments, and tools needed for each procedure listed in bullet points for quick reference.
- Description of case situation and examination/evaluation details.
- Description of procedures, patient-centered approaches, difficulty assessments, complication management, medication protocols, current science, and similar information.

Ample space is provided for you to jot down personal notes, observations, and reminders, making it easier to tailor the information to your specific needs and making these books into a type of workbook.

There is often more than one way to solve a situation. Sometimes Matthias and Markus will discuss their varying approaches and protocols.

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30 MINUTES TO Ridge Preservation

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30 MINUTES TO Guided Bone Regeneration (GBR)

CHAPTER 1

BASICS

Sinus floor elevation, or sinus lift, is a technique that involves elevating the Schneiderian membrane in the sinus to create a space between the bone-limited sinus floor caudally (and possibly anteriorly and distally) and the sinus membrane cranially (and possibly anteriorly and distally). In shallow sinuses, a significant portion of the boundary may be formed by the Schneiderian membrane. The effect of this on the success rate is unclear from the literature; however, clinical experience suggests that it is not a major factor.

The aim of this technique is to increase the vertical dimension (not necessarily the width) of the lateral maxilla to create enough space for the safe placement of implants.

From a biologic perspective, the objective of the procedure should be to preserve and maintain as many boundary walls as possible. Therefore, the access should be large enough to allow for proper work, but not larger. The more the wall is opened, the more regenerative surface is lost.

The literature indicates that the technique used to perform the sinus lift does not influence the success rate (Esposito et al). In clinical practice, different preferences may exist, depending on the practitioner.

Sinus floor elevation is one of the safer and more successful augmentation procedures. The most common intraoperative complication is the perforation of the Schneiderian membrane, which occurs in 7% to 41% of the cases (Nolan et al, Stacchi et al). Complete failures with graft loss are uncommon and reported in the literature to be around 7% (Nolan et al, Stacchi et al), with postoperative complications ranging from acute sinusitis and fistulas to vertigo (Nolan et al, Stacchi et al).

Although complications are relatively rare, they can be potentially severe. Bleeding can sometimes be difficult to control and infections can spread rapidly. Thus, a step-by-step approach based on sound knowledge is required.

Esposito M, Felice P, Worthington HV. Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus. Cochrane Database Syst Rev 2014;2014:CD008397. doi:10.1002/14651858.CD008397.pub2.

Meta-analysis

"Many trials compared different sinus lift procedures and none of these indicated that one procedure reduced prosthetic or implant failures when compared to the other. Based on low quality evidence, patients may prefer rotary instruments over hand malleting for crestal sinus lift."

Nolan PJ, Freeman K, Kraut RA. Correlation between Schneiderian membrane perforation and sinus lift graft outcome: a retrospective evaluation of 359 augmented sinus. J Oral Maxillofac Surg 2014;72:47–52. doi:10.1016/j.joms.2013.07.020. Epub 2013 Sep 24.

Retrospective case series

"The incidence of sinus membrane perforation was 41%. There was an overall sinus graft failure rate of 6.7%; of the failed sinus grafts, 70.8% had a perforated sinus membrane at augmentation. There were 11.3% of sinuses with perforated membranes at graft placement that failed compared with 3.4% of sinuses with intact membranes failing."

Stacchi C, Bernardello F, Spinato S, et al. Intraoperative complications and early implant failure after transcrestal sinus floor elevation with residual bone height ≤ 5 mm: A retrospective multicenter study. Clin Oral Implants Res 2022;33:783–791. doi:10.1111/clr.13959. Epub 2022 May 29.

A retrospective multicenter study

"The following adverse events were recorded: membrane perforation (7.2%), acute sinusitis (0.9%), implant displacement into the sinus cavity (0.7%), oro-antral fistula (0.2%), and benign paroxysmal positional vertigo (0.5% of osteotome cases)."

CHAPTER 2

THE PROCEDURES

This chapter offers a concise overview of evidence-based practices, which will be demonstrated with detailed images in the following sections. The purpose here is to provide a brief synopsis.

2.1 WHEN TO DO IT

An augmentation is a means to create a stable and durable implant site, rather than a goal per se.

The indication for sinus floor elevation is based on two interrelated factors:

- Planned prosthetic treatment.
- Required implant dimensions.

When the available bone in the desired position for the planned tooth replacement is inadequate to place an implant of sufficient size, an appropriate reconstructive procedure is needed. In the lateral maxilla, this may involve a sinus lift, a lateral/vertical augmentation, or a combination of these techniques.

Therefore, the first step is to determine which prosthetic solution should be supported by the implant. Since the indication for fixed prostheses is influenced by the patients' local situation, these considerations are particularly relevant for the edentulous maxilla.

Further information on this topic can be found in "30 MINUTES TO Prosthetic Solutions" in this series or, for example, in the book "Implant Prosthodontics" (Wolfart).

After the position and dimension of the necessary implant have been established, they are planned using 3D-planning software. This ensures the correct indication and the identification of anatomical challenges.

The question of what degree of bone deficiency necessitates a sinus lift or what length and width of an implant should be pursued is controversial. The load that the implant has to withstand must always be considered. The treatment of a very large and strong patient, often a bruxer, must be evaluated differently from that of a small patient with weak masticatory muscles. The opposing dentition must also be taken into account.

It is clinically and scientifically recognized that a sufficient lateral maxillary bone volume should be able to accommodate an implant with a diameter of ≥ 4 mm and a length of ≥ 10 mm. Various studies demonstrate that shorter and thinner implants can also be used successfully (Thoma et al, Toledano et al).

The prosthetic load on potentially undersized implants also has to be considered. Underdimensioning can easily result in implant failures or damage to the corresponding prosthetic components.

The implant size should therefore always be adequately dimensioned; also considering that a bone contour that requires a reduction of the intended implant dimensions is usually not ideally suited for the reduced width.

Depending on the augmentation need, a decision can then be made regarding the suitable technique.

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Prosthetic Solutions on Implants
Quintessence Publishing
Planned for publication in 2027

Wolfart S. Implant Prosthodontics. Quintessence Publishing, 2016.
ISBN 978-1-85097-282-2.

Thoma DS, Haas R, Sporniak-Tutak K, Garcia A, Taylor TD, Hämmerle CHF. Randomized controlled multicentre study comparing short dental implants (6 mm) versus longer dental implants (11-15 mm) in combination with sinus floor elevation procedures: 5-year data. J Clin Periodontol 2018;45:1465–1474. doi:10.1111/jcpe.13025. Epub 2018 Nov 25.
Randomized controlled multicenter study
"At 5 years, 90 patients (124 implants; short: 60; long: 64) were re-examined (drop-out rate rate 10%). Patient-level implant survival rates were 98.5% (short; 1 implant failure) and 100% (long; p = 0.49)."

Felix CBP, Kurien A, Devanarayanan A, Kumar D, Thirumurthy VR, Bindhoo YA. Subantral sinus augmentation using hydraulic lift system and alloplastic phosphosilicate putty followed by simultaneous implant placement for the rehabilitation of an atrophic posterior maxilla: A case report. J Clin Transl Res 2022;8:86–92.

Toledano M, Fernández-Romero E, Vallecillo C, Toledano R, Osorio MT, Vallecillo-Rivas M. Short versus standard implants at sinus augmented sites: a systematic review and meta-analysis. Clin Oral Investig 2022;26:6681–6698. doi:10.1007/s00784-022-04628-1.

2.2 HOW TO DO IT

2.2.1 The lateral approach

Various techniques for sinus lift procedures have been described in the literature and are used in practice. These include simple methods of removing the lateral sinus wall with a bur as well as complex preparations involving a trapdoor that is then pushed into the sinus, methods that use biomaterials to fill the sinus, graftless techniques, or even hip bone veneer grafts (Starch-Jensen and Jensen, Esposito et al).

The first step is to perform a radiographically and clinically based 3D analysis to determine the optimal implant position. The decision regarding whether to place the implant and perform the sinus lift simultaneously depends on the clinical case. For bone heights above 4 to 5 mm, a combined approach can be performed if the bone stability is good. In our experience, bone heights of less than 3 mm should always be grafted first. In cases of soft bone, previous medical conditions, or other expected difficulties, we prefer a non-simultaneous approach (Cha et al, Felice et al).

In this book, we will focus on our standard technique, which is easy to learn and has high safety and low complication rates. Other techniques can be found in comprehensive textbooks (Chen et al, Jensen).

The incision line should correspond with the incision that will be used later to place the implants in order to minimize scarring. The size of the lateral window should not be larger than necessary to improve the healing potential and reduce the operative risks. A gentle preparation through the bone using a bone scraper is beneficial as it also helps to identify intraosseous vessels that might cause bleeding complications if not coagulated properly. Only a very thin layer of bone should remain covering the Schneiderian membrane. This is then removed using a diamond bur. Sinus lift elevators are then used to carefully detach the membrane, avoiding tears. All sources of bleeding should be addressed before proceeding with the sinus lift procedure. If there is doubt about whether the membrane is intact, a resorbable collagen membrane can be used and placed on the Schneiderian membrane after adaptation in order to seal tears. Bone substitute – possibly with autogenous bone chips and platelet-rich fibrin (PRF), blood, or hyaluronic acid – is then used to fill the sinus. After another check for any potential sources of bleeding, a lateral augmentation may be added (see “30 MINUTES TO Guided Bone Regeneration (GBR)” and “30 MINUTES TO Lateral and Vertical Augmentation” in this series). The wound is then closed with multiple layer sutures. Finally, a radiograph verifies the position of the bone graft.

Starch-Jensen T, Jensen JD. Maxillary sinus floor augmentation: A review of selected treatment modalities. J Oral Maxillofac Res 2017;8:e3. doi:10.5037/jomr.2017.8303. eCollection 2017 Jul-Sep.
Literature review

Esposito M, Felice P, Worthington HV. Interventions for replacing missing teeth: augmentation procedures of the maxillary sinus. Cochrane Database Syst Rev 2014;2014:CD008397. doi:10.1002/14651858.CD008397.pub2.
Meta-analysis

Cha HS, Kim A, Nowzari H, Chang HS, Ahn KM. Simultaneous sinus lift and implant installation: prospective study of consecutive two hundred seventeen sinus lift and four hundred sixty-two implants. Clin Implant Dent Relat Res 2014;16:337–347. doi:10.1111/cid.12012. Epub 2012 Nov 15.
Prospective cohort study

Felice P, Pistilli R, Piattelli M, Soardi E, Barausse C, Esposito M. 1-stage versus 2-stage lateral sinus lift procedures: 1-year post-loading results of a multicentre randomised controlled trial. Eur J Oral Implantol 2014;7:65–75.
1-year multicenter randomized controlled trial

Chen S, Buser D, Wismeijer D (Eds). Sinus Floor Elevation Procedures: ITI Treatment Guide Series, Volume 5. Quintessence Publishing, 2011. ISBN 978-3-938947-18-0.

Jensen OT. The Sinus Bone Graft, ed 3. Quintessence Publishing, 2019. ISBN 978-0-86715-791-8.

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Guided Bone Regeneration (GBR) Berlin: Quintessence Publishing, 2026.

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Lateral and Vertical Augmentation Quintessence Publishing
Planned for publication in 2027

2.2.2 The transcrestal approach

For situations where the additional required bone height in the sinus is around 2 mm (Antonaya-Mira et al) and the stability of the residual bone is good enough to support the implant, a transcrestal approach is applied.

Various techniques such as hydrodynamic procedures are described in the literature (Praveen et al); however, we resort to the osteotome technique.

The benefits of a transcrestal approach are obvious – by avoiding the lateral approach, trauma and the risk of complications are significantly reduced. The disadvantage is that the overview is significantly reduced, and ruptures of the Schneiderian membrane are difficult to check.

After the necessary steps for implantation preparation have been taken (see the first case hereunder regarding implantology and implant placement as well as implant dimension considerations discussed in books in this series), the drilling protocol is followed in such a way that approximately 1 to 2 mm of bone height to the sinus is left intact. The residual bone lamella (sinus floor) is then carefully elevated with an osteotome (Summers). A hammer is usually used to drive the chisel-like osteotome cranially, but this is relatively uncomfortable for the patient and its use needs to be clearly communicated beforehand. Alternatively, gentle and strictly controlled pressure can also be applied using only the osteotome. However, there is a significant risk of excessive pressure, causing the osteotome to penetrate too far into the sinus and, in the worst case, to the floor of the orbit. Bone graft material is then inserted into the implant tunnel up to approximately three-quarters of the length of the planned implant. If a perforation is suspected, a piece of collagen membrane can be placed at the appropriate height using the osteotome. When the implant is inserted, the graft material is then pushed into its final position.

A transcrestal (closed sinus lift) approach is employed when the desired additional bone height in the sinus is around 2 mm (Antonaya-Mira et al) and the residual bone can provide adequate stability for the implant.

Various techniques such as hydrodynamic procedures have been described in the literature (Praveen et al), but we employ the osteotome technique.

The transcrestal approach offers several advantages as it reduces the surgical trauma and the risk of complications associated with the lateral approach. The downside is that visualization is significantly diminished, and breaches in the Schneiderian membrane are difficult to identify.

Antonaya-Mira R, Barona-Dorado C, Martínez-Rodríguez N, Cáceres-Madroño E, Martínez-González JM. Meta-analysis of the increase in height in maxillary sinus elevations with osteotome. Med Oral Patol Oral Cir Bucal 2012;17:e146–e152. Published online 2011 Dec 6. doi:10.4317/medoral.16921.

Meta-analysis

Praveen AA, Venkadassalapathy S, Victor DJ, et al. Efficacy of two different hydrodynamic sinus lift systems for atraumatic elevation in immediate implant placement. Patient Prefer Adherence 2023;17:1197–1207. doi:10.2147/PPA.S403036. eCollection 2023.

Case series

Summers RB. A new concept in maxillary implant surgery: the osteotome technique. Compendium 1994;15:152, 154–156, 158.

Tröltzsch M, Tröltzsch M. 30 MINUTES TO the First Case in Implantology
Quintessence Publishing
Planned for publication in 2027

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Implant Placement and Implant Dimension Considerations
Quintessence Publishing
Planned for publication in 2027

CHAPTER 3

MEDICATION

Please consider the patient's medical history as well as alternative procedures if there are allergies or intolerances.

In general, the evidence on the efficacy of antibiotics (Salgado-Peralvo et al), analgesia, and corticosteroids (Mordini et al) is inconclusive. This, however, may be due to a lack of evidence for the omission of perioperative antibiotics.

We follow a consistent regimen. We initiate the antibiotic therapy the evening before with 1 g of amoxicillin and continue the therapy on the day of surgery and on the first and second postoperative days with 3 g of amoxicillin divided into three doses (1-1-1). Ibuprofen 600 can be used as an analgesic at the same frequency. For patients in countries where metamizole is approved, we recommend 500 mg of metamizole at the same frequency. Both medications can also be combined. In countries where metamizole is not approved, paracetamol (note the maximum dose!) can be used as a combination drug.

Further reading can be found in the book "Medicine in Dentistry" (Tröltzsch et al) or the corresponding books in this series ("30 MINUTES to Analgesics" and "30 MINUTES TO Antibiotics").

Salgado-Peralvo ÁO, Garcia-Sanchez A, Kewalramani N, Romandini M, Velasco-Ortega E. Preventive antibiotic therapy in sinus elevation procedures: A systematic review. Int J Oral Maxillofac Implants 2023;38:19–28. doi:10.11607/jomi.9930.
Systematic review
"Not enough evidence is available to support either the use or nonuse of preventive antibiotic therapy for sinus elevation surgeries or to support the superiority of any protocol over others."

Mordini L, Patianna GP, Di Domenico GL, Natto ZS, Valente NA. The use of corticosteroids in the lateral sinus augmentation surgical procedure: A systematic review and meta-analysis. Clin Implant Dent Relat Res 2022;24:776–791. doi:10.1111/cid.13126. Epub 2022 Sep 6.

Tröltzsch M, Kauffmann P, Tröltzsch M (Eds). Medicine in Dentistry. Quintessence Publishing, 2025. ISBN 978-1-78698-114-1.

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Painkillers
Quintessence Publishing
Planned for publication in 2027

Tröltzsch M, Tröltzsch M. 30 MINUTES TO Antibiotics
Quintessence Publishing
Planned for publication in 2027

CHAPTER 4

STEP-BY-STEP PROCEDURES

This chapter provides a detailed, illustrated guide to the surgical procedures. It begins with a transcrestal sinus lift, followed by a standard case utilizing a lateral approach, and concludes with a more complex case (in a separate publication).

4.1 Clinical Case A: Transcrestal Approach

Clinical situation

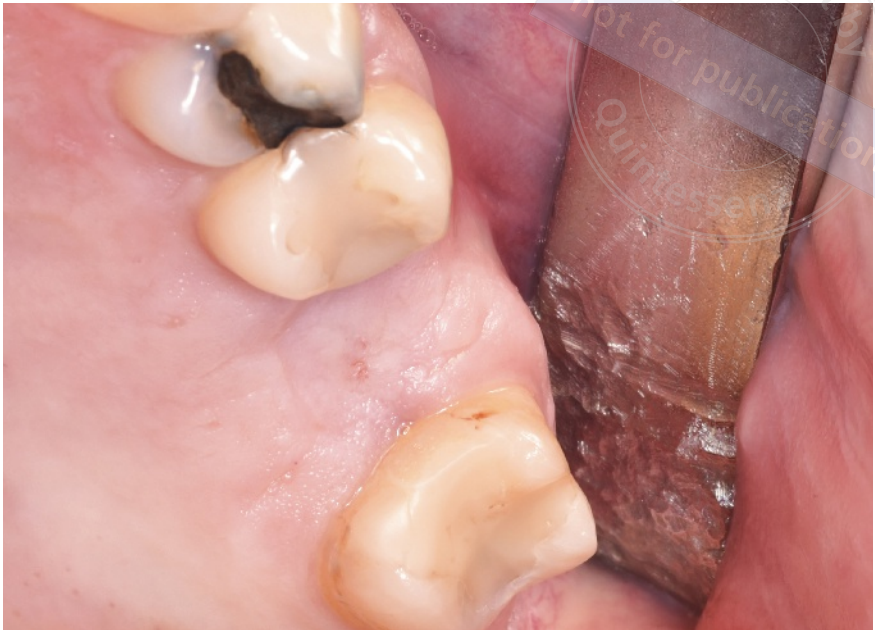
- Normal soft tissue.
- Smoker.
- Continuous anticoagulation with 100 mg/day aspirin.

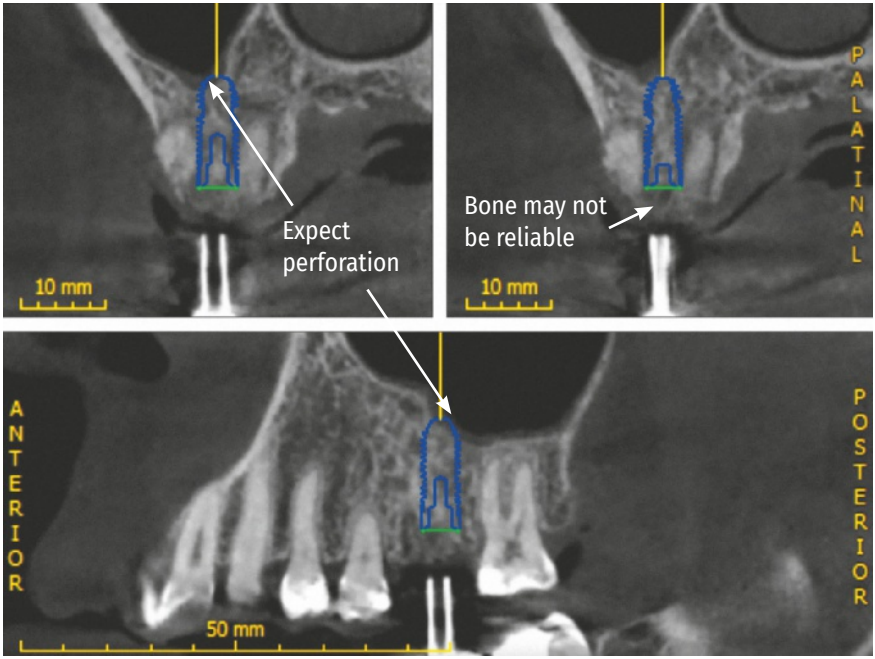
Clinical examination

- Approximately 2.5 mm of soft tissue with normal contour.
- Anticipating a standard bone situation.

CBCT evaluation (coDiagnostiX software; Dental Wings)

- Crestal bone readings may be uncertain.
- Consider that a CBCT might present a slightly altered image compared with actual conditions.
- General guideline: maintain a 2 mm distance from sensitive areas.
- Recommend carrying out a minor internal sinus lift operation.





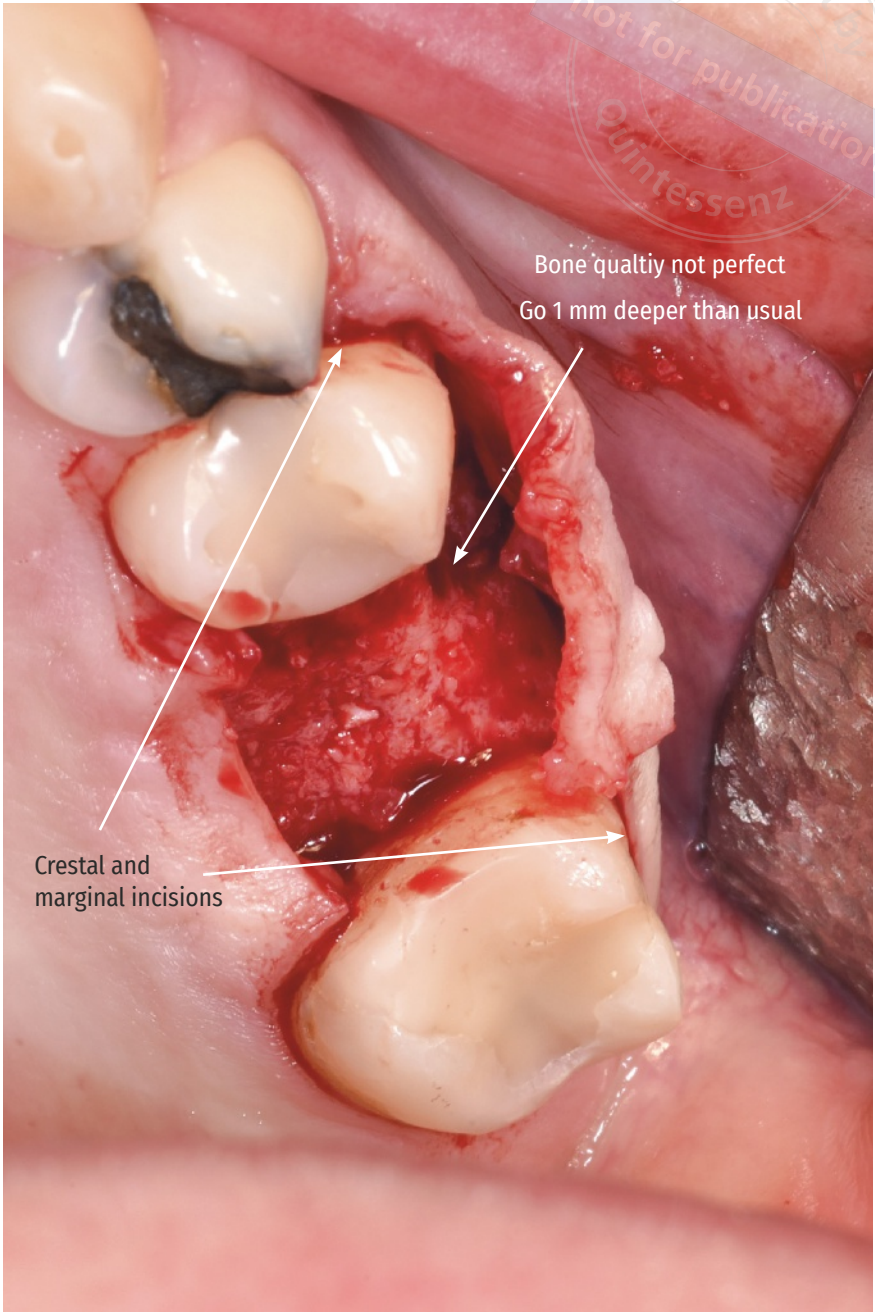
Instruments in use

- Periosteal elevator or raspatory
- Scalpel blade No. 15
- Retractors
- Surgical suction

Procedure

Crestal incision.

Marginal extension around the neighboring teeth.



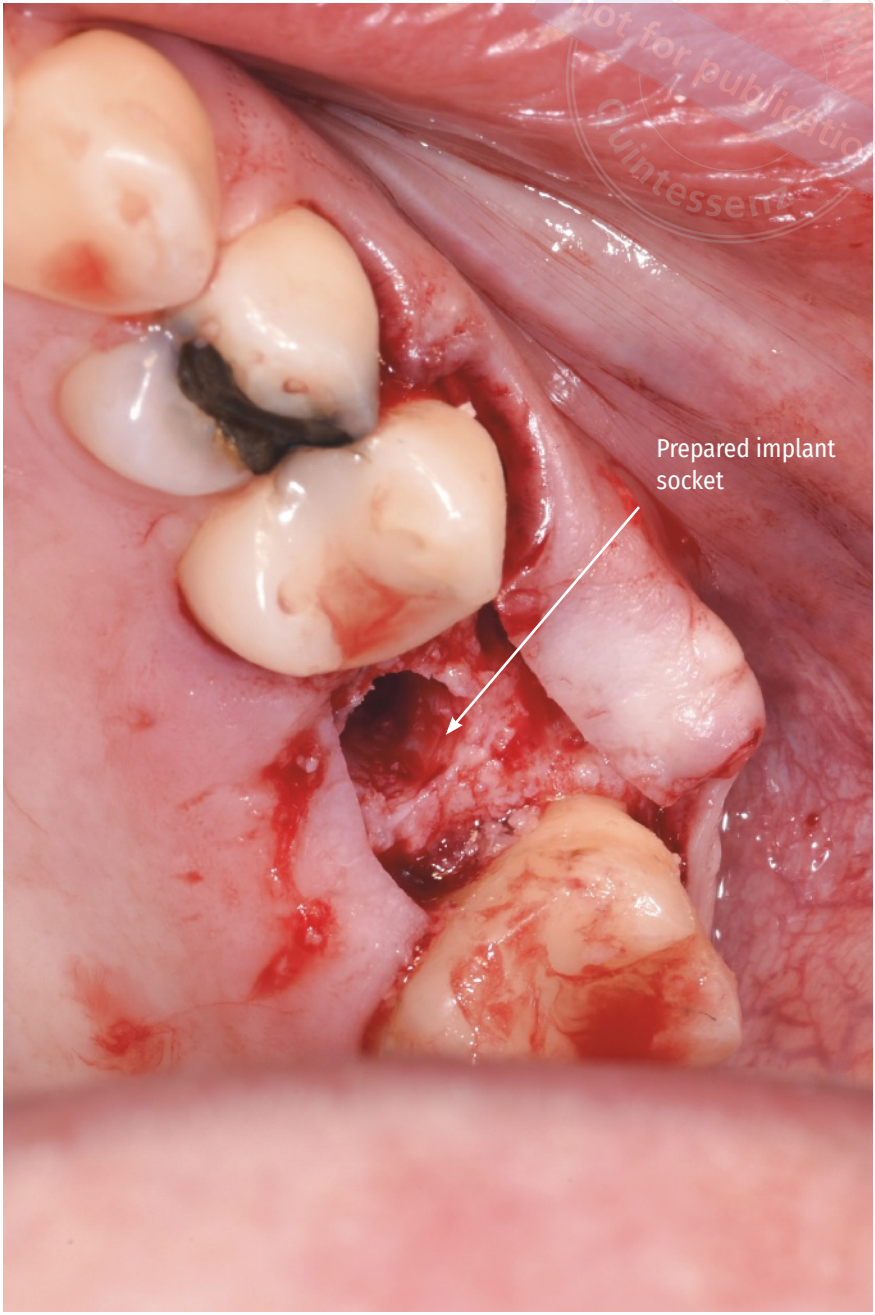
Instruments in use

- Regular implant kit (BEGO)
- Surgical guide
- Retractors
- Surgical suction

Procedure

Prepare the implant to about 3-mm diameter, not larger.

Make sure to leave 1 to 2 mm of bone layer; do not drill into the sinus.



Instruments in use

- Sinus plunger
- Surgical guide
- Retractors
- Surgical suction

Procedure

Use the smallest plunger that fits into the site.

Apply very gentle force and slowly push up. DANGER! – If you apply too much force, you might slip up too far. Alternatively, use very light hammer strokes to push up the bone.

Use a surgical guide to avoid altering the angulation!

Following this, use the next wider implant drill and follow it up with the next wider plunger.

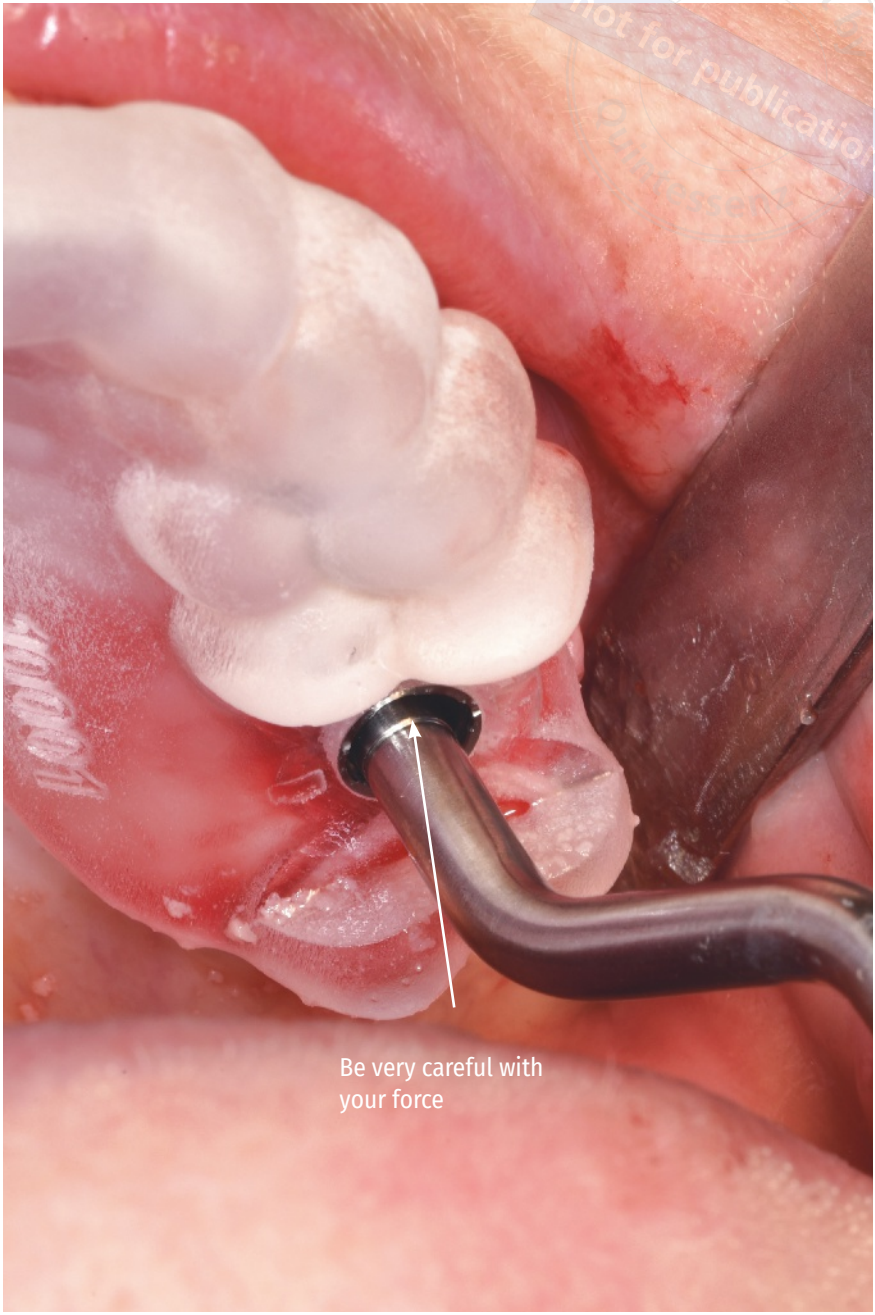
Repeat until you have reached the desired dimensions.

Markus

I mostly use very gentle pressure with the plunger, as the use of the hammer gives the patient too much discomfort.

Matthias

In my professional assessment, applying too much pressure can be hazardous as it increases the risk of the osteotome slipping, and subsequent dislocation. I prefer to employ cautious taps with a hammer. With adequate patient preparation, the process is typically well managed.

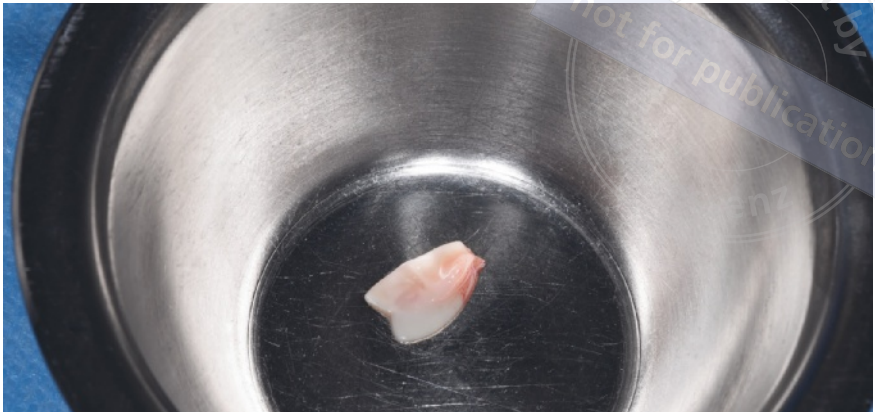


Instruments in use

- Small surgical tray
- Platelet-rich fibrin (PRF) membrane (alternatively: hyaluronic acid, eg, REGENFAST; Geistlich)
- Deproteinized bovine bone mineral (DBBM) (Bio-Oss; Geistlich)
- Retractors
- Surgical suction

Procedure

Place the bone graft material onto the tacky PRF membrane, creating a uniformly applicable graft body.

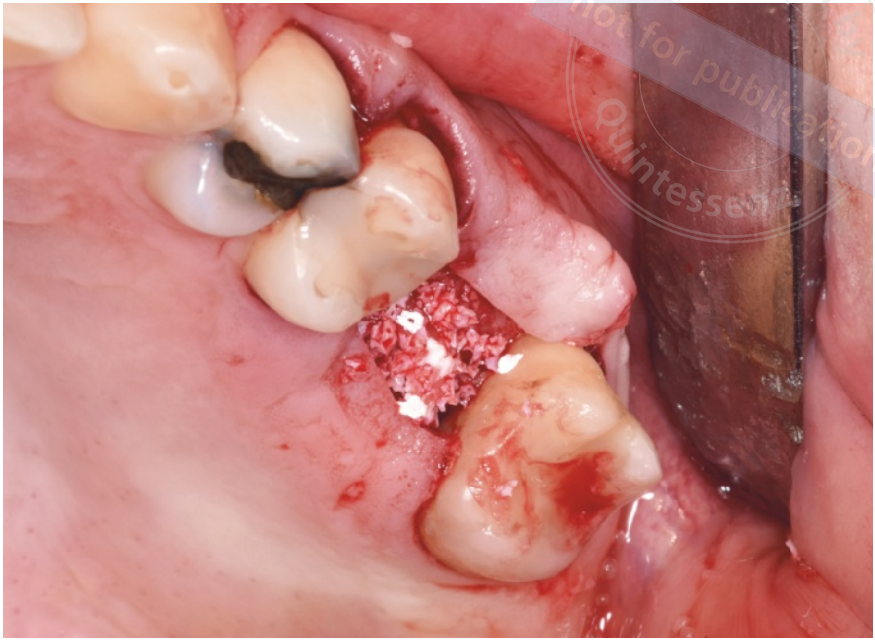


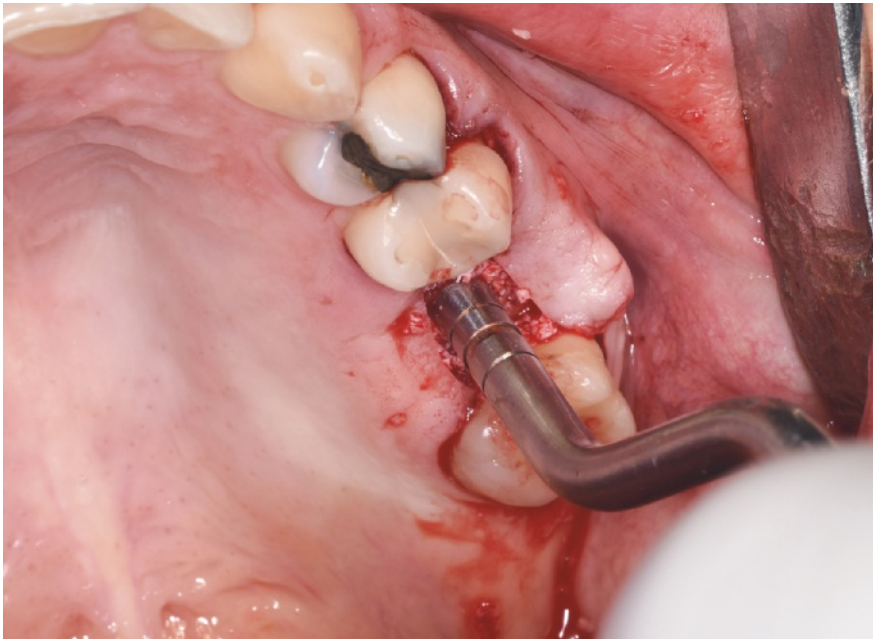
Instruments in use

- PRF membrane (alternatively: hyaluronic acid, eg, REGENFAST) covered with DBBM (Bio-Oss)
- Sinus plunger
- Retractors
- Surgical suction

Procedure

Place the bone substitute directly at the implant area.
Utilize a sinus plunger that is one size smaller than the final size needed.
Insert the bone substitute approximately two-thirds into the implant site.





Instruments in use

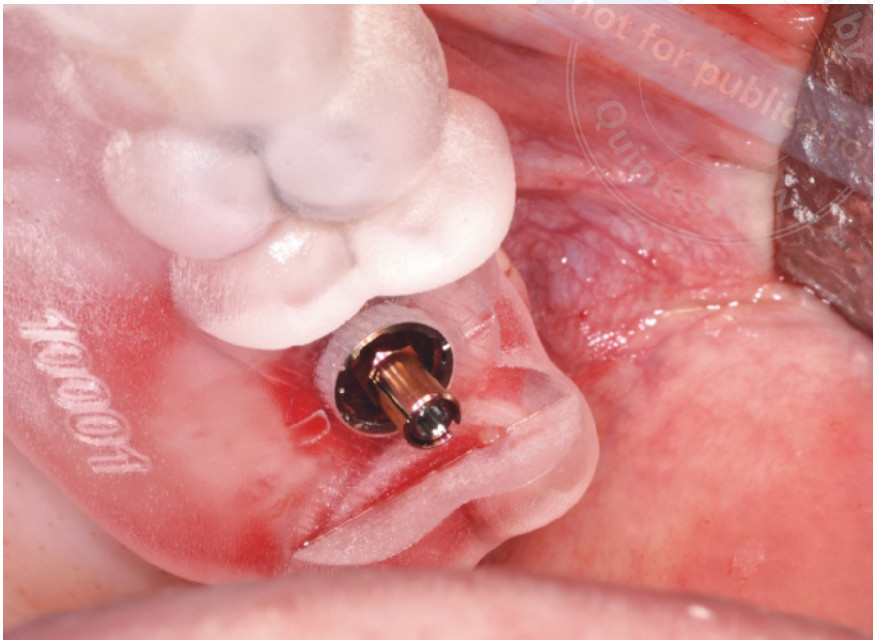
- Surgical guide
- Implant kit (BEGO)
- Retractors
- Surgical suction

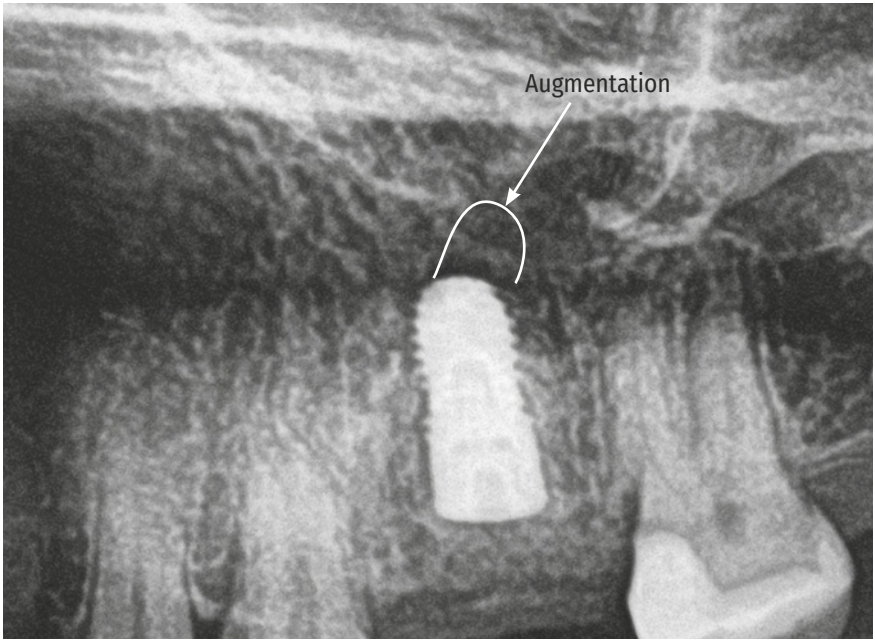
Procedure

Conclude by positioning the implant, ensuring the biomaterial is correctly situated at the apex of the implant.
Complete the implantation procedure in the standard manner.

Outcome

A radiograph will reveal a subtle halo signifying the presence of the biomaterial at the apex of the implant.





CHAPTER 4

STEP-BY-STEP PROCEDURES

4.1 MINOR DEFECTS

Our standard approach to everyday ridge preservation.

4.1.1 Minor defects: standard approach

Clinical situation

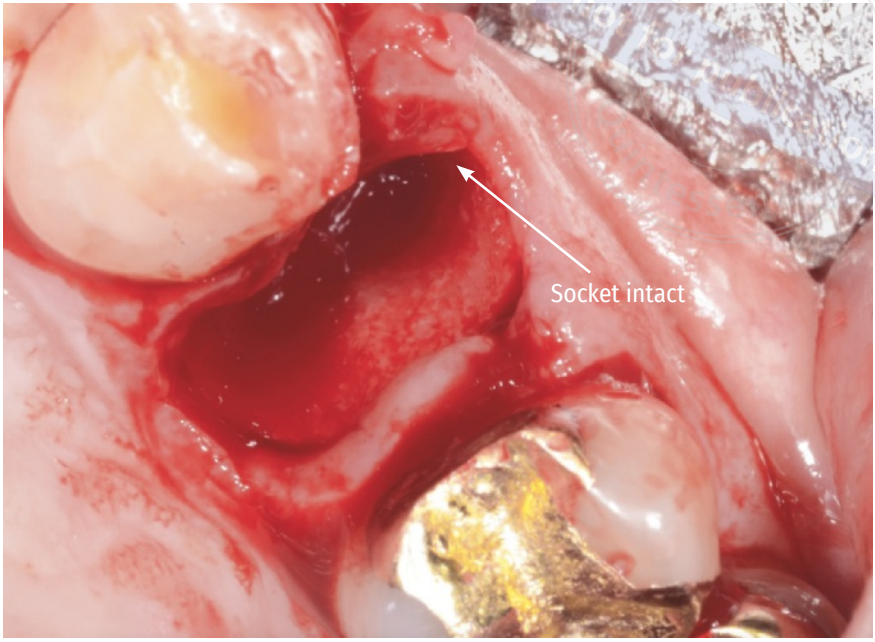
Regular soft tissue.
Healthy patient.
Normal extraction.

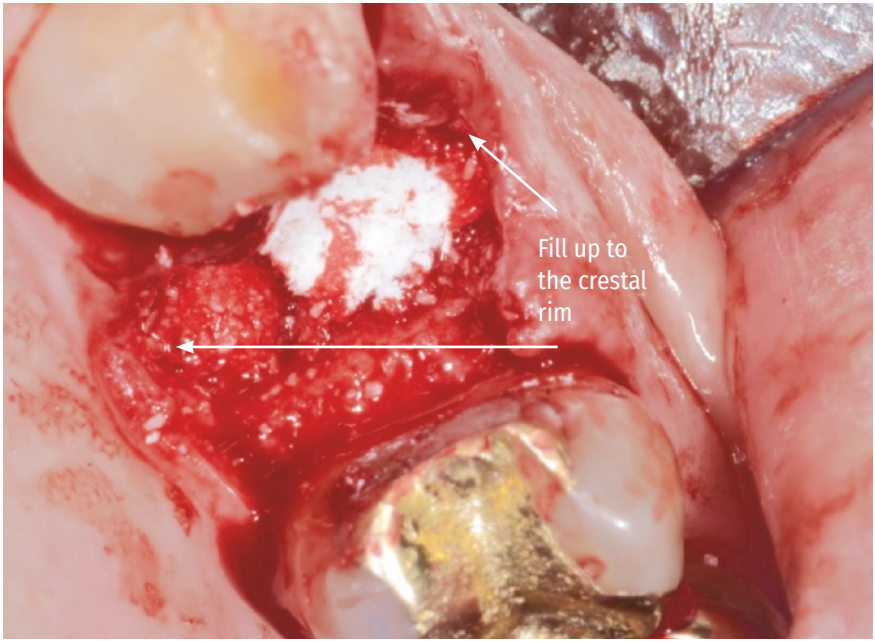
Clinical examination

Extraction socket intact.
No extensive inflammation.

Procedure

Simply place the biomaterial (Bio-Oss Collagen; Geistlich) into the extraction socket. Make sure the defect is filled up to the crestal rim. It is not important to completely fill the apical area, just make sure the material will not slip deeper.


Socket intact


Fill up to
the crestal
rim

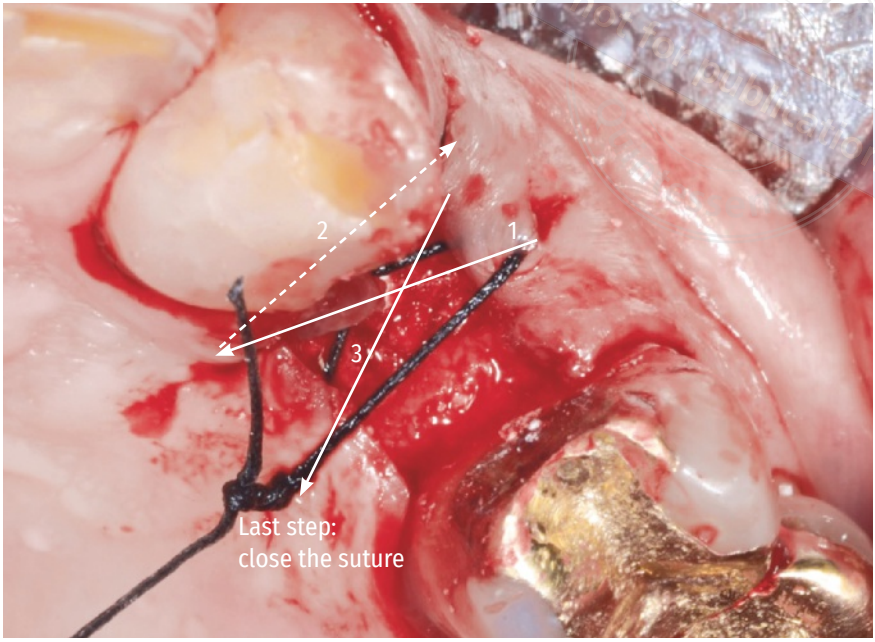
Instruments in use

- Suture material (3-0 silk)
- Surgical set
- Surgical suction

Procedure

The suture is designed to secure the biomaterial in its designated position without displacing the surrounding soft tissue.

Employ either single-button or X-shaped continuous sutures to ensure that the biomaterial is adequately retained.


2
1
3
Last step:
close the suture

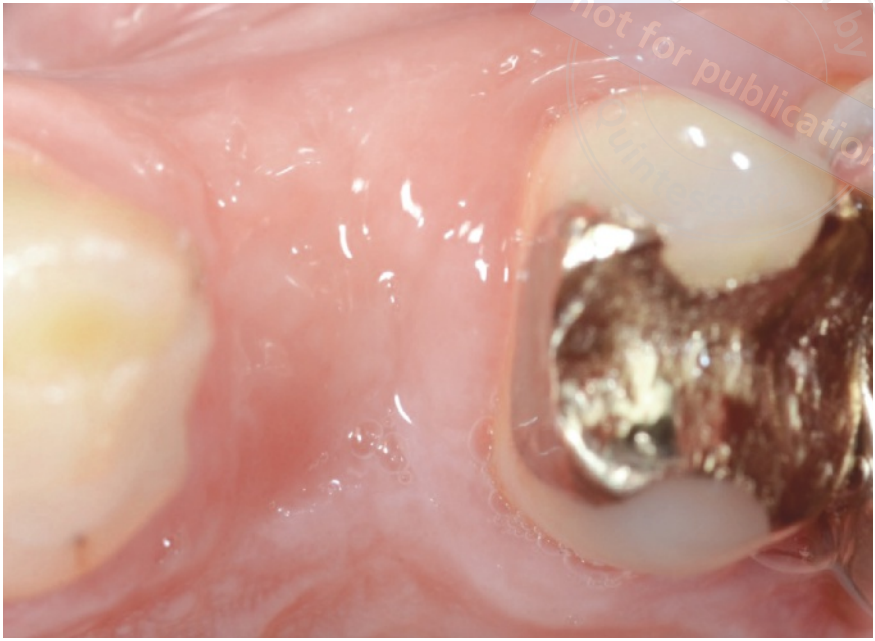

Maintain dehiscence
for granulation

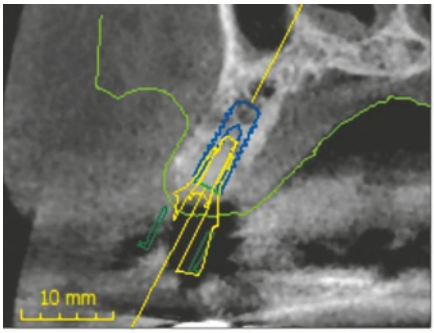
Clinical situation 3 months postoperatively

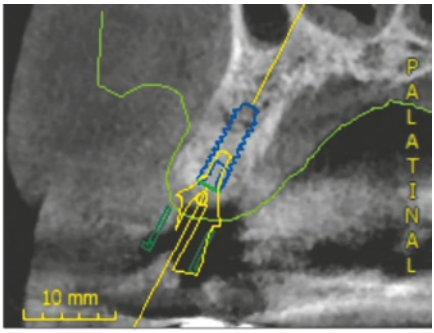
Bony contour preserved.
Nice soft tissue.

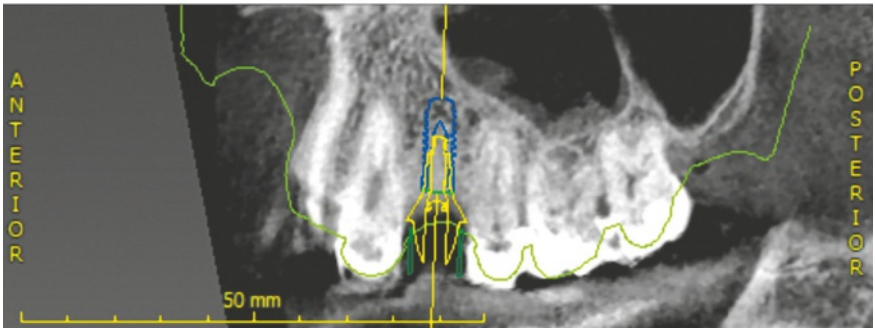
Implant planning CBCT (coDiagnostiX software; Dental Wings)

Ridge fully preserved in height and width.
No augmentation needed.
Implant is 3.3 mm in diameter and 10 mm in length, for reference.









4.2 GBR WITH REINFORCEMENT

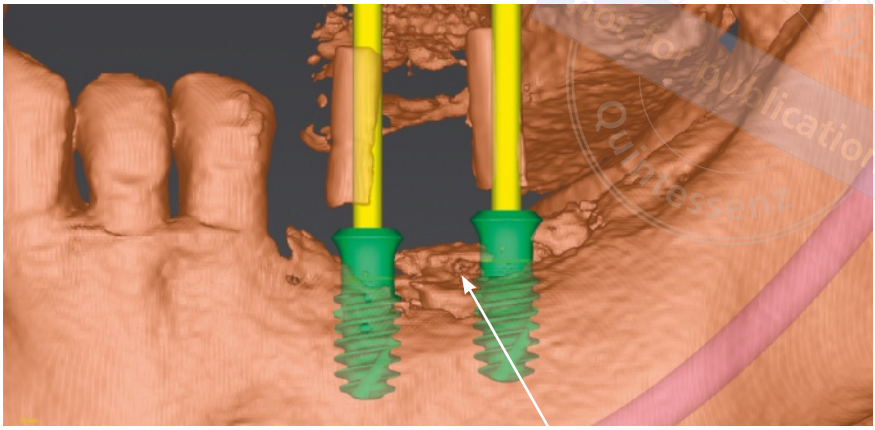
Our standard approach to medium augmentation volumes.

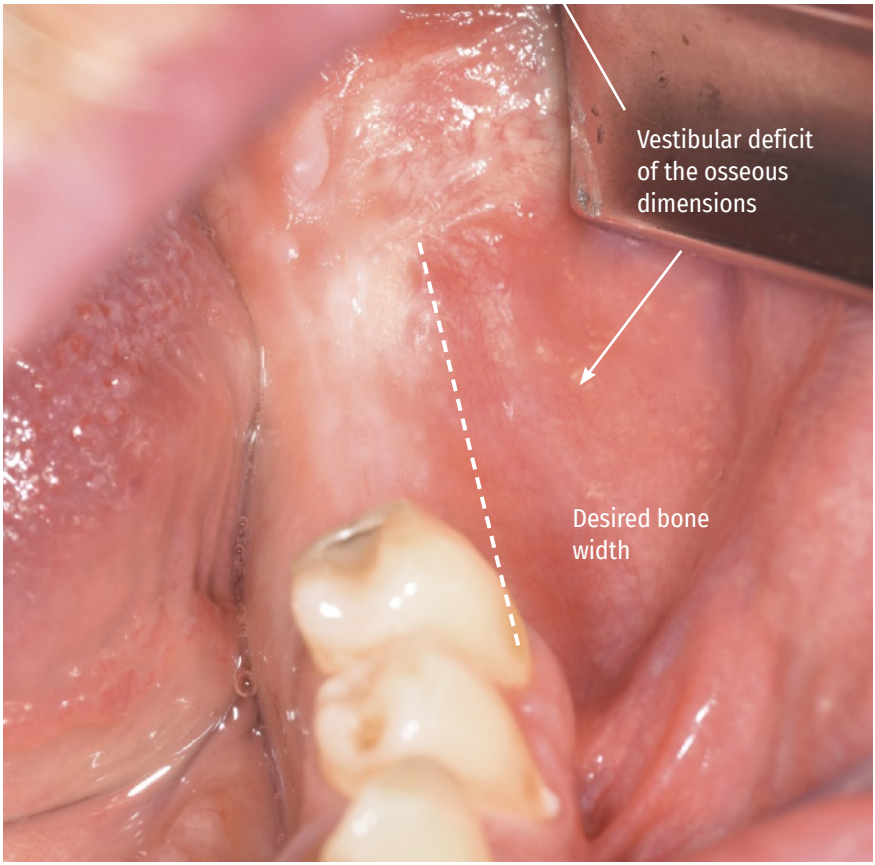
Clinical situation

In this case, a lateral bone deficit is evident in the left mandible. Approximately 4 months prior, a ridge preservation procedure was performed. However, due to severe periodontal damage to the teeth, the lateral bone wall could not be fully preserved.

The planning software for the CBCT scan (coDiagnostiX software; Dental Wings) clearly highlights this vestibular defect (implant dimensions: 4.1-mm diameter, 8-mm length). In such situations, it is essential to discuss the treatment approach with the patient. In this instance, the patient is young, healthy, and wishes to have the arch restored as comprehensively as possible. Therefore, GBR with reinforcement is indicated, as a lateral augmentation exceeding 3 mm is required.

Alternatively, the implants could be placed more deeply. However, this would sacrifice a portion of the remaining lingual bone, and the implant shoulder would be positioned significantly below the cementoenamel junction (CEJ) of the neighboring teeth – a clear disadvantage.



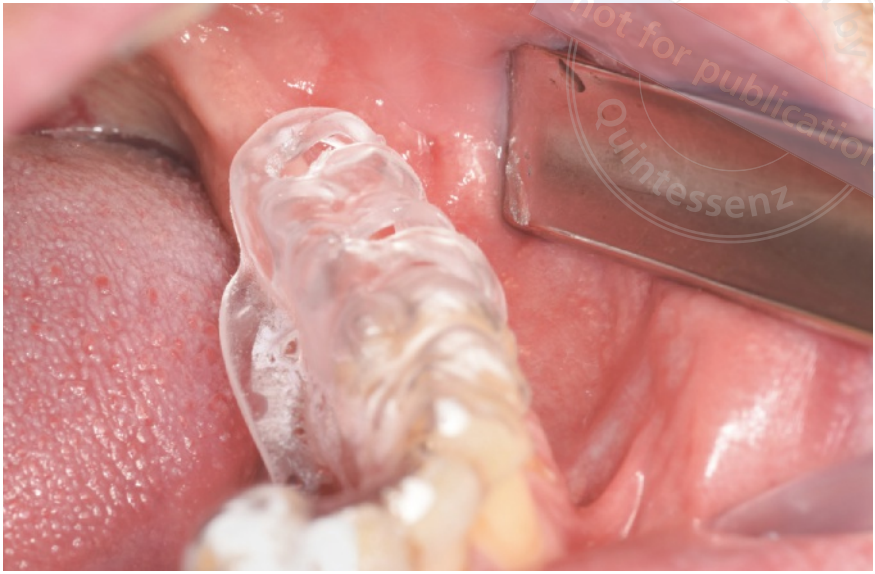


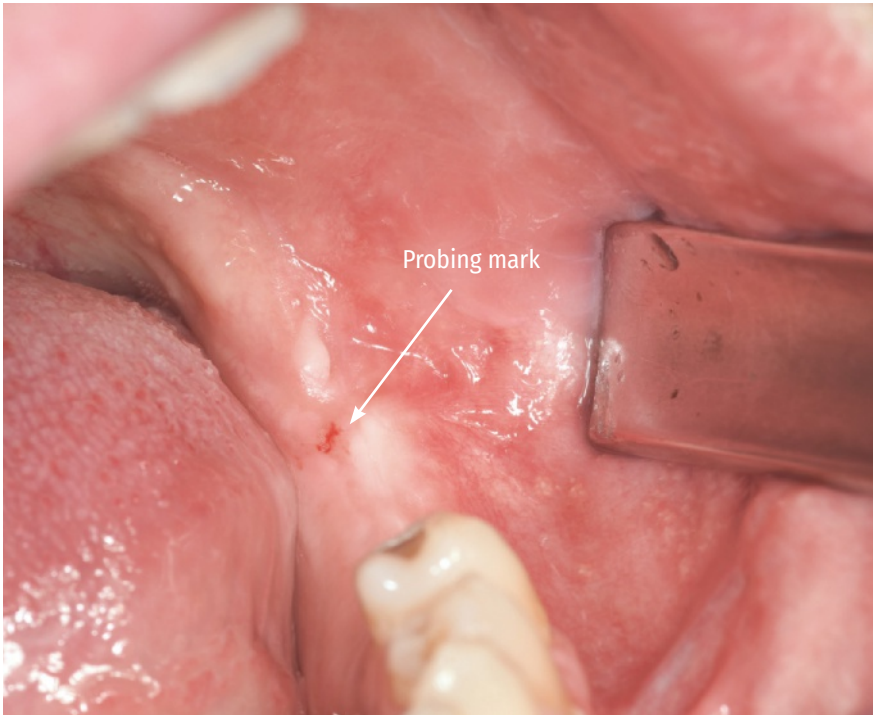
Procedure

First, the planning template is inserted. This step largely depends on the individual protocol. For details, refer to the section on implant dimension considerations in "30 MINUTES to Implant Placement" in this series.

For our protocols, planning is already crucial for the augmentation process: First, to determine the correct position for the augmentation, and second, to ensure that the incision line is consistently followed from the very first step in the procedure. This approach helps to avoid additional scarring.

Using the template, the position of the future implants is now marked with a probe. The incision is made either directly along this line or slightly displaced toward the lingual side. This ensures that as much keratinized gingiva as possible remains vestibular.





Instruments in use

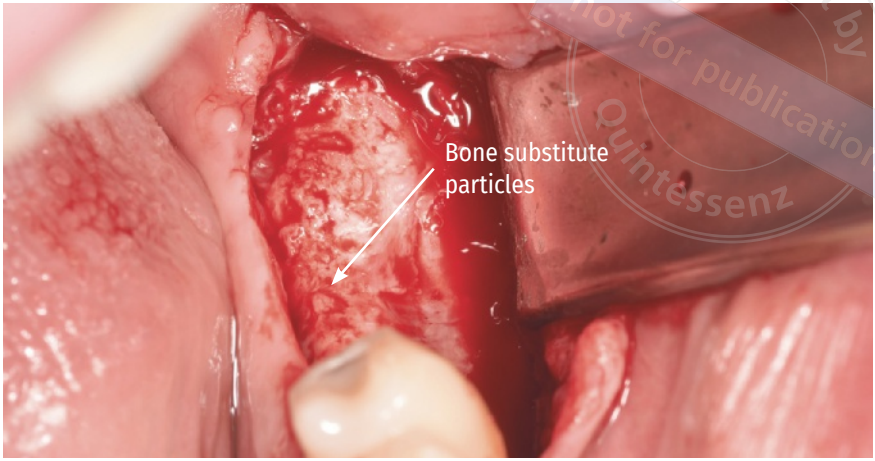
- Safescraper
- Surgical blade No. 15
- Surgical set
- Surgical suction

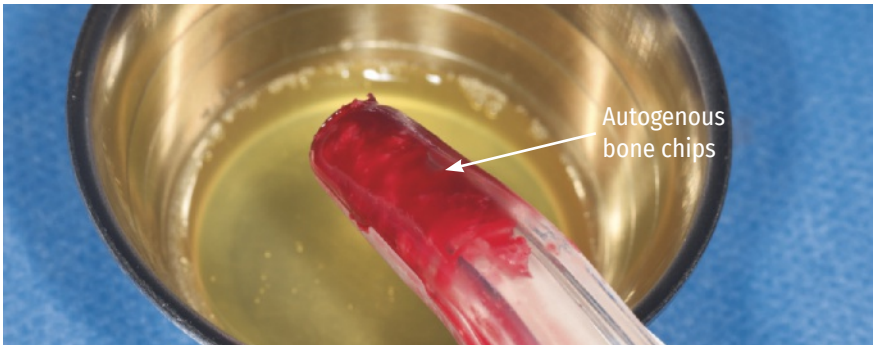
Procedure

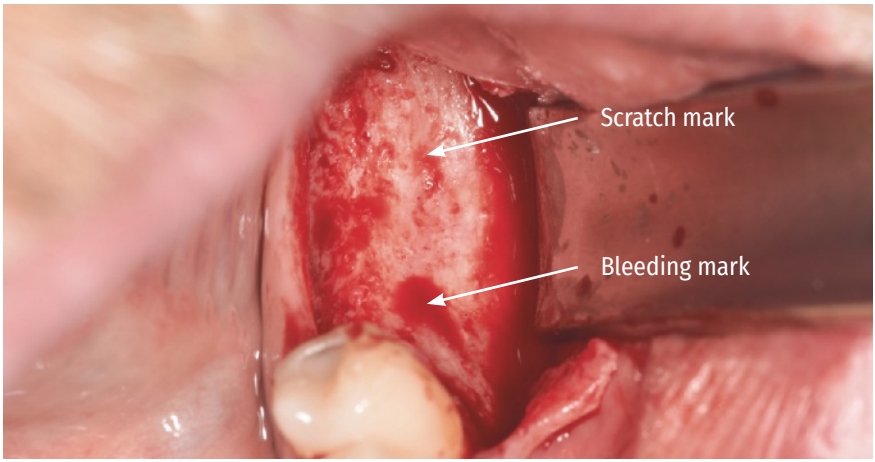
A crestal incision is made, without the need for relieving incisions. In the distal area, great care must be taken to avoid the path of the lingual nerve, while in the anterior area, one or two adjacent teeth can be included in the flap with a marginal incision. Well-healed bone is observed, with remnants of the bone substitute material (Bio-Oss Collagen) used for the ridge preservation.

The bone surface is now conditioned with a Safescraper after the periosteum has been relieved, both vestibularly and lingually, and the flap has been mobilized. The bone chips are placed in PRF; alternatively, hyaluronic acid or whole blood can also be used. A less optimal alternative would be saline solution.

In the lower image, the conditioned bone surface can be seen with scratch marks and pinpoint bleeding. This bleeding is particularly important as it stimulates bone regeneration in this area.







Instruments in use

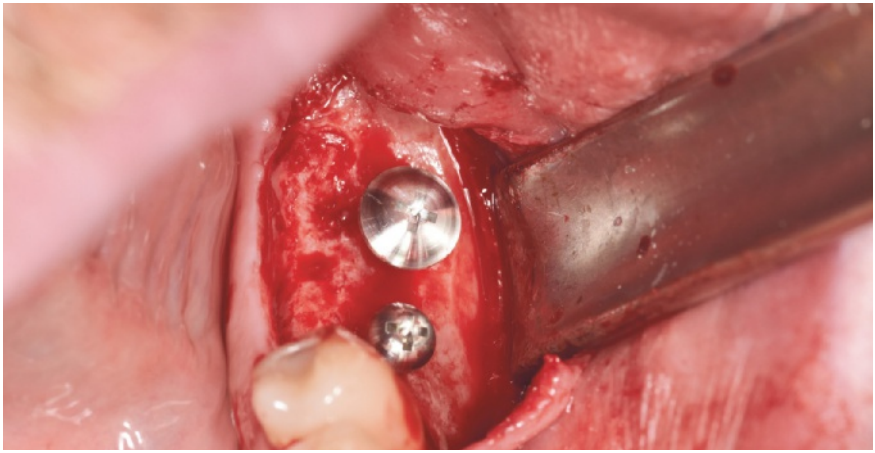
- Surgical set
- Surgical suction
- Drill 1.1 mm (must match the screws)
- Tenting screws

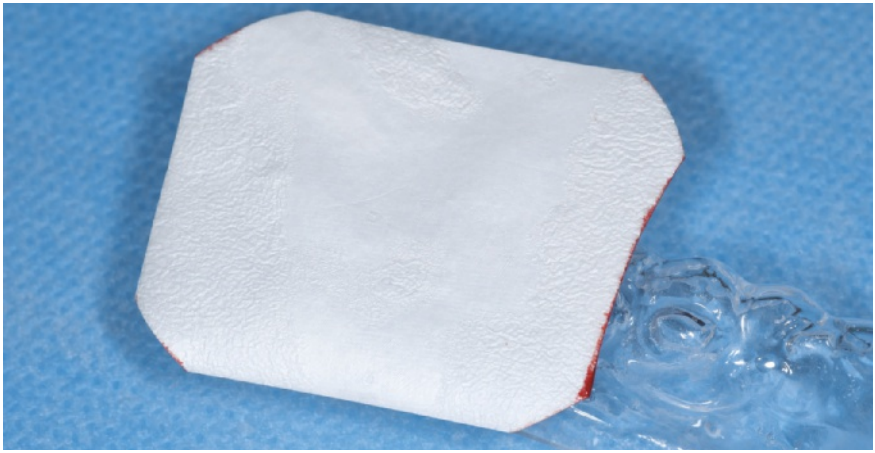
Procedure

Now, the autogenous bone chips, the liquid (in this case, PRF), and the bone substitute material (The Graft; Purgo) with a particle size of 0.25 to 1 mm are mixed together to later obtain "sticky bone."

The tenting screws (Umbrella screws; Geistlich) are placed at the appropriate sites. Choosing the screw position is one of the more challenging aspects of this technique. Ideally, the surgeon should have already determined the placement of the screws using 3D planning beforehand, taking into account nerve proximity and the risk of perforation. The screws must be firmly anchored in the bone.

Next, a resorbable collagen membrane (The Cover Flex; Purgo) is trimmed according to the template so that it fits intraorally, eliminating the need for adjustments inside the mouth.





Instruments in use

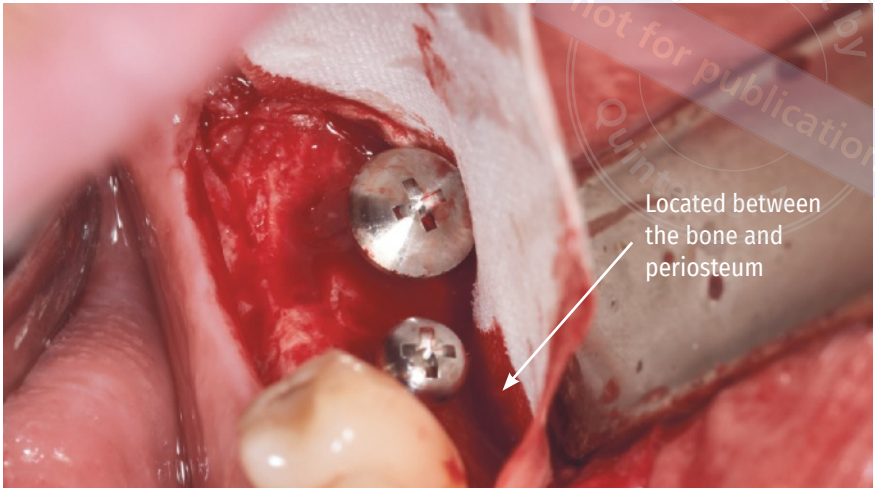
- Surgical set
- Surgical suction

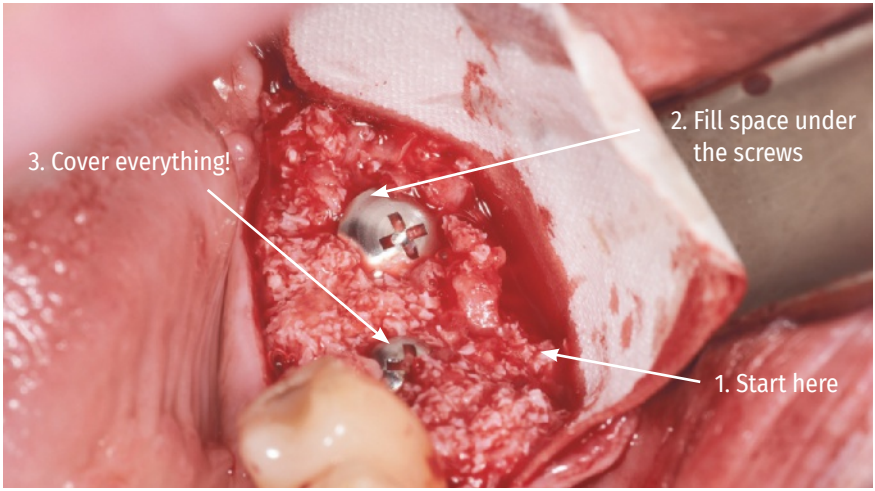
Procedure

The resorbable collagen membrane (The Cover Flex) is now placed vestibularly under the periosteum, thereby securing it in place. This prevents slippage and provides a stable counterpressure when packing with sticky bone.

The sequence of steps is intentionally chosen to allow the mixed combination of the autogenous bone chips, the liquid, and the bone substitute material (see above) to stand for a period of time. During this time, depending on the selected base fluid (except for saline), an effective bonding occurs, resulting in highly manageable sticky bone.

The sticky bone is now initially packed in the caudal area between the bone and the membrane, and then distributed under the screw heads. Overall, the area can be contoured in such a way that slightly more material is added. Even partially covering the screw heads does not pose any problem.





Instruments in use

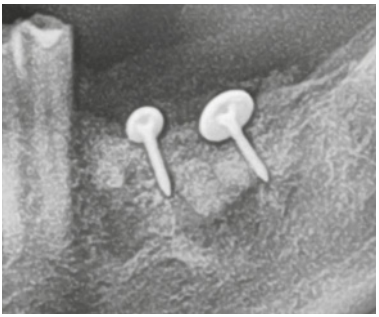
- Surgical set
- Botex PTFE (PFOA-free) suture material 5-0
- Surgical suction

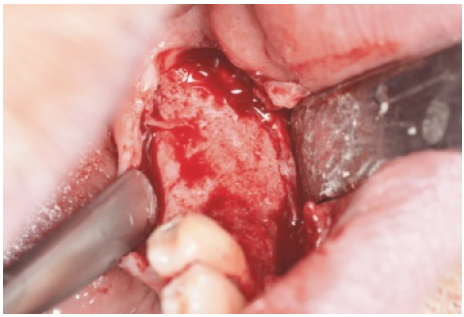
Procedure

The resorbable collagen membrane (The Cover Flex) is now pulled over the augmentation toward the lingual side and also placed under the periosteum here. Membranes that feature a higher stiffness are somewhat more difficult to position to the lingual side, but they are more shape-stable during the initial placement on the vestibular side.

The flap is fixed with sutures. The process begins at the boundary tooth and then progresses distally. This way, in the area where tension is highest, the flap is initially adapted, allowing tissue from the softer areas to be drawn in. Once the wound is closed with crystal-clear precision, deep-running sutures are placed to secure the closure.

After 9 days, the wound appears to have healed excellently, with the only exception being at the very back, where the wound edges had been slightly turned in during suturing. This area is still showing more intense healing activity.





Radiograph: Postoperative situation after 4 months when the screws were removed. Clinical image: Postoperative situation after 4 months after screw removal – healthy bone.