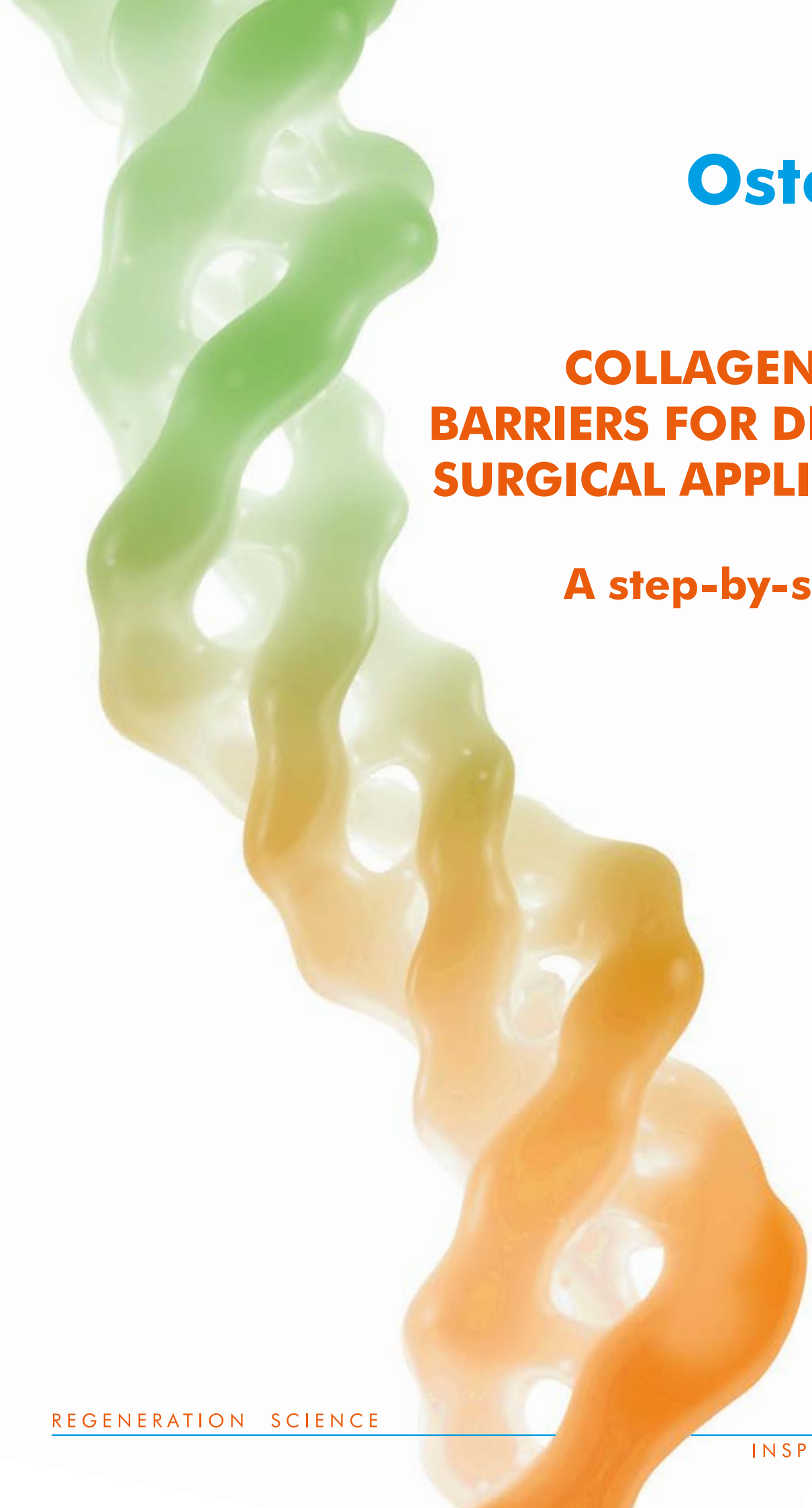
OsteoBiol®
by Tecnoss

# COLLAGENIC BONE BARRIERS FOR DIFFERENT SURGICAL APPLICATIONS

## A step-by-step guide



REGENERATION SCIENCE

INSPIRED BY NATURE

## EXTRACTION SOCKETS CLASSIFICATION

Human teeth are positioned in alveolar sockets surrounded by four bony walls: buccal, lingual, mesial, and distal. Several conditions like periodontal disease or traumas are common causes of dental fractures or bone loss around the teeth.
If a tooth cannot be treated, it may be necessary to extract it. In 2007 Elian et al.[1] published a schematic classification for extraction sockets. They identified three types of sockets according to the presence/absence of buccal bone and soft tissue (Figure 1).

- Type I sockets - both the buccal soft and hard tissue are at a non-pathological level;
- Type II sockets - the buccal soft tissue is present, while the hard tissue is missing;
- Type III sockets - both the buccal soft and hard tissue are missing.

## BONE DEFECTS CLASSIFICATION

Pathological conditions mentioned above may lead to complex horizontal/vertical bone defects. According to the classification developed by Benic and Hämmerle, bone defects can be classified into six different categories based on the morphology of the defect and the need for augmentation of the ridge contour[2] (Figure 2).

- Class 0 defects have sufficient bone volume to allow a standard implant placement;
- Class I defects are characterized by a gap between the implant surface and the bone. Depending on the width of the gap and the location of the defect, the gap may or may not be filled with a bone substitute;
- Class II defects are characterized by peri-implant dehiscences. The stability of the graft is provided by the adjacent bone walls;
- Class III defects are characterized by peri-implant dehiscences. The stability of the graft is not provided by the adjacent bone walls;
- Class IV defects require horizontal augmentation;
- Class V defects encompass vertical defects.

## BONE DEFECTS AND IMPLANT PLACEMENT

Sufficient peri-implant bone is a prerequisite for implant longevity and stability of the esthetic result as it stabilizes the soft tissue. Each defect involves specific hard and soft tissue requirements for reconstruction. In the case when one or multiple bony walls are missing, it is necessary to reconstruct the bone contour by using various surgical protocols. Some allow immediate implant placement[3,4], while others necessitate longer times to regenerate an appropriate amount of bone before placing the implant[5,6].
Autogenous bone (AB) is considered the gold standard for bone regeneration, and its usage is highly recommended to treat Class V bone defects[5,6]. Given that AB is available in limited quantities, oral surgeons often rely on alternatives to AB. For example, autogenous cortical bone plates can be replaced by xenogeneic[3-6] bone substitutes, as demonstrated by various research groups all over the world.
Finally, other experimental and clinical studies reported that OsteoBiol® *Lamina*® prevents soft tissue ingrowth[7] and preserves the graft volume when used in combination with a collagenic biomaterial[8] or AB[6].


**References:**

1.Elian N et al.
Pract. Proced. Aesthet. Dent,
2007;19(2):99-104

2. Benic GI et al.
Periodontol 2000,
2014 Oct;66(1):13-40

3. Schuh PL et al.
Materials (Basel),
2021 Sep 9;14(18):5180

4. Elaskary A et al.
Int J Oral Maxillofac Implants,
2021 Jan-Feb;36(1):146-153

5. Villa G et al.
Int J Periodontics Restorative Dent,
2023 July-Aug;43(4):435-441

6. Happe A et al.
J Clin Med,
2023 Nov 9;12(22):7013

7. Fischer KR et al.
Ann Anat,
2020 Sep;231:151524

8. Wachtel H et al.
Int J Periodontics Restorative Dent,
2013 Jul-Aug;33(4):491-7

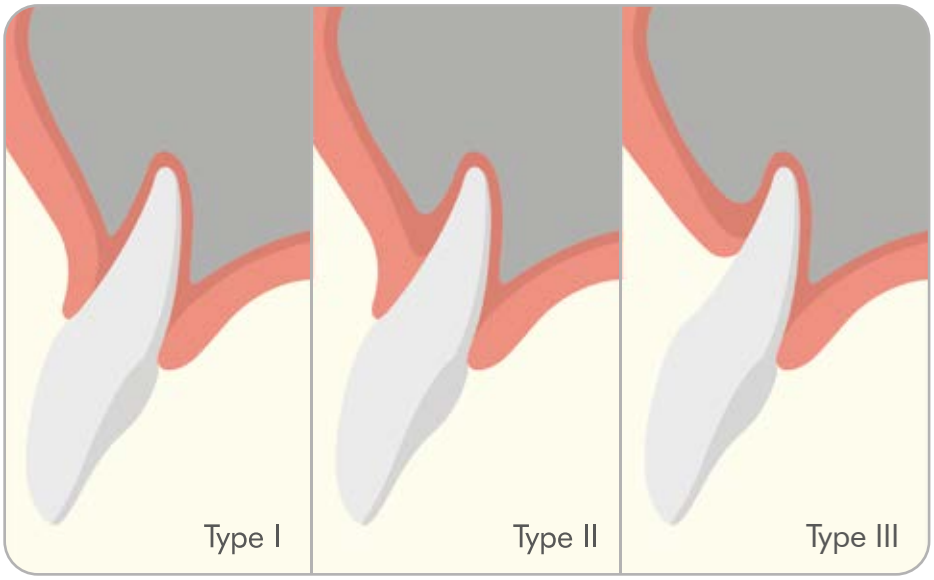



**FIG 1**

Extraction socket classification according to Elian et al.

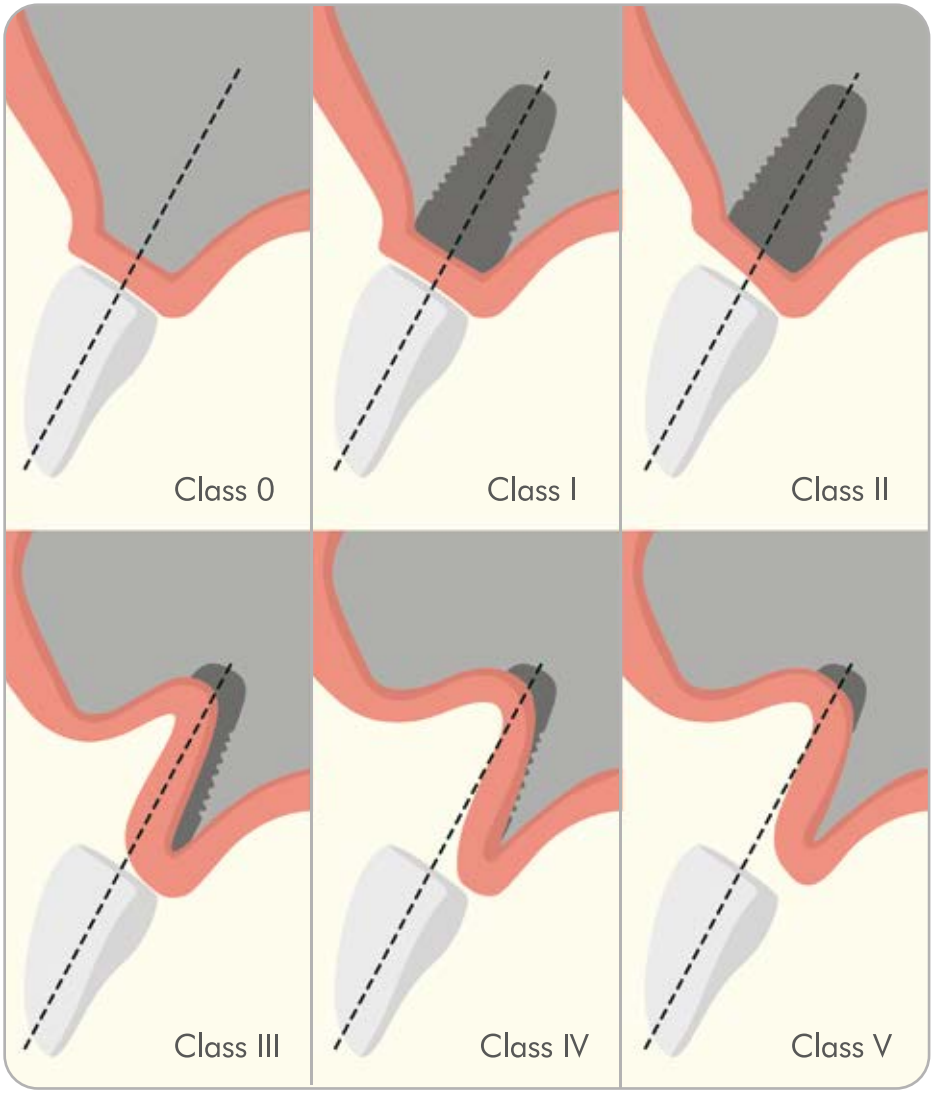



**FIG 2**

Bone defect classification according to Benic and Hämmerle.

**References:**

1. Elaskary A et al.
Int J Oral Maxillofac Implants,
2020;35(4):799-807

2. Elaskary A et al.
Int J Oral Implantol (Berl),
2021 Aug 20;14(3):307-320

3. Elaskary et al.
Int J Oral Maxillofac Implants,
2021;36(1):146-153

4. Elaskary A et al.
J Clin Periodontol,
2022 Jun;49 Suppl 23:4-385

5. Dhande SH et al.
J. Med. Res,
2022;21:1-0

6. Ghallab NA et al.
Oral Maxillofac Surg,
2022 Jun 20

7. Elaskary A, et al.
J Oral Maxillofac Surg,
2022 Aug;80(8):1398-1407

8. ElAskary A et al.
Clin Implant Dent Relat Res,
2022 Oct;24(5):559-568

9. Elaskary A et al.
Int J Oral Maxillofac Implants,
2023 May, Jun;38(3):468-478

10. Hamed MM et al.
BMC Oral Health,
2023 Sep 1;23(1):623

11. Elaskary A et al.
Clin Implant Dent Relat Res,
2023 Sep 5

## TREATMENT OF TYPE II EXTRACTION SOCKETS: THE VESTIBULAR SOCKET THERAPY

When dealing with type II extraction sockets in the esthetic area, few solutions are available. Delayed implant placement has several disadvantages, including tissue height and width drop, post-restorative scar tissue formation, and mid-facial recession. Cortical xenogeneic collagenic bone barriers can be utilized to treat type II extraction sockets in the esthetic area and reconstruct the buccal bone in 3 dimensions. Among the various surgical procedures described in literature, Vestibular Socket Therapy (VST, page 5)[1-11] allows immediate implant placement and minimally invasive surgical intervention in type II sockets where the buccal bone is missing. Therefore, it represents an effective and predictable alternative to other conventional surgical approaches[8,9].

## SURGICAL PROCEDURE

Before surgery, patients received a non-surgical periodontal treatment followed by the prescription of a 0.12% chlorhexidine mouthwash for one week. Then, a CBCT scan was performed to evaluate the anatomy of the defect, plan implant insertion and manufacture a surgical guide for the subsequent immediate implant placement.
After a minimally traumatic tooth extraction, the socket was curetted and carefully debrided.
A 1 cm-long horizontal incision was made with a 15c scalpel at the deepest point of the mucogingival junction of the extracted tooth. Then, tissues were reflected and dissected in an incisal direction.
An implant with an appropriate design to achieve adequate primary stability was inserted using the surgical guide followed by placing a flexible collagenic cortical bone barrier (OsteoBiol® *Soft Cortical Lamina*®, 1 mm) that was adapted to the size of the defect. Subsequently, it was inserted through the buccal incision and fixed with two titanium tacks 1 mm apically to the socket. The jumping gap is filled with a 1:1 mixture of autogenous bone and OsteoBiol® *Gen-Os*®.
The buccal incision was then sutured using 6/0 nylon sutures, and an anatomical healing abutment was placed and sealed with composite to guarantee the sterility of the healing chamber.
Ten days after the surgery, patients were recalled for a follow-up exam. The final crown was placed about two months after surgery. Patients were usually recalled six months after surgery for a final exam.

## SCIENTIFIC EVIDENCE ON THE VST

Given that the VST was developed to replace compromised teeth in the esthetic area, many studies focused on the esthetic outcomes of this technique. A one-arm cohort study[3] on 16 patients reported a pink esthetic score (PES) equal to 12.63 one year after implant placement. A similar result was found in a prospective single-arm study on 20 patients (PES = 12.48 two years after surgery)[2]. The VST technique was reported to have superior PES scores when it was compared to a conventional minimally traumatic extraction approach[6] and comparable PES score to the partial extraction therapy[9].
Bone level changes were also investigated. A one-arm cohort study[3] on 16 patients reported a significant increase in bone height one year after the surgery. Finally, the VST showed in terms of bone height modifications similar to conventional approaches[8,9].



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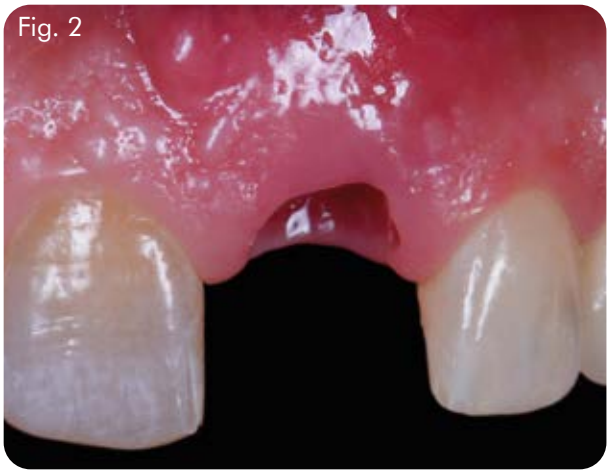
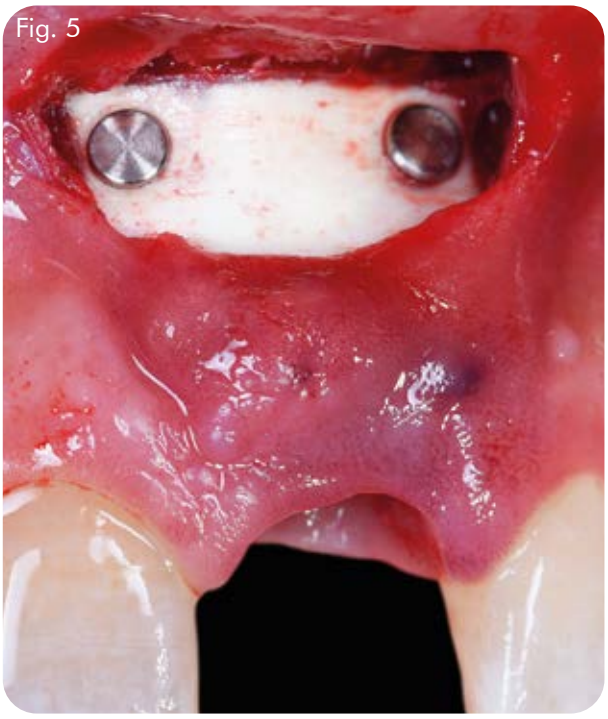
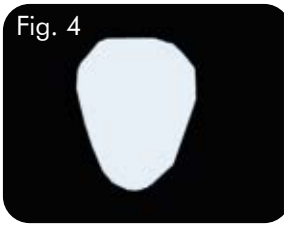
# The Vestibular Socket Therapy

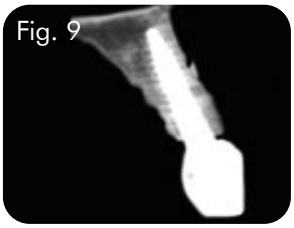











Sex: **female** | Age: **35**

**Fig. 1** CBCT scan showing a sagittal section of broken central incisor, with lost labial plate of bone

**Fig. 2** Frontal view of the location after tooth extraction and the socket debridment

**Fig. 3** The particulated bone graft mixture was prepared for grafting the osseous defect, using OsteoBiol® *Gen-Os*® mixed with autogenous bone chips 50:50

**Fig. 4** A 1 mm-thick OsteoBiol® *Soft Cortical Lamina*® was trimmed to cover the osseous defect

**Fig. 5** The 1 mm OsteoBiol® *Soft Cortical Lamina*® was stabilized using two membrane tacs apically

**Fig. 6** Customized healing abutment was fitted to preserve the original socket architecture and to cover the bone graft

**Fig. 7** A screw retained zirconia crown was prepared

**Fig. 8** Final restoration in place, showing a total restoration of the soft tissue margins

**Fig. 9** Two years post operative CBCT scan showing the regeneration of the labial plate of bone

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Bone substitutes: **OsteoBiol® *Gen-Os*®**
**OsteoBiol® *Lamina*®**

**References:**

1. Elian N at al.
Aesthet. Dent,
2007;19(2):99-104

2. Schuh PL at al.
Materials (Basel),
2021 Sep 9;14(18):5180

3. Köttgen C et al.
Int J Esthet Dent,
2024 May 10;19(2):152-169

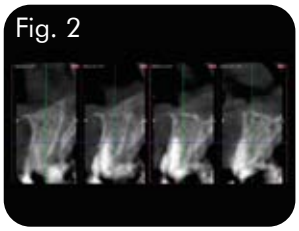
## IMMEDIATE IMPLANT PLACEMENT IN THE ESTETHIC AREA: THE MULTI-LAYER TECHNIQUE

A prosthetic-driven implant placement is possible in bone defects where both soft and hard tissues are healthy. As a consequence, there is usually no need to use a barrier to improve the contour of the ridge.
When treating bone defects in the esthetic area where part of or the entire buccal bone is missing, it is necessary to reconstruct the bony wall to achieve predictable results[1].
Various surgical protocols and biomaterials have been used to treat these bone defects, and, among them, the Multi-Layer Technique (MLT, page 7) was demonstrated to be a predictable approach for immediate implant placement in the esthetic area when the buccal bone is missing[2].
The MLT consists of three elements: a slowly resorbable cortical bone barrier, a collagenic xenograft, and connective tissue graft (CTG). A network of international dentists described the surgical procedure in a case series with a follow-up of five years[2].
ASA-1 and ASA-2 (ASA: American Society of Anaesthesiologists) patients received an antibiotic starting from the day before the surgery. On the day of the intervention, under local anaesthesia, an intrasulcular incision was made around the tooth to be extracted with a 15c surgical blade.
The tooth was gently extracted to preserve the bony contour. Later, the granulation tissue was removed, the post-extractive socket was cleaned, and an implant was inserted with a final insertion torque of 30-50 Ncm.
The buccal bone was reconstructed by using OsteoBiol® *Soft Cortical Lamina*® (0.5 mm) or OsteoBiol® *Curved Lamina*® (1 mm). OsteoBiol® *Soft Cortical Lamina*® was hydrated for 5/10 minutes and tailored to the anatomy of the defect.
Soft tissue was harvested from the palate, de-epithelized, sized to adapt to the anatomy of the defect, then inserted between OsteoBiol® *Lamina*® and the gingiva, and fixed with two horizontal mattress sutures.
The gap between the implant and OsteoBiol® *Lamina*® was filled with the dual-phase pre-hydrated xenograft OsteoBiol® *mp3*®. The collagenic biomaterial was condensed into the defect with a compactor.
The socket was closed with an abutment (no collagen membranes were used). The provisional crown was immediately screwed onto the abutment.

## POST-OP MANAGEMENT

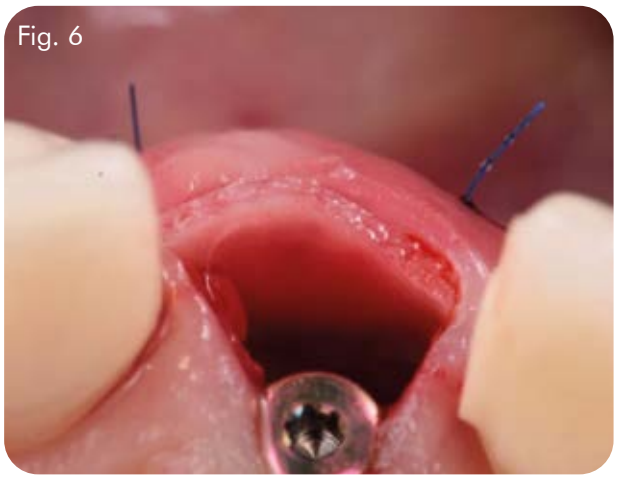
Topical application of chlorhexidine gluconate was prescribed to all patients to reduce the risk of infection.
Sutures were removed 8-10 days post-surgery. Follow-up visits were planned 1 month, 3 months, and 6 months after the surgery. Five years post-surgery, the implant success rate was equal to 100%.
The authors reported four minor complications (peri-implantitis, fracture of the provisional crown, palatal cyst four years after the surgery, and a lamina fragment removed after 18 months) without compromising the surgery's positive outcomes or the implants' stability [2]. Further details are reported in Table 1.
The predictability and safety of the technique were reconfirmed by another team of German dentists in a case report on a compromised patient with kidney failure on dialysis[3].

# The Multi-Layer Technique

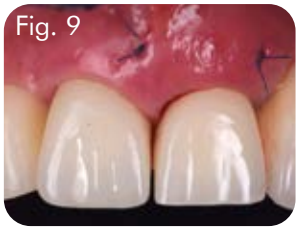















Sex: **female** | Age: **67**

**Fig. 1-2** Pre-op clinical photograph (1) and radiograph (2)

**Fig. 3-4** Minimally traumatic tooth extraction

**Fig. 5-8** The Multi-layer Technique

**Fig. 5** Placement of the soft tissue

**Fig. 6** Insertion of an OsteoBiol® *Lamina*®

**Fig. 7** Frontal view of the defect

**Fig. 8** Insertion of the pre-hydrated collagenic bone mix

**Fig. 9** Suture

**Fig. 10-12** One-year follow-up

Graphically adapted from Schuh Paul Leonhard, Wachtel Hannes, Beuer Florian, Goker Funda, Del Fabbro Massimo, Francetti Luca, Testori Tiziano

**Multi-Layer Technique (MLT) with Porcine Collagenic Cortical Bone Lamina for Bone Regeneration Procedures and Immediate Post-Extraction Implantation in the Esthetic Area: A Retrospective Case Series with a Mean Follow-Up of 5 Years.**

Materials (Basel). 2021 Sep 9;14(18):5180.



Bone substitutes: **OsteoBiol® *mp3*®**
**OsteoBiol® *Lamina*®**

| Factor | | No. of implants | Complications |
|---|---|---|---|
| Smoking status | Smoker | 18 | 1 |
| | Non-smoker | 47 | 3 |
| Periapical infection | Yes | 53 | 3 |
| | No | 12 | 1 |
| Previous root canal treatment | Yes | 36 | 3 |
| | No | 29 | 1 |
| Location | Maxilla | 57 | 4 |
| | Mandible | 8 | 0 |
| Loading mode | Immediate | 40 | 2 |
| | Delayed | 25 | 2 |

**Table 1**

Data from Schuh Paul Leonhard, Wachtel Hannes, Beuer Florian, Goker Funda, Del Fabbro Massimo, Francetti Luca, Testori Tiziano

**Multi-Layer Technique (MLT) with Porcine Collagenic Cortical Bone Lamina for Bone Regeneration Procedures and Immediate Post-Extraction Implantation in the Esthetic Area: A Retrospective Case Series with a Mean Follow-Up of 5 Years.**

Materials (Basel). 2021 Sep 9;14(18):5180.

**References:**

1. Wachtel H et al.
Int J Periodontics Restorative Dent,
2013 Jul-Aug;33(4):491-7

2. Lopez MA et al.
Applied Sciences,
2022; 12(20):10285

3. Rossi R et al.
Journal of the Lebanese Dental Association,
Volume 52 - N° 1- January-June 2017

4. Rossi R et al.
Int J Esthet Dent,
2020;15(4):454-473

## TREATMENT OF CLASS IV HORIZONTAL BONE DEFECTS

According to Benic and Hämmerle, Class IV bone defects encompass clinical situations where a horizontal augmentation protocol with delayed implant placement is required. Using the collagenic cortical bone barrier OsteoBiol® *Lamina*® in combination with OsteoBiol® *mp3*®, a team of German dentists preserved the graft volume and regenerated an appropriate amount of new bone to insert implants six months after the surgery[1].
Similar results were reported by a team of Italian researchers in a case study on 20 patients[2].
Before surgery, patients underwent a session of oral hygiene. Mepivacaine 20 mg/mL + adrenaline 1:100,000 was injected at the beginning of the surgery.
A bucco-lingual crestal incision and an intrasulcular incision were made on the edentulous area and the adjacent tooth, respectively.
A full-thickness flap was elevated at both the buccal and the lingual site.
Multiple cortical perforations were performed using a diamond drill to stimulate bleeding.
An OsteoBiol® *Soft Cortical Lamina*® (1 mm) was adapted to the size of the defect and then fixed with two osteosynthesis screws to reconstruct the missing bone wall. OsteoBiol® *mp3*® was grafted in between the pristine bone and the lamina; subsequently, the defect was covered with an OsteoBiol® *Evolution* collagen membrane.
Flaps were sutured using single stitches, and implants were inserted in the newly formed bone 8 months after the surgery.
Histological analysis of a biopsy retrieved 8 months after the surgery showed that the lamina was perfectly integrated with the newly formed bone. All implants survived at the second follow-up two years after the surgery.

## TREATMENT OF KNIFE-EDGE RIDGES

Knife-edge ridges are defects characterized by severe horizontal bone resorption. In this clinical scenario, not only a biomaterial is required to act as a scaffold to regenerate bone horizontally, but also a barrier is necessary to maintain the graft in close contact with the pristine bone. Titanium meshes are valid options to treat knife-edge ridges; however, patients undergo an additional surgery to remove the mesh.
Slowly resorbable collagenic cortical bone barriers such as OsteoBiol® *Curved Lamina*® (1 mm) were proven to be a valid option for reconstructing knife-edge ridges[3]. Thanks to its curved shape, OsteoBiol® *Curved Lamina*® can be easily used to reconstruct the missing buccal bone and, at the same time, can be bent over the graft. Moreover, OsteoBiol® *Curved Lamina*® acts as a selective cellular barrier in preventing epithelial cells from colonizing the graft.
Under local anaesthesia using articaine 2% with adrenaline 1:200.000, a 12c blade was used to open a full-thickness buccal and lingual flap exposing the underlying bone.
OsteoBiol® *Curved Lamina*® was adapted to the anatomy of the defect and then inserted in between the bone and the flap without hydrating it.
The buccal and lingual flap was mobilized at this point to get a passive closure and avoid tension. Subsequently, OsteoBiol® *Gen-Os*® was inserted to fill the gap between the ridge and the cortical bone barrier. OsteoBiol® *Curved Lamina*® was bent over the graft to cover it, and the flap was closed with mattress sutures. Page 9 shows a clinical case with OsteoBiol® *Curved Lamina*® (1 mm). OsteoBiol® *Curved Lamina*® should be fixed with osteosynthesis screws or titanium tacks[4]



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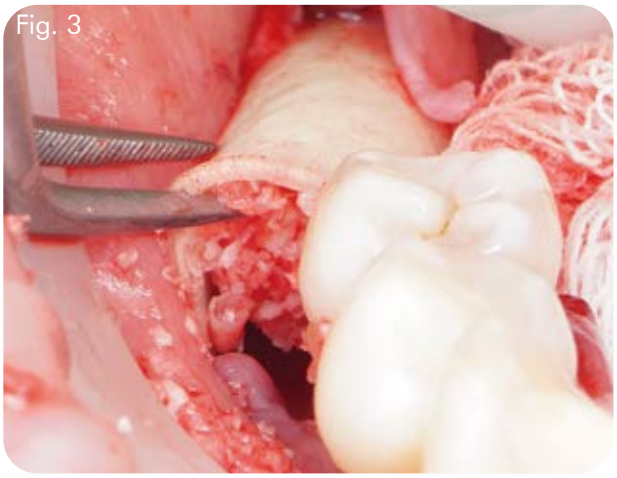
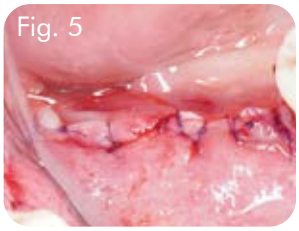
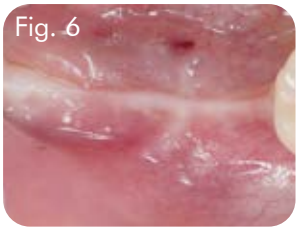
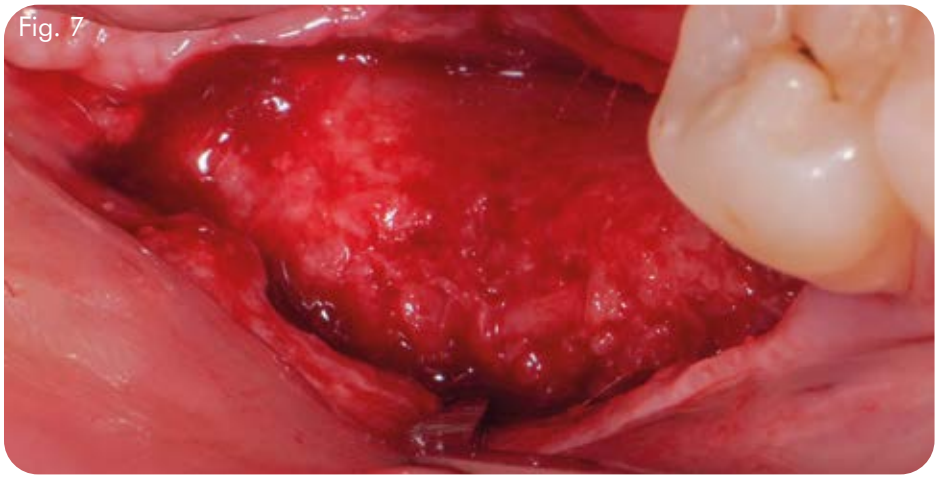
# Horizontal and vertical GBR on knife-edge ridges of the mandible

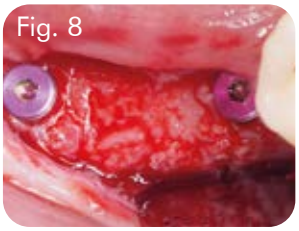



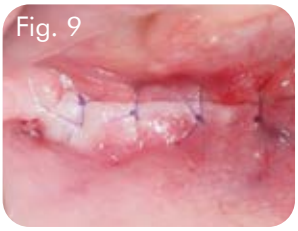









Sex: **male** | Age: **61**

**Fig. 1** Occlusal view of the posterior mandible area reveals a knife edge ridge and both horizontal and vertical collapse

**Fig. 2** Autogenous particulate bone mixed with porcine cortico-cancellous bone mix OsteoBiol® *Gen-Os*®

**Fig. 3** Graft placed to fill the edentulous area for augmentation under dry OsteoBiol® *Lamina*®

**Fig. 4** Flaps secured on top of OsteoBiol® *Lamina*® using resorbable horizontal mattress sutures

**Fig. 5** Soft tissues sutured with double simple 6/0 sutures

**Fig. 6** Intraoral view after 6 months

**Fig. 7** After 6 months following augmentation (in the second stage) increase of the bone width on the buccal-lingual aspect and the bone normal quality is observed

**Fig. 8** Two standard diameter implants placed with good primary stability

**Fig. 9** Implants were had been left in situ for two months before proceeding to the next stage. Soft tissues sutured with double simple 6/0 sutures

**Fig. 10** Implants exposed and the cover-screws replaced with multi-unit abutments

**Fig. 11** Soft tissue augmentation performed to optimize and protect the augmented area. Epithelial embossed connective tissue graft was sutured on buccal aspect of the implants

**Fig. 12** Tissue healing after 2 weeks

**Fig. 13** Periapical radiograph, 8 months after the first stage of surgery

Documentation provided by

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Bone substitutes: **OsteoBiol® *mp3*®**
**OsteoBiol® *Lamina*®**

**References:**

1.Felice P et al.
Clin. Implant. Dent. Relat. Res,
2009;11((Suppl. 1)):e69–e8

2.Felice P et al.
Int J Periodontics Restorative Dent,
2017 Jul/Aug;37(4):469-480

3. Urban IA et al.
Int J Oral Maxillofac Implants,
2009;24:502-510

4. Khoury, F et al.
J Clin Med,
2023 Nov. 9;12(22):7013

5. Happe A et al.
J Clin Med,
2023 Nov 9;12(22):7013

6. Villa G et al.
Int J Periodontics Restorative Dent,
2023 July-Aug;43(4):435-441

## TREATMENT OF CLASS V BONE DEFECTS: THE MODIFIED SHELL TECHNIQUE

As described in the previous sections, the regeneration of Class V bone defects represents one of the most complicated surgical procedures in implant dentistry. Such difficulties originate from the fact that the area where osteogenic cells migrate from is limited, thus making it difficult to regenerate an appropriate amount of newly formed bone for predictable implant placement.

Various surgical techniques have been developed to treat Class V bone defects[1-6]. Among them, the onlay technique (a surgical approach consisting of placing a bone block above the pristine bone and fixing it with osteosynthesis screws) was proven to be a low-predictable surgical procedure when compared to the inlay approach[1-2]. Other approaches, such as the Shell Technique[4] reported excellent clinical results; however, they are characterized by high invasiveness as extensive harvesting of autogenous bone is required.

In more detail, oral surgeons are asked to harvest big portions of autogenous bone (AB) from the mandibular ramus when performing the Shell Technique, increasing morbidity for the patient. Furthermore, AB is available in limited quantities.

AB cortical bone plates are used to reconstruct the buccal and/or palatal bone wall, and there is a need to adapt the cortical bone plates to the defect sites using diamond discs, a procedure that carries risks of injury to the operator. Additionally, cortical bone plates are very rigid, and, as a consequence, they do not always adapt to the anatomy of the defect. Finally, harvesting a bone plate is a time-consuming procedure.

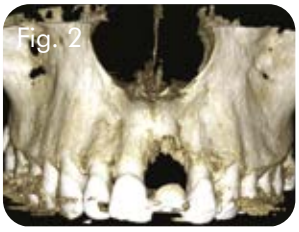
Based on these considerations, a team of German authors proposed an innovative approach to reduce the invasiveness of the Shell Technique[5]. Instead of harvesting cortical bone plates from the mandibular ramus, they used a xenogeneic cortical bone barrier (OsteoBiol® *Cortical Lamina*®, 0.7 mm) for reconstructing single tooth sites with Class V defects.

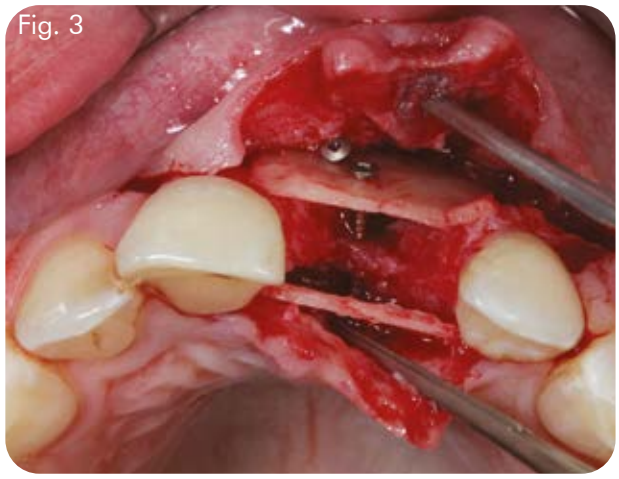
The bone barrier was hydrated for about 10 minutes to reduce its stiffness, then, it was tailored to the anatomy of the defect using sterile cutters, and finally fixed with two 1 mm osteosynthesis screws from the buccal side. The gap between the OsteoBiol® *Lamina*® and the pristine bone was then filled with autogenous bone particles harvested from the mandibular ramus, and the site covered with an OsteoBiol® *Evolution* collagen membrane.

After four months, implants were inserted in the newly formed bone. Volumetric analyses revealed a volume increase of 382.59 $mm^3$ (including OsteoBiol® *Lamina*®) and 250.84 $mm^3$ without it. Regarding the vertical bone gain, values ranged from 7 to 11.3 mm. Page 11 shows a clinical case on the Modified Shell Technique.

Similar results were reconfirmed by a team of international implantologists in another case study with 15 patients[6]. Oral surgeons used a cortical bone barrier (OsteoBiol® *Cortical Lamina*®, 1 mm) in combination with a 50:50 mixture of OsteoBiol® *Gen-Os*® and AB. The healing was uneventful in all patients, and twenty-seven implants were inserted 6 months after the surgery. Mean horizontal bone gain was 4.79 mm, 5.59 mm, and 5.79 mm at 1 -, 3- and 5-mm reference points apical to the buccal bone crest.

# The Modified Shell Technique in the esthetic area

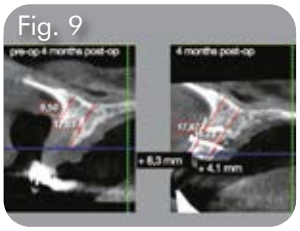



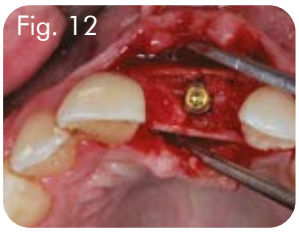















Sex: **Male** | Age: **33**

**Fig. 1** Initial situation after surgical removal of an incisor with external root resorption

**Fig. 2** CBCT scan shows a vertical bone defect according Class V of Benic and Hämmerle

**Fig. 3** Reconstruction of buccal and palatal bone plate with OsteoBiol® *Rigid Lamina*®

**Fig. 4** The created space was filled with autogenous bone chips harvested from the ramus

**Fig. 5** The site is covered with a membrane of native collagen (OsteoBiol® *Evolution*)

**Fig. 6** Healing after one week

**Fig. 7** Situation 4 months after bone augmentation

**Fig. 8** CBCT 4 months after bone augmentation

**Fig. 9** CBCT cross sections before and after surgery, revealing the amount of bone that was augmented

**Fig. 10** Clinical site 4 months after augmentation before implant placement

**Fig. 11** Implant placement

**Fig. 12** Occlusal view of the implant (diameter: 3.3 mm)

**Fig. 13** Wound closure with microsurgical sutures

**Fig. 14** Final result 2 years after implant placement

**Fig. 15** Periapical radiograph 2 years after implant placement

**Fig. 16** Smile of the patient

Documentation provided by

Dr **Arndt Happe**
Germany

Bone substitute: **OsteoBiol® *Lamina*®**
Membrane: **OsteoBiol® *Evolution***

## FUTURE PERSPECTIVES

It has been shown that OsteoBiol® *Lamina*® is a valid biomaterial to treat post-extraction sockets due to the great flexibility, space-making capacity, and slow biodegradation rate. There is also evidence that OsteoBiol® *Lamina*® can be employed in other surgical protocols.

Maxillary sinus lift requires the elevation of the sinus membrane, a procedure that in 10 – 20% of the cases may lead to a perforation. In a case series with 11 patients, OsteoBiol® *Soft Lamina*® (0.5 mm) was hydrated and placed below the sinus membrane to avoid graft displacement into the sinus[1].

OsteoBiol® *Lamina*® can be used also in periodontology to reconstruct the bone wall around a periodontally compromised tooth, avoiding or delaying the time of insertion of an implant (page 13).

Finally, various studies published between 2005 and 2018 reported that OsteoBiol® *Lamina*® can be used to reconstruct the orbital floor in cranio-maxillofacial surgery surgeries[2-7].

## CONCLUSIONS

AB is still the gold standard for bone regeneration, nevertheless it is available in limited quantities. Furthermore, AB harvesting is an invasive and time-consuming procedure and may expose patients to multiple surgeries.

The use of OsteoBiol® *Cortical Lamina*® (0.7 mm or 1 mm) as an alternative to AB plates has been documented in the Modified Shell Technique (Figure 3) with positive clinical outcomes[8-9]. By using a xenogeneic cortical bone barrier, oral surgeons overcome many problems they face when harvesting AB cortical plates, cortical bone plate availability, shape and bendability, risk of injuries, and duration of the surgery to mention some.

It has been demonstrated that OsteoBiol® *Curved Lamina*® (1 mm) could be used for complex horizontal regeneration[10] as an alternative to AB cortical bone plates or titanium meshes. The biological explanation of this evidence is that OsteoBiol® *Curved Lamina*® increases the viability and the activity of human osteoblast compared to the control (surface of a Petri dish)[11]. Moreover, *Curved Lamina*® has been demonstrated to act as a selective barrier preventing epithelial cells from invading the graft beneath its surface, and there is no need to remove it as it integrates with the newly formed bone[10].

Lastly, in the case of sockets with compromised buccal bone, it has been demonstrated that OsteoBiol® *Soft Cortical Lamina*® could be used to reconstruct the missing buccal bone with the VST (OsteoBiol® *Soft Cortical Lamina*® 1 mm, Figure 3) or the MLT techniques (OsteoBiol® *Soft Cortical Lamina*® 0.5 mm, OsteoBiol® *Curved Lamina*® 1 mm, Figure 3). These minimally invasive surgical protocols for defects localized in the esthetic area were proven to meet surgeon and patient needs such as an immediate implant placement[12,13], satisfying esthetic[12,13] outcomes, and preservation of the socket contour[12,13].


**References:**

1. Izzetti R et al.
Clin Adv Periodontics,
2024 Apr 22

2. Rinna C et al.
J Craniofac Surg,
2005 Nov;16(6):968-72

3.Grenga PL et al.
Ophthalmic Plast Reconstr Surg,
2009 Mar-Apr;25(2):123-5

4.Rinna C et al.
J Craniofac Surg,
2009 May;20(3):881-4

5.Ozel B et al.
J Craniomaxillofac Surg,
2015 Oct;43(8):1583-8

6.Cascone P et al.
Case Rep Surg,
2018 Mar 15;2018:2968983

7.Senese O et al.
Arch Craniofac Surg,
2018 Jun;19(2):108-113

8.Happe Aet al.
J Clin Med,
2023 Nov 9;12(22):7013

9.Villa G et al.
Int J Periodontics Restorative Dent,
2023 July-Aug;43(4):435-441

10.Rossi R et al.
Int J Esthet Dent,
2020;15(4):454-473

11. Pierfelice TV et al.
J Funct Biomater,
2023 Feb 27;14(3):133

12.Schuh PL et al.
Materials (Basel),
2021 Sep 9;14(18):5180

13.Elaskary A et al.
Int J Oral Implantol (Berl),
2021 Aug 20;14(3):307-320.
PMID: 34415130




OsteoBiol® by Tecnoss

# Treatment of a periodontal defect


Fig. 1

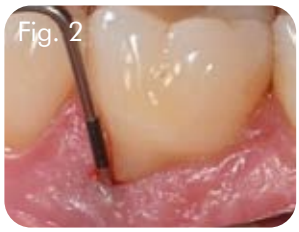


Fig. 2

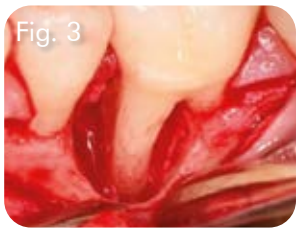


Fig. 3


Fig. 5

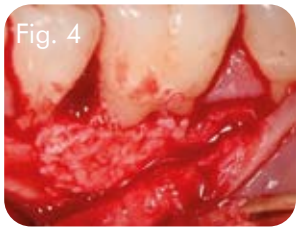


Fig. 4

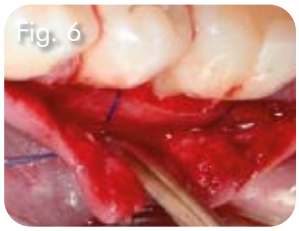


Fig. 6


Fig. 7


Fig. 8


Fig. 9

Sex: **female** | Age: **42**

**Fig. 1** Baseline

**Fig. 2** Clinical probing

**Fig. 3** Periodontal defect

**Fig. 4** The defect was grafted with OsteoBiol *GTO*®

**Fig. 5** OsteoBiol® *Lamina*® was used to reconstruct the buccal wall

**Fig. 6** Sutures

**Fig. 7** Post-op

**Fig. 8** . Pre-op radiograph

**Fig. 9** Post-op radiograph at 6 months

Documentation provided by

Prof. **Patrick Schmidlin**
University of Zurich

Bone substitutes: **OsteoBiol® *GTO*®**
**OsteoBiol® *Lamina*®**

**VST**

- Flapless immediate implant placement in the esthetic area
- Minimal volumetric loss
- No mid-facial soft tissue recession and high PES
- Socket contour preservation

**MLT**

- Minimally invasive procedure
- Immediate implant placement in the esthetic area
- Reduced post-operative disadvantages
- Applicable to compromised post-extraction sockets where the buccal bone is missing

**Modified Shell Technique**

- Reduced need of autogenous bone
- Time saving procedure
- Reduced risk of injuries for both patients and surgeons is reduced
- *Lamina*® is bendable and adaptable to the anatomy of the defect

**FIG 3**

Summary of the advantages of the techniques described in the booklet.

# Selected scientific publications

| ALVEOLAR REGENERATION | ARTICLE NUMBER | | | | | | |
|---|---|---|---|---|---|---|---|
| HORIZONTAL RIDGE WIDTH CHANGES | N° 50 | | | | | | |
| VERTICAL RIDGE HEIGHT CHANGES | N° 50 | | | | | | |
| PINK ESTETHIC SCORE | N° 218 | N° 223 | N° 265 | N° 302 | N° 306 | N° 307 | |
| BLEEDING INDEX | N° 218 | | | | | | |
| PERI-IMPLANT PROBING DEPTH | N° 218 | N° 223 | N° 302 | | | | |
| BONE HEIGHT CHANGE | N° 218 | | | | | | |
| BONE THICKNESS CHANGE | N° 218 | N° 223 | N° 266 | N° 268 | N° 302 | N° 306 | N° 307 |
| IMPLANT SURVIVAL RATE | N° 223 | N° 224 | | | | | |
| SOFT TISSUE CHANGES | N° 266 | N° 302 | N° 307 | | | | |
| HORIZONTAL BONE CHANGE | N° 284 | N° 315 | | | | | |
| **HORIZONTAL AUGMENTATION** | **ARTICLE NUMBER** | | | | | | |
| HISTOLOGY | N° 64 | N° 149 | N° 275 | N° 327 | | | |
| BUCCO-LINGUAL RIDGE WIDTH | N° 149 | | | | | | |
| COMPLICATIONS | N° 209 | N° 232 | | | | | |
| VOLUMETRIC ANALYSIS OF THE DEFECT | N° 209 | | | | | | |
| PERI-IMPLANT BONE CHANGE | N° 275 | | | | | | |
| IMPLANT SURVIVAL RATE | N° 275 | | | | | | |
| HORIZONTAL BONE GAIN | N° 232 | N° 327 | | | | | |
| **HORIZONTAL/VERTICAL AUGMENTATION** | **ARTICLE NUMBER** | | | | | | |
| COMPLICATIONS | N° 97 | | | | | | |
| HISTOLOGY | N° 97 | N° 229 | | | | | |
| OPERATIVE TIME | N° 220 | | | | | | |
| BONE RESORPTION | N° 220 | | | | | | |
| BONE WIDTH CHANGE | N° 229 | | | | | | |
| VERTICAL BONE CHANGE | N° 229 | | | | | | |
| **VERTICAL AUGMENTATION** | **ARTICLE NUMBER** | | | | | | |
| HORIZONTAL BONE GAIN | N° 309 | | | | | | |
| COMPLICATIONS | N° 309 | | | | | | |
| VOLUMETRIC ANALYSIS OF THE DEFECT | N° 313 | | | | | | |
| **LATERAL ACCESS SINUS LIFT** | **ARTICLE NUMBER** | | | | | | |
| COMPLICATIONS | N° 45 | N° 325 | | | | | |
| IMPLANT SURVIVAL RATE | N° 45 | N° 208 | | | | | |
| OPERATIVE TIME | N° 166 | | | | | | |
| VOLUMETRIC ANALYSIS OF THE DEFECT | N° 166 | N° 325 | | | | | |
| BONE HEIGHT CHANGE | N° 208 | | | | | | |
| ISQ | N° 208 | | | | | | |
| **MAXILLOFACIAL** | **ARTICLE NUMBER** | | | | | | |
| COMPLICATIONS | N° 89 | N° 337 | | | | | |

## ALVEOLAR REGENERATION

N°50 - FESTA VM, ADDABBO F, LAINO L, FEMIANO F, RULLO R
**PORCINE-DERIVED XENOGRAFT COMBINED WITH A SOFT CORTICAL MEMBRANE VERSUS EXTRACTION ALONE FOR IMPLANT SITE DEVELOPMENT: A CLINICAL STUDY IN HUMANS**
CLINICAL IMPLANT DENTAL RELATED RESEARCH. 2013 OCT;15(5):707-13

N° 218 - ELASKARY A, GAWEESH YY, EL TANTAWI M, MAEBED MA
**VESTIBULAR SOCKET THERAPY: A NOVEL APPROACH FOR IMPLANT PLACEMENT IN DEFECTIVE FRESH EXTRACTION SOCKETS WITH OR WITHOUT ACTIVE SOCKET INFECTION (ONE-ARM COHORT STUDY)**
INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL IMPLANTS, JAN-FEB 2021;36(1):146-153

N° 223 - ELASKARY A, MEABED M, ABD-ELWAHAB RADI I
**VESTIBULAR SOCKET THERAPY WITH IMMEDIATE IMPLANT PLACEMENT FOR MANAGING COMPROMISED FRESH EXTRACTION SOCKETS: A PROSPECTIVE SINGLE-ARM CLINICAL STUDY**
INTERNATIONAL JOURNAL OF ORAL IMPLANTOLOGY (BERL), 2021 AUG 20;14(3):307-320

M° 224 - SCHUH PL, WACHTEL H, BEUER F, GOKER F, DEL FABBRO M, FRANCETTI L, TESTORI T
**MULTI-LAYER TECHNIQUE (MLT) WITH PORCINE COLLAGENATED CORTICAL BONE LAMINA FOR BONE REGENERATION PROCEDURES AND IMMEDIATE POST-EXTRACTION IMPLANTATION IN THE ESTHETIC AREA: A RETROSPECTIVE CASE SERIES WITH A MEAN FOLLOW-UP OF 5 YEARS**
MATERIALS, 2021 SEP 9;14(18):5180

N° 265 - GHALLAB NA, ELASKARY A, ELSABAGH H, TOUKHY AE, ABDELRAHMAN H, EL-KIMARY G
**A NOVEL ATRAUMATIC EXTRACTION TECHNIQUE USING VESTIBULAR SOCKET THERAPY FOR IMMEDIATE IMPLANT PLACEMENT: A RANDOMIZED CONTROLLED CLINICAL TRIAL**
ORAL AND MAXILLOFACIAL SURGERY, 2023 SEP;27(3):497-505

# Selected scientific publications

N° 266 - ELASKARY A, ELFANA A, MEABED M, ABD-ELWAHAB RADI I, AKRAM M, FAWZY EL-SAYED K
**IMMEDIATE IMPLANT PLACEMENT UTILIZING VESTIBULAR SOCKET THERAPY VERSUS EARLY IMPLANT PLACEMENT WITH CONTOUR AUGMENTATION FOR REHABILITATION OF COMPROMISED EXTRACTION SOCKETS IN THE ESTHETIC ZONE: A RANDOMIZED CONTROLLED CLINICAL TRIAL**
CLINICAL IMPLANT DENTISTRY AND RELATED RESEARCH, 2022 OCT;24(5):559-568

N° 268 - ELASKARY A, ABDELRAHMAN H, ELSABAGH HH, EL-KIMARY GI
**DOES GRAFTING THE JUMPING GAP IN IMMEDIATELY PLACED ANTERIOR IMPLANTS USING VESTIBULAR SOCKET THERAPY INFLUENCE THE LABIAL BONE THICKNESS?**
JOURNAL OF ORAL AND MAXILLOFACIAL SURGERY, 2022 AUG;80(8):1398-1407

N° 284 - GRASSI A, MEMÈ L, STRAPPA EM, MARTINI E, BAMBINI F.
**MODIFIED PERIOSTEAL INHIBITION (MPI) TECHNIQUE FOR EXTRACTION SOCKETS: A CASE SERIES REPORT**
APPLIED SCIENCES. 2022; 12:12292.

N° 302 - ELASKARY A, ABDELRAHMAN H, ELFAHL B, ELSABAGH H, EL-KIMARY G, GHALLAB NA
**IMMEDIATE IMPLANT PLACEMENT IN INTACT FRESH EXTRACTION SOCKETS USING VESTIBULAR SOCKET THERAPY VERSUS PARTIAL EXTRACTION THERAPY IN THE ESTHETIC ZONE: A RANDOMIZED CLINICAL TRIAL**
INTERNATIONAL JOURNAL OF ORALAL MAXILLOFACIAL IMPLANTS. 2023 MAY, JUN;38(3):468-478

N° 306 - HAMED MM, EL-TONSY MM, ELASKARY A, ABDELAZIZ GO, SAEED SS, ELFAHL BN
**EFFECT OF THREE DIFFERENT GRAFTING MATERIALS ON IMMEDIATE IMPLANT PLACEMENT USING VESTIBULAR SOCKET THERAPY IN CLASS II EXTRACTION SOCKETS IN THE MAXILLARY ESTHETIC ZONE: A RANDOMIZED CONTROLLED CLINICAL TRIAL**
BMC ORAL HEALTH. 2023 SEP 1;23(1):623

N° 307 - ELASKARY A, GHALLAB N, THABET A, SHEMAIS N
**THE BONE SHIELDING VERSUS DUAL-ZONE CONCEPT IN TREATING THIN-WALLED FRESH EXTRACTION SOCKETS WITH IMMEDIATE IMPLANT PLACEMENT: SOFT AND HARD TISSUE CHANGES. A RANDOMIZED CLINICAL TRIAL**
CLINICAL IMPLANT DENTISTRY AND RELATED RESEARCH 2023 SEP 5

N° 315 - GRASSI A, MONICA D, MINETTI E, BALLINI A, GIANFREDA F, BOLLERO P, CICCIÙ M, MASTRANGELO F
**INNOVATIVE ALVEOLAR RIDGE PRESERVATION SURGICAL TECHNIQUE WITH IMMEDIATE DENTAL IMPLANT PLACEMENT: A RETROSPECTIVE CASE REPORT OF 1-YEAR FOLLOW-UP**
EUROPEAN JOURNAL OF DENTISTRY, 2023 NOV 23

## HORIZONTAL AUGMENTATION

N° 64 - WACHTEL H, FICKL S, HINZE M, BOLZ W, THALMAIR T
**THE BONE LAMINA TECHNIQUE: A NOVEL APPROACH FOR LATERAL RIDGE AUGMENTATION - A CASE SERIES**
INTERNATIONAL JOURNAL OF PERIODONTICS AND RESTORATIVE DENTISTRY, 2013 JUL-AUG;33(4):491-7

N° 149 - AMR AEH, ABDEL GHAFFAR KA, ABUEL-ELA HA, ABD ELHAMID ES
**XENOGENIC FLEXIBLE BONE LAMINA GRAFT: A SUCCESSFUL ALTERNATIVE TO THE AUTOGENOUS ONLAY BONE BLOCK GRAFT IN ALVEOLAR RIDGE AUGMENTATION: A CLINICAL, RADIOGRAPHIC AND HISTOLOGICAL EVALUATION**
JOURNAL OF DENTAL TREATMENT AND ORAL CARE, 2017;1(1);104

N° 209 - SCARANO A, CICCARESE S, AMUSO D, MORTELLARO C, LORUSSO F
**CORTICAL BONE LAMINA APPROACH FOR MANDIBULAR LARGE CYSTIC DEFECT: A CASE REPORT**
JOURNAL OF BIOLOGICAL REGULATORS AND HOMEOSTATIC AGENTS. 2019 NOV-DEC;33(6 SUPPL. 2):85-91

N° 232 - FOTI V, SAVIO D, ROSSI R
**ONE-TIME CORTICAL LAMINA: A NEW TECHNIQUE FOR HORIZONTAL RIDGE AUGMENTATION. A CASE SERIES**
JOURNAL OF BIOMEDICAL ENGINEERING AND MEDICAL IMAGING, DECEMBER, 25, 2021, VOL. 8, NO. 6

N° 275 - LOPEZ MA, PASSARELLI PC, NETTI A, D'ADDONA A, CARINCI F, WYCHOWAŃSKI P, CECCHETTI F
**PORCINE CORTICAL BONE LAMINA AS A PREDICTABLE TECHNIQUE FOR GUIDED BONE REGENERATION: HISTOMORPHOMETRIC AND RADIOGRAPHIC EVALUATION**
APPLIED SCIENCES 2022, 12, 10285

N° 327 - KHALIL S., GHOSN N, MOKBEL N, CHAKAR
**THE HORIZONTAL RIDGE AUGMENTATION USING EQUINE XENOGRAFT AND THE CORTICAL LAMINA: A CLINICAL, RADIOGRAPHIC AND HISTOLOGICAL PROSPECTIVE STUDY.**
MAR DENTAL SCIENCES & ORAL REHABILITATION (2023) 05:(01)

## HORIZONTAL/VERTICAL AUGMENTATION

N° 97 - ROSSI R, RANCITELLI D, POLI PP, RASIA DAL POLO M, NANNMARK U, MAIORANA C
**THE USE OF A COLLAGENATED PORCINE CORTICAL LAMINA IN THE RECONSTRUCTION OF ALVEOLAR RIDGE DEFECTS. A CLINICAL AND HISTOLOGICAL STUDY**
MINERVA STOMATOLOGICA, 2016 OCT;65(5):257-68.

N° 220 - IGLESIAS VELÁZQUEZ Ó, TRESGUERRES FGF, LECO BERROCAL I, TRESGUERRES IF, LÓPEZ PINTOR RM, CARBADILLO J, LÓPEZ QUILES J, TORRES J
**SPLIT BONE BLOCK TECHNIQUE: 4-MONTH RESULTS OF A RANDOMISED CLINICAL TRIAL COMPARING CLINICAL AND RADIOGRAPHIC OUTCOMES BETWEEN AUTOGENOUS AND XENOGENEIC CORTICAL PLATES**
INTERNATIONAL JOURNAL OF ORAL IMPLANTOLOGY, 2021;14(1):41-52

N° 229 - LOPEZ MA, PASSARELLI PC, RELLA E, NETTI A, LOPEZ A, CASALE M, D'ADDONA A
**ALVEOLAR RIDGE AUGMENTATION WITH THE BONE INTO BONE TECHNIQUE: A HISTOLOGICAL AND HISTOMORPHOMETRIC ANALYSIS**
JOURNAL OF OSSEOINTEGRATION, SEPTEMBER 2021; 13(3) 121-126

## VERTICAL AUGMENTATION

N° 309 - VILLA G, RIZZACASA A, BESSA L, SPINA P, BAROOTCHI S, TAVELLI L, WANG HL.
**SHELL TECHNIQUE WITH A XENOGENEIC CORTICAL BONE LAMINA AND PARTICULATE BONE GRAFT FOR HORIZONTAL RIDGE AUGMENTATION: A CASE SERIE**
INTERNATIONAL JOURNAL OF PERIODONTICS AND RESTORATIVE DENTISTRY 2023 JULY-AUG;43(4):435-441

N° 313 - HAPPE A, BLENDER SM, LUTHARDT RG, RUDOLPH H, KUHN K
**DIGITAL EVALUATION OF VERTICAL RIDGE AUGMENTATION WITH THE MODIFIED SHELL TECHNIQUE USING A XENOGENEIC BONE LAMINA: A CASE SERIES**
JOURNAL OF CLINICAL MEDICINE. 2023; 12(22):7013

## LATERAL ACCESS SINUS LIFT

N°45 - HINZE M, VRIELINCK L, THALMAIR T, WACHTEL H, BOLZ W
**ZYGOMATIC IMPLANT PLACEMENT IN CONJUCTION WITH SINUS BONE GRAFTING: THE "EXTENDED SINUS ELEVATION TECHNIQUE". A CASE-COHORT STUDY**
INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL IMPLANTS,, 2013 NOV-DEC;28(6):E376-85

N° 166 - | SCARANO A, DE OLIVEIRA PS, TRAINI T, LORUSSO F
**SINUS MEMBRANE ELEVATION WITH HETEROLOGOUS CORTICAL LAMINA: A RANDOMIZED STUDY OF A NEW SURGICAL TECHNIQUE FOR MAXILLARY SINUS FLOOR AUGMENTATION WITHOUT BONE GRAFT**
MATERIALS, 2018 AUG 17;11(8):1457

N° 208 - LUONGO R, SGARAMELLA N, TRAINI T, BUGEA C
**GRAFTLESS MAXILLARY SINUS FLOOR AUGMENTATION WITH SIMULTANEOUS PORCINE BONE LAYER INSERTION: A 1- TO 5-YEAR FOLLOW-UP STUDY**
INTERNATIONAL JOURNAL OF ORAL AND MAXILLOFACIAL IMPLANTS, JUL/AUG 2020;35(4):808-815

N° 325 - ROSSANA I, CHIARA C, MARCO N, NICCOLÒ B, FILIPPO G, ANTONIO B
**MAXILLARY SINUS AUGMENTATION VIA THE BONE LID TECHNIQUE: A PROSPECTIVE, RADIOGRAPHIC CASE SERIES**
CLINICAL ADVANCE IN PERIODONTICS. 2024 APR 22

## MAXILLOFACIAL

N° 89 - SANTAGATA M, GUARINIELLO L, TARTARO G
A MODIFIED EDENTULOUS EXPANSION (MERE) TECHNIQUE FOR IMMEDIATE PLACEMENT OF IMPLANTS. A CASE REPORT
JOURNAL OF ORAL IMPLANTOLOGY, 2011 MAR;37 SPEC N.:114-9

N° 327 - SAKR, H., SHAABAN, A., ALY, T., ELSHIEKH, S
**CLINICAL EVALUATION OF USING CORTICAL LAMINA XENOGRAFT IN RECONSTRUCTION OF ORBITAL FLOOR**
ALEXANDRIA DENTAL JOURNAL, 46(ISSUE 2), 8-1

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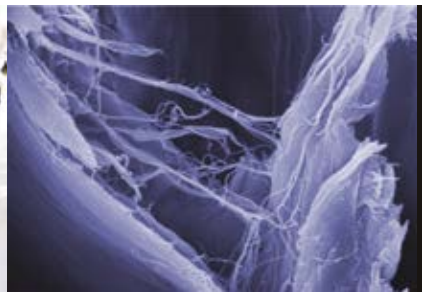
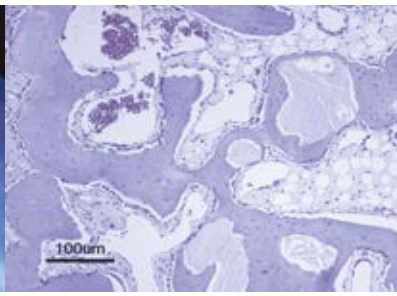
by Tecnoss




Tecnoss s.r.l. is an innovative, globally active company that develops, produces and documents premium-quality xenogenic biomaterials by the brands Tecnoss® and OsteoBiol®.

Its 25 years of research led to its patent-protected production process that ensures neutralization of antigenic components in order to achieve biocompatibility. While at the same time the Tecnoss® process preserves the natural collagen matrix inside the biomaterial.

Tecnoss® products comply with highest quality standards such as ISO 13485 and European laws.

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