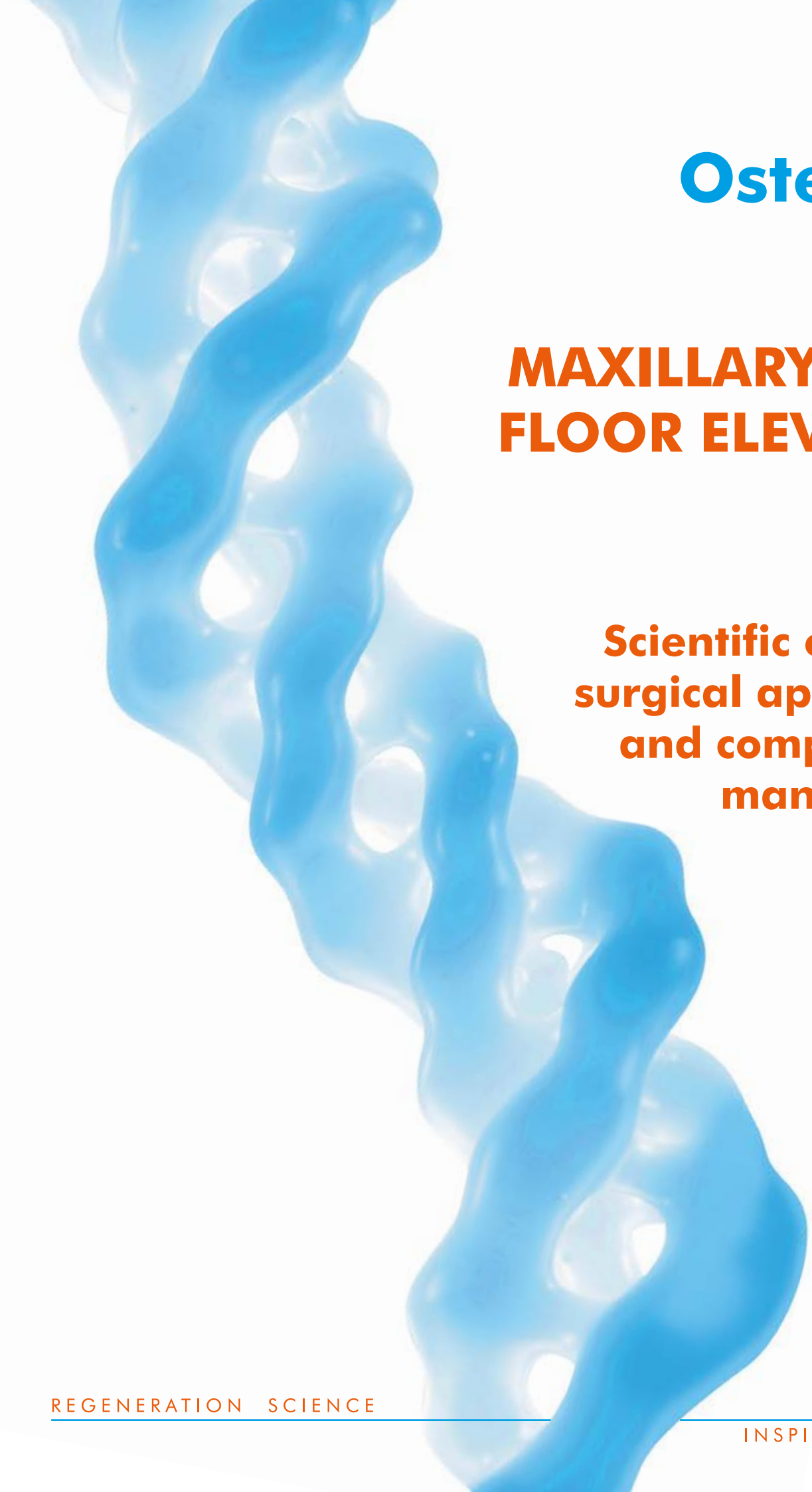
OsteoBiol®
by Tecnoss

MAXILLARY SINUS FLOOR ELEVATION

Scientific evidence, surgical approaches and complications management



REGENERATION SCIENCE

INSPIRED BY NATURE

References:

1. Rosano G et al.
J Oral Maxillofac Surg,
2010 Jun;68(6):1360-4

2. Rosano G et al.
Clin Oral Implants Res,
2011 Jul;22(7):711-715

3. Stacchi C et al.
Int J Periodontics Restorative Dent,
2020 May/Jun;40(3):e95-e102

MAXILLARY SINUSES ANATOMY

The maxillary sinus (Fig.1) has an irregular pyramidal shape. The floor (lower wall) is usually connected to the roots of the second premolar and first molar. However, in a certain number of cases, the floor of the maxillary sinus may extend distally to the third molar and mesially to the first premolars or canines. The roof (upper wall) of the sinus constitutes the majority of the orbital floor. The distal wall faces the maxillary tuberosity while the medial wall faces the nasal cavity. The medial wall of the maxillary sinus opens into the inferior part of the ethmoidal infundibulum through an ostium. The anatomical area encompassing the sinus ostium, the ethmoidal infundibulum, and the hiatus semilunaris is called the ostio-meatal complex. The mesio-buccal (anterior-vestibular) and the medial wall are the most involved walls during maxillary sinus elevation. The mesio-buccal wall contains the neurovascular fascia; the medial wall is responsible for the formation of septa that divide the maxillary sinus from the nasal cavity. Sometimes, maxillary sinuses might be incompletely divided by septa, which can be easily detected through CBTC or radiography. A cadaveric study reported that out of 60 sinuses, 20 incomplete septa were identified, all found in the anterior-lateral region of the sinus[1]. The internal sinus cavity is covered by the Schneiderian membrane (also called sinus membrane, SM), a mucous membrane covered by a pseudo-stratified columnar ciliated epithelium made of three different types of cells: basal cells, "goblet" cells and columnar cells bearing cilia. Serum mucosa glands are present as well. The SM has a thickness that varies from 0.1 mm to 1 mm but pathologies may cause the SM to thicken.

BLOOD VESSELS AND INNERVATION

Maxillary sinuses are highly innervated and vascularised anatomical areas. The infraorbital, anterior, middle, and posterior superior alveolar branches of the maxillary nerve and the nasal branches of the pterygopalatine ganglia innervate maxillary sinuses. The arterial blood supply is provided by branches derived from the maxillary, infraorbital, and greater palatine arteries. Veins drain blood to the facial vein or the pterygoid venous plexus. An intraosseous and extraosseous anastomosis between the posterior superior alveolar artery (PSAA) and the infraorbital artery (IOA) supplies the lateral antral wall with blood. A cadaveric study performed on fifteen human cadavers reported an anastomosis between PSAA and IOA in all dissected sinuses. In all cases, the anastomosis was found to be partially intraosseous and located between the SM and the lateral wall of the sinus[2].

SINUS LIFT DECISION TREE

Because of the thickness of the SM and the presence of blood vessels and nerves, implantologists should meticulously plan SM elevation to lower the risks associated with the surgical procedure. Commonly found problems are SM perforation, haemosinus, oroantral fistulas, and sinusitis. Decision trees come in handy to overcome these problems. One of the most recent and comprehensive decision trees was developed by Stacchi and co-workers and published in 2020[3]. According to the Authors, two parameters must be taken into account: the crestal bone height and the width of the sinus cavity (distance between the buccal and palatal walls) measured at a height of 10 mm and comprising the alveolar crest. When the crestal bone height is between 5 and 8 mm, it is advisable to insert short implants. Narrow sinuses (width <12 mm) with a crestal bone height between 3 and 5 mm should be treated with a one-stage transcrestal approach while wide ones (width >12 mm) necessitate a one-stage lateral approach. For sinuses with a crestal bone height <3 mm, the Authors suggest a two-stage approach (Fig.2).

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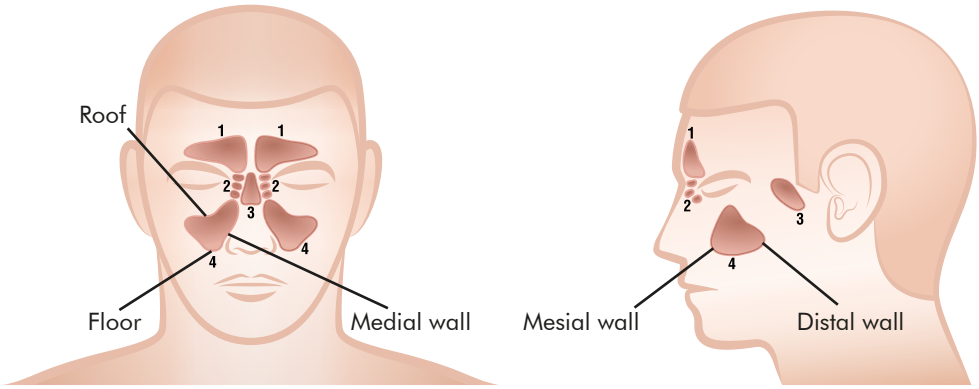

FIG 1

The anatomy of human paranasal sinuses. Maxillary sinuses, the largest paranasal sinuses, are located on the left and the right of the nose.

1. Frontal sinuses
2. Ethmoidal sinuses
3. Sphenoidal sinuses
4. Maxillary sinuses

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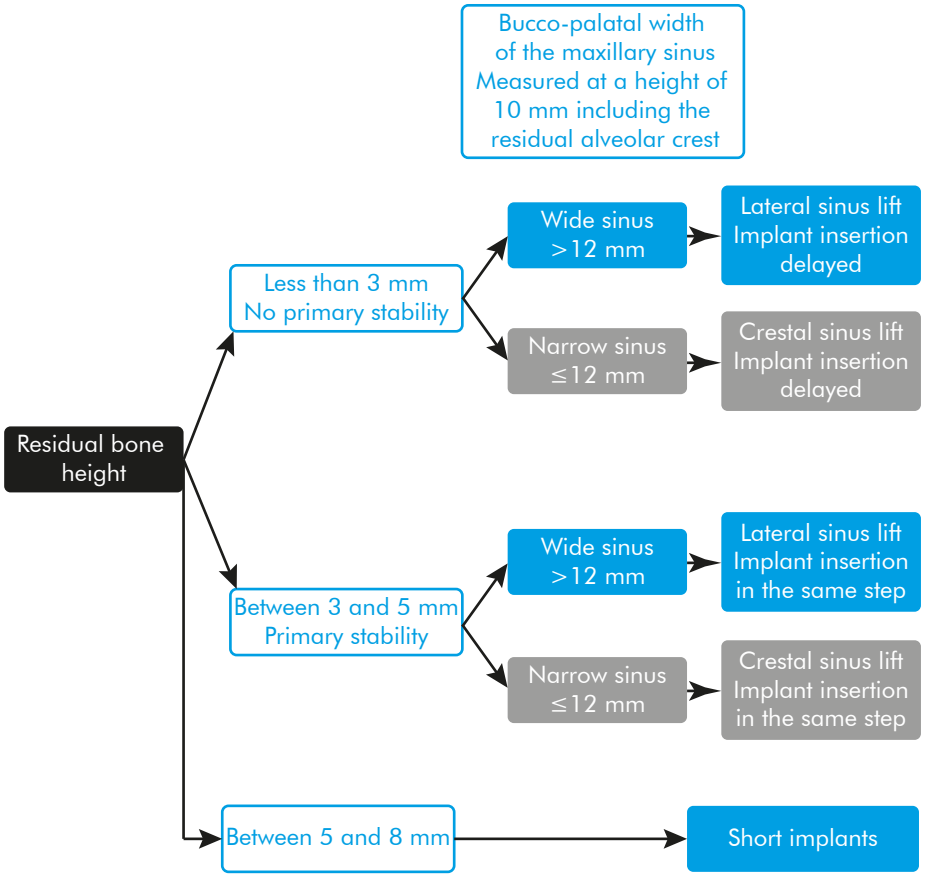

FIG 2

An example of a decision tree for sinus membrane elevation.

Graphically adapted and translated from Stacchi Claudio, Bernardello Fabio, Lombardi Teresa, Spinato Sergio. **Guida alla riabilitazione implanto-protesica del mascellare posteriore atrofico - Capitolo 4. Stacchi C., Spinato S. Rialzo di seno o impianti corti: criteri decisionali per la scelta della terapia,** pp. 115-120, © Edra SpA 2022

References:

1. Barone A et al.
Int J Periodontics Restorative Dent,
2008 Jun;28(3):283-9

2. Santagata M et al.
J Oral Implantol,
2010;36(6):485-9

3. Lombardi T et al.
Int J Implant Dent,
2022 Jul 22;8(1):32

4. Chen MH et al.
J Prosthodont,
2018 Jun;27(5):394-401

5. Bernardello F et al.
Sinusitis,
2021; 5(2):132-140

6. Testori T et al.
Int J Oral Implantol,
2023 accepted

7. Comuzzi L et al.
Materials (Basel),
2022 Apr 19;15(9):2964

TRANSCRESTAL SINUS MEMBRANE ELEVATION

Scientific literature reports different surgical protocols to perform a safe and predictable transcrestal sinus floor elevation for narrow sinuses. Two different studies[1,2] reported that transcrestal sinus floor elevation with osteotomes in combination with the Dual-Phase collagenated cortico-cancellous bone gel OsteoBiol® *Gel 40* is a safe and complication-free surgical procedure. Nevertheless, the pressure generated by the osteotomes in combination with more brittle bone substitute granules might perforate the SM, resulting in an increased risk of infection or the interruption of the surgery if the perforation is not manageable. To overcome the issue, a team of Italian researchers introduced a minimally invasive surgical procedure. After performing a crestal antrostomy with the preferred technique, OsteoBiol® *Gel 40* was gently injected into the antrostomy (Fig.3). Then, flaps were sutured to reach primary closure. The mean duration of the surgery was measured and was equal to 27.2 minutes (range 14 – 54 minutes)[3]. Out of seventy-one implants placed, fifty-four were immediately placed after SM elevation[3]. Finally, the Authors reported a 100% implant success rate over a follow-up period from 12 to 32 months[3].

SINUS MEMBRANE PERFORATION IN TRANSCRESTAL SINUS MEMBRANE ELEVATION

Due to the thickness of the sinus membrane, SM perforation is a common complication when performing sinus floor elevation. Based on a meta-analysis, the SM perforation rate during transcrestal approach spanned from 0% to 10%[4]. To mitigate this risk, collagenated biomaterials are reported to be a valid option. OsteoBiol® *Gel 40*, thanks to the presence of 40% collagen gel and the granulometry of the bone particles up to 0.3 mm, allows a safe detachment and elevation of the SM[3]. Scientific literature reports that biomaterial granules accidentally dispersed into the SM and granules with larger diameters might be responsible for ostio-meatal complex occlusion, sinusitis or other clinical complications. On the other hand, as demonstrated by a team of Italian researchers[5], OsteoBiol® *Gel 40* bone granules, thanks to its micrometric granulometry, can easily be transported by the ciliar activity through the ostio-meatal complex without any major complications (Fig 4). The same results were shown in a recent paper with the lateral approach[6].

BIOMATERIAL SHRINKAGE IN TRANSCRESTAL SINUS MEMBRANE ELEVATION

A retrospective analysis[7] extensively investigated the dimensional changes of different biomaterials used for maxillary sinus elevation. A linear regression analysis on aggregated data over a mean period of 93.33 months revealed no correlation between the follow-up time and graft resorption. Nevertheless, when data were gathered according to the granulometry of the particles, biomaterials with small particles, such as OsteoBiol® *Putty* and OsteoBiol® *Gel 40*, reported a mean mesio-distal and vertical graft change of about 20% and 7%[7]. In another study[3] a predictable shrinkage rate was reported for OsteoBiol® *Gel 40* (equal to 36% after six months), which is consistent with the amount of collagen gel contained in the biomaterial (about 40%) (Fig.5).

DISCOVER
THE SURGICAL PROCEDURE

OsteoBiol® by Tecnoss

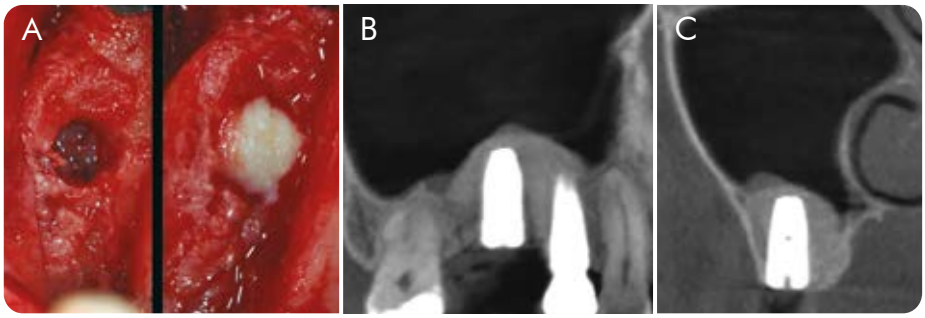

FIG 3

OsteoBiol® *Gel 40* can be easily injected into the antrostomy gently lifting the SM, as shown in the radiograph.

(A) Syringing OsteoBiol® *Gel 40*

(B-C) Panorex and cross-section CBCT at T0.

OsteoBiol® *Gel 40* elevated the SM above the apex of the adjacent tooth

Documentation provided by Dr. Bernardello Fabio and Prof. Stacchi Claudio.

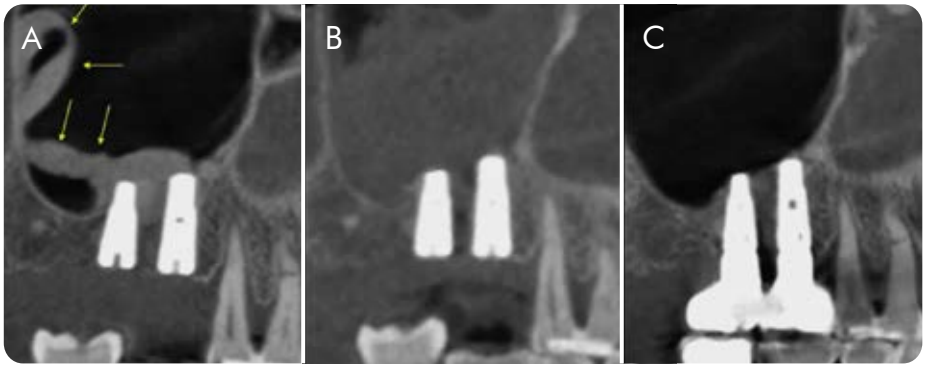

FIG 4

Healing of maxillary sinus after accidental dissemination of OsteoBiol® *Gel 40* granules.

(A) Panorex showing OsteoBiol® *Gel 40* granules dispersed into the sinus

(B) 2-month Panorex showing the absence of Dual-Phase granules and SM thickening

(C) CBCT at 6-months showing a complete SM healing and satisfactory endo-sinusal regeneration around implants

Graphically adapted from Bernardello Fabio, Lombardi Teresa, Stacchi Claudio.

Clearance of Bone Substitute in Gel Form Accidentally Dispersed into the Sinus Cavity during Transcrestal Maxillary Sinus Floor Elevation: Two-Case Report.

Sinusitis 2021, 5, 132-140

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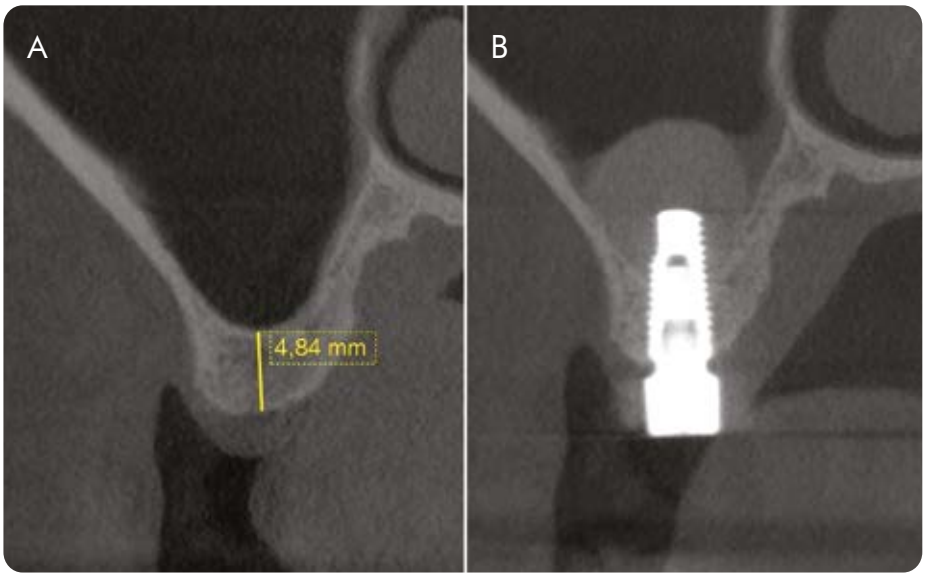

FIG 5

When inserted into narrow sinuses (A), OsteoBiol® *Gel 40* shows a typical dome shape (B).

Graphically adapted from Lombardi Teresa, Lamazza Luca, Bernardello Fabio, Ziętek Grzegorz, Stacchi Claudio, Giuseppe Troiano.

Clinical and radiographic outcomes following transcrestal maxillary sinus floor elevation with injectable xenogenous bone substitute in gel form: a prospective multicenter study. Int J Implant Dent.

2022 Jul 22;8(1):32

CCBY Licence

References:

1. Tatum H et al.
Dent. Clin. North. Am,
1986, 30, 207-229

2. Correia F et al.
Dentistry Journal,
2024; 12(2):33

3. Testori T ,Wallace SS.
Surgical procedures: lateral window approach. In: Maxillary sinus surgery and alternatives in treatment. Testori T, Del Fabbro, Weinstein R, Wallace SS.
(191-215). Quintessence Publishing 2009
All right reserved

4. Masuda K et al.
Int J Oral Maxillofac Implants,
2019 July/August;34(4):819-827

5. Hirota A et al.
Oral Maxillofac Surg,
2020 Sep;24(3):299-308

6. Kawakami S et al.
Int J Oral Maxillofac Implants,
2019January/February;34(1):223-232

7. Scala A et al.
Oral Maxillofac Surg,
2020 Dec;24(4):403-410

8. Imai H et al.
Int J Oral Maxillofac Implants,
2020 May/Jun;35(3):591-598

9. Nakajima Y et al.
Dent J (Basel),
2023 Jan 26;11(2):31

10. Perini A et al.
Dent J (Basel),
2021 Nov 12;9(11):131

11. Correia F et al.
Dentistry Journal,
2024; 12(2):33

DISCOVER
THE SURGICAL PROCEDURE

LATERAL ACCESS SINUS LIFT: FLAP DESIGN AND ANTROSTOMY PREPARATION

Maxillary sinus elevation through a lateral approach is one of the most widely used and documented surgical procedures in implant dentistry. The procedure was defined by Tatum[1] during the 80's and consists of elevating the sinus membrane to create a void below the SM to be filled with either autogenous bone chips, allografts, or xenogenic bone granules[2]. To have access to the SM, a flap must be carefully designed taking into consideration the anatomy of the area and the presence/absence of keratinized tissue[3]. A releasing incision should be made only if necessary and, during flap elevation, the integrity of the periosteum should be preserved[3]. The bone must be removed using a piezoelectric insert or a diamond bur, and, as reported by a team of international researchers in an experimental study, both procedures result in comparable healing outcomes[4]. Scientists extensively investigated if the position of the antrostomy would affect the outcomes of the intervention. In a randomized controlled trial on 24 patients, a team of scientists[5] reported that positioning the antrostomy either at the base of the sinus or 3-4 mm cranially to the base does not affect the amount of newly formed bone. Similar outcomes were reported when the antrostomy was placed 4 mm or 8 mm in height[6]. Furthermore, as proved in an experimental study on rabbits with OsteoBiol® collagenated biomaterials, large (5x6 mm) and small (3x6 mm) antrostomy led to comparable histomorphometric outcomes[7]. When a similar test was conducted on humans, a similar result between a large antrostomy placed 8 mm in height and a small one located 4 mm in height[8] were reported.

SINUS MEMBRANE DISPLACEMENT AND PERFORATION

The displacement of the SM is a possible source of complication, since an incorrect displacement may cause a perforation of the membrane. To lower this risk, the instruments used to elevate the membrane must be kept in contact with the bone. Moreover, it is advisable to start detaching the membrane cranially, then medially, distally, and posteriorly[3]. Not only the surgical approach but also the contour of biomaterials might increase the SM perforation rate. As demonstrated in an experimental study in rabbits, eight weeks after the surgery, anorganic bovine bone was reported to perforate SM seven times more than OsteoBiol® *Gen-Os*®[9] (Fig 6).

BIOMATERIAL GRAFTING

Biomaterials must be carefully inserted into the sinus: the least accessible areas should be filled first. It is recommended to fill the anterior and the posterior recesses and then the medial sinus wall[3]. Furthermore, it is highly recommended to compact the biomaterial[3]. Implants should be inserted with low speed and low torque[3]. After the grafting of the biomaterial and implant placement, the antrostomy is usually covered with a collagen membrane to avoid the contamination of the biomaterial or its accidental extrusion from the sinus when sneezing[10]. Flaps should be sutured tension-free[3]. Among the different biomaterials available on the market, OsteoBiol® *mp3*® was reported to have comparable outcomes to autogenous bone. Twelve patients were treated in a split-mouth randomized controlled trial and 24 sinuses were elevated either with OsteoBiol® *mp3*® or autogenous bone chips harvested from the mandibular ramus or the chin[11]. Data collected over a period of three years demonstrated comparable results between the two experimental groups in terms of marginal bone loss and implant success rate (Fig 7).

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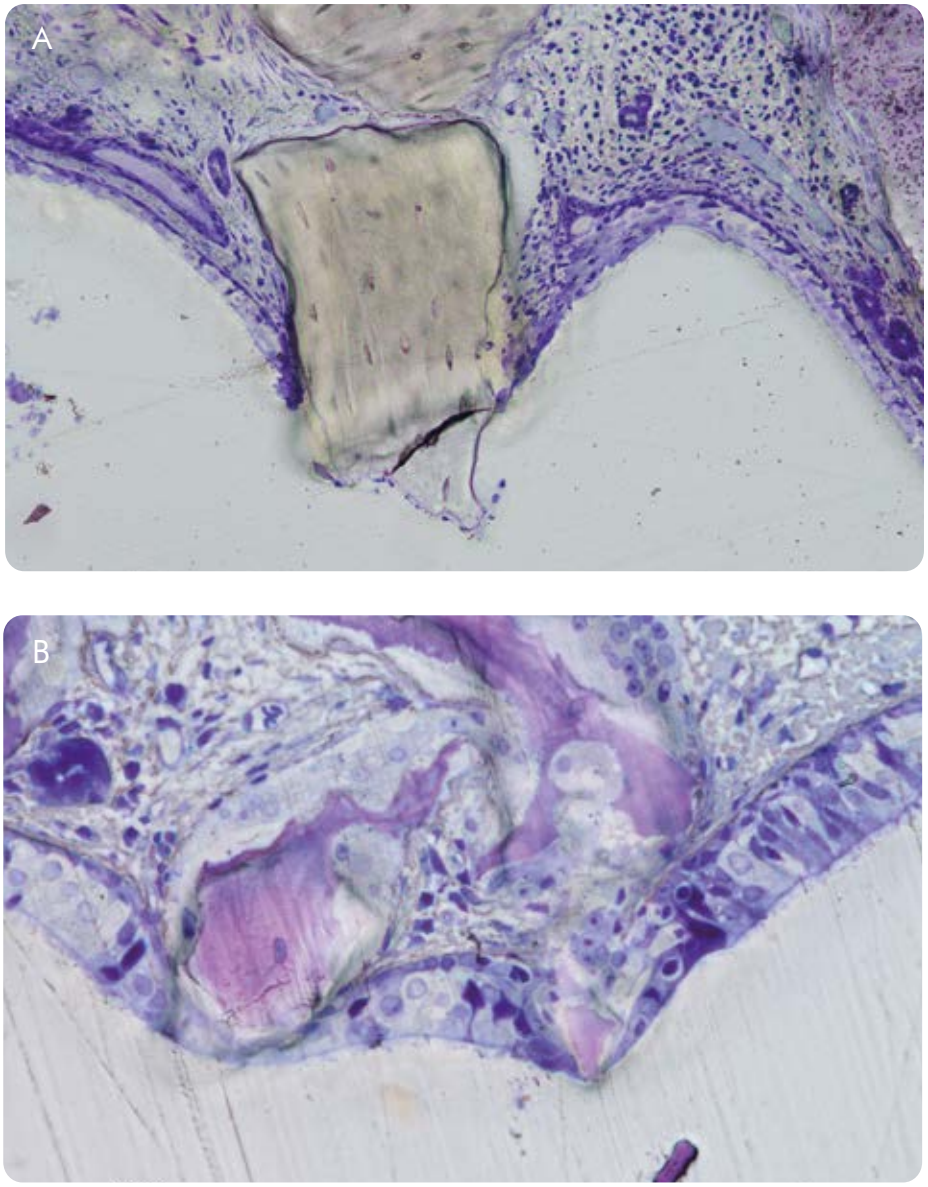

FIG 6

(A) Histology depicting the perforated sinus membrane in rabbits treated with anorganic bovine bone.

(B) Dual-Phase OsteoBiol® *Gen-Os*® granules showed a lower perforation rate due to their smooth edges.

Graphically adapted from Nakajima Yasushi, Daniele Botticelli, Ermenegildo Federico De Rossi, Vitor Ferreira Balan, Eduardo Pires Godoy, Erick Ricardo Silva, Samuel Porfirio Xavier.

Schneiderian Membrane Collateral Damage Caused by Collagenated and Non-Collagenated Xenografts: A Histological Study in Rabbits.

Dent. J. 2023, 11, 31

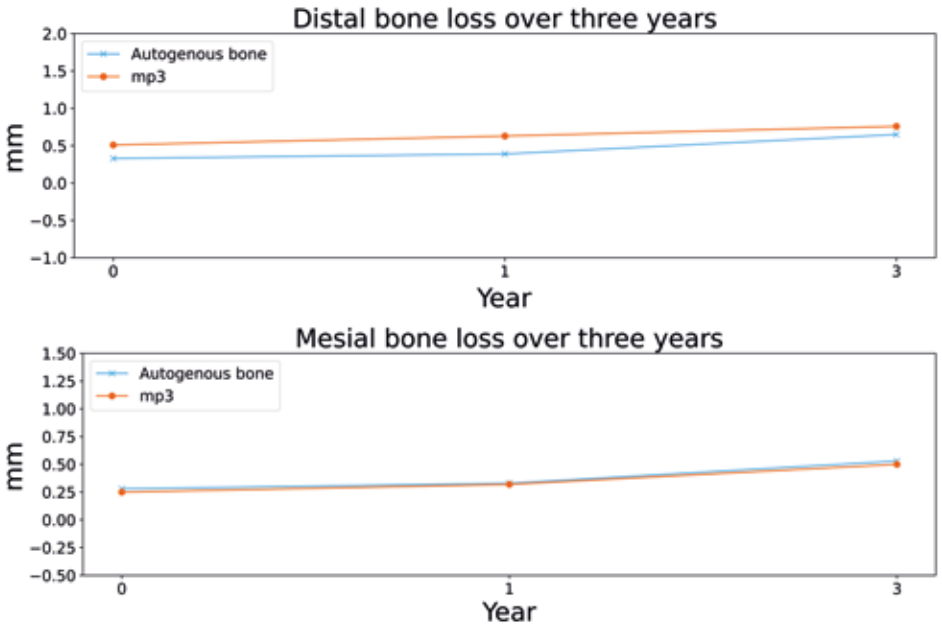

FIG 7

Mesial and distal bone loss around implants inserted in patients treated with autogenous bone and OsteoBiol® *mp3*®. After three years, similar results were found in the two experimental groups.

Graphically adapted from Correia Francisco, Sónia Gouveia, António Campos Felino, Ricardo Faria-Almeida, Daniel Pozza.

Maxillary Sinus Augmentation with Xenogenic Collagen-Retained Heterologous Cortico-Cancellous Bone: A 3-Year Follow-Up Randomized Controlled Trial.

Dent. J. 2024, 12, 33

References:

1. Torretta S et al.
Clin Oral Implants Res,
2013 Aug;24 Suppl A100:57-62

2. Saibene AM et al.
Acta Otorhinolaryngol Ital,
2021 Apr;41(Suppl. 1):S116-S123

3. Craig JR et al.
Int Forum Allergy Rhinol,
2021 Aug;11(8):1235-1248

4. Sabatino L et al.
Medicina (Kaunas),
2023 May 12;59(5):937

THE IMPORTANCE OF COLLABORATION WITH ENTs

It is absolutely necessary to evaluate, through a CBCT scan, the patency of the ostio-meatal complex (a fundamental prerequisite) and the condition of the membrane to determine the need for an ENT consultation before deciding patient's eligibility for the surgery (Fig 8). As proved by a team of Italian researchers, fibreoptic endoscopy and radiological evaluation to investigate the anatomy of the sinus and the ostio-meatal complex have proven to be valid approaches to plan a sinus elevation[1]. Nasal endoscopy is the gold standard procedure for the diagnosis of odontogenic sinusitis, but a high-definition CT of the maxillofacial complex comes in handy when ENT surgeons are evaluating the ostio-meatal complex and frontal sinuses to check the health of those anatomical areas. When using CT and CBCT implantologists have to be aware that the former provides a better resolution of the maxillary sinuses and the soft tissues, while the latter is more useful for the diagnosis of dental conditions[2].
The importance of a collaboration between ENT surgeons and implantologists is also reported in an international multidisciplinary consensus statement released by a team of nine oral and eight ENT surgeons[3]. A survey of 37 clinical statements was submitted to all 17 participants. Upon analysis of the results, the international team reached a strong consensus that a collaboration between ENTs and implantologists is required to diagnose odontogenic sinusitis (ODS). Finally, the Authors concluded a comprehensive diagnosis of ODS requires ENT surgeons to diagnose sinus inflammation and implantologists to confirm the odontogenic nature of the pathology.

PATHOLOGY AND CLINICS OF ODS

According to scientific literature, apical or marginal periodontitis, oroantral communication, and infection caused by foreign bodies are the major causes of ODS. Oroantral communications (OACs) are open communication between the oral cavity and the maxillary sinus that, when not treated accordingly, develop into oroantral fistulas (OAFs). From a clinical point of view, symptoms commonly found in patients diagnosed with ODS are foul odour, head and facial pain, pus at the maxillary meatus, bleeding under endoscopic examination, unilateral facial pressure, and opacification of the sinus when CT is performed. A history of tooth loss and toothache, regenerative procedures before implant placement, and peri-implantitis may be a clue for odontogenic sinusitis (Fig. 9).

MANAGEMENT OF OACs AND ODS

The absence of a contamination and the presence of an open ostium that allows oxygenation and drainage of the mucus outside the maxillary sinus are fundamental for a self-resolution of OACs. In the case of a lack of patency of the ostium, implantologists are highly recommended to collaborate with ENT surgeons whose duty is to re-establish the functional conditions of the maxillary sinus. CT and Functional Endoscopic Sinus Surgery (FESS) are valid approaches to check and restore the patency of the maxillary sinus. Finally, as demonstrated by a team of Italian researchers[4], collagenated biomaterials such as OsteoBiol® *Lamina*®, OsteoBiol® *TSV Gel*, and OsteoBiol® *Evolution* in combination with functional endoscopic sinus surgery (FESS) are valid treatments to treat OACs/OAFs.

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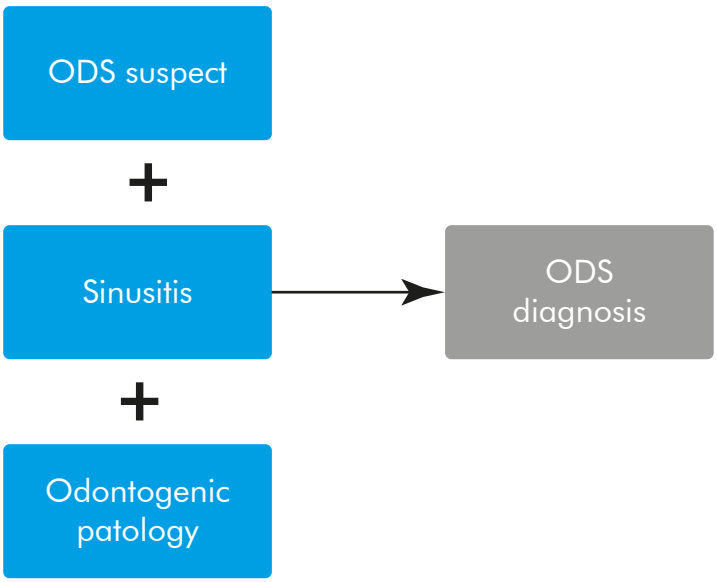
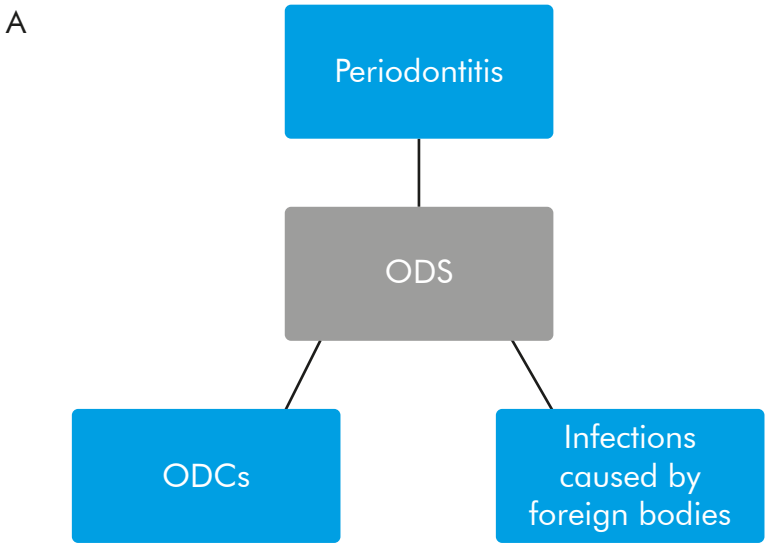


FIG 8

A collaboration between ENT surgeons and dental implant providers is necessary for a correct diagnosis of ODS. ENT surgeons have the expertise to diagnose sinusitis, while dental implant providers are asked to determine the odontogenic orgin of the pathology.



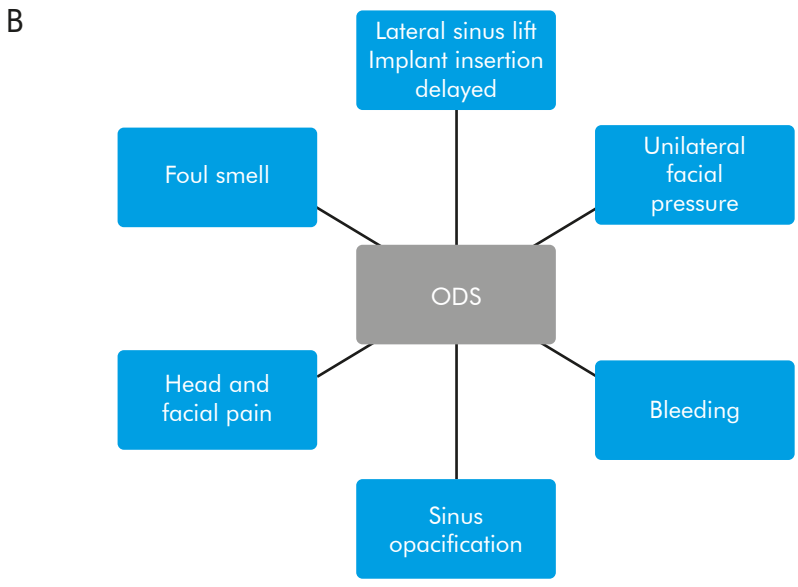


FIG 9

Common causes (A) and symptoms (B) of ODS.

References:

1. Nakajima Y et al. Dent J (Basel), 2023 Jan 26;11(2):31

2. Pistilli R et al. J Dent, 2022 Jun;121:104137

3. Testori T et al. Int J Dent, 2012;2012:365809

4. Correia F et al. Dentistry Journal, 2024; 12(2):33

5. Sakuma S et al. Int J Implant Dent, 2020 Sep 30;6(1):35

COMPLICATION MANAGEMENT

As described in the previous sections, collagenated xenografts in combination with innovative surgical procedures have dramatically reduced the number of complications occurring during sinus lift procedures. Furthermore, Dual-Phase xenografts reported a lower SM perforation rate when compared to anorganic bovine bone in an experimental study in rabbits[1] (Fig. 10). Furthermore, ten years after the placement of 113 implants in sinus grafted with OsteoBiol® *mp3*®, an implant success rate equal to 100% was reported[2]. As the study reported two sinus membrane perforations and five minor complications[2], sinus elevation is not a complication-free surgical procedure and implantologists should be able to recognize (Fig. 11) and treat them.

Postoperative infections, for example, are reported to vary from 2% to 5.6%[3]. First and foremost, sterility is a must. It is advisable to avoid contact between the biomaterial and biological fluids (i.e. saliva). In addition, reducing the number and duration of the surgery may be a valid approach to lowering the infection risk. Autogenous bone is the gold standard for bone regeneration; nevertheless, it should be harvested from the chin, hip, or mandibular ramus, which increases the possibility of infections. Collagenated biomaterials such as OsteoBiol® *mp3*® reported comparable results to autogenous bone, having at the same time a lower risk and invasiveness[4].

Even though a team of researchers proved that the position of the antrostomy does not affect the amount of newly formed bone, sinus membrane mechanical displacement may lead to the formation of an oedema[5]. This surgically induced oedema has the potential to extend sufficiently to occlude the ostium, leading to the loss of patency in both the ostium and ethmoidal infundibulum, as evidenced by tomographic assessments[5]. Although this condition is generally reversible, it is advisable to undergo a follow-up tomographic examination for reassessment.

The most common symptoms after sinus elevation are swelling or pain, and scientific literature reports a normal resolution within three weeks. Should the symptoms persisted for more than three weeks, CT and endoscopy would be recommended. Regarding sinus infections, Amoxicillin/Clavulanic acid 1 gr TID and Metronidazole 500 mg TID by mouth for patients not allergic to Penicillin and Levofloxacin 400 mg BID by mouth for patients allergic to Penicillin for 72 hours to symptom remission are the most prescribed therapeutical approaches[3]. In the case of migration of the graft into the sinus, a multidisciplinary approach involving collaborations with ENTs is necessary. Finally, an examination performed by an ENT is suggested before the re-entry (usually after 6-9 months)[3].

A multidisciplinary team published a list of recommendations to avoid complications during sinus lifts[3]. Researchers highlighted the importance of the assessment of the clinical history of the patients, including smoking habits and history of periodontal or endodontic diseases. Dentists need to avoid contamination risks by performing preop disinfection of the skin, keeping the soft tissue flap distant from the antrostomy, and avoiding the contamination of the graft with the patient's saliva. Since the post-operation phase is a source of complications, patients should be treated with chlorhexidine mouthwash and be subjected to a weekly follow-up for the first week and, later, every three months.

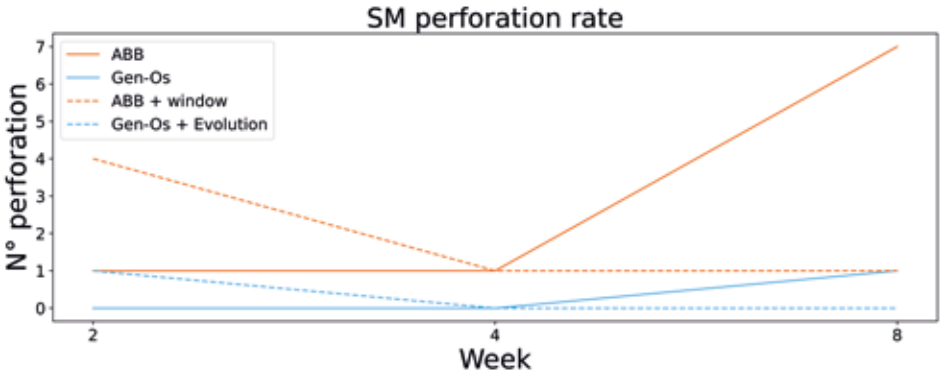


FIG 10

SM perforation rate over eight weeks. X-axis: time; Y-axis: number of perforations. OsteoBiol® collagenated biomaterial reported a lower perforation rate than anorganic bovine bone. Furthermore, OsteoBiol® *Evolution* membrane showed a protective effect on the SM.

Graphically adapted from Nakajima Yasushi, Daniele Botticelli, Ermenegildo Federico De Rossi, Vitor Ferreira Balan, Eduardo Pires Godoy, Erick Ricardo Silva, Samuel Porfirio Xavier. **Schneiderian Membrane Collateral Damage Caused by Collagenated and Non-Collagenated Xenografts: A Histological Study in Rabbits.**

Dentistry Journal. 2023; 11(2):31.

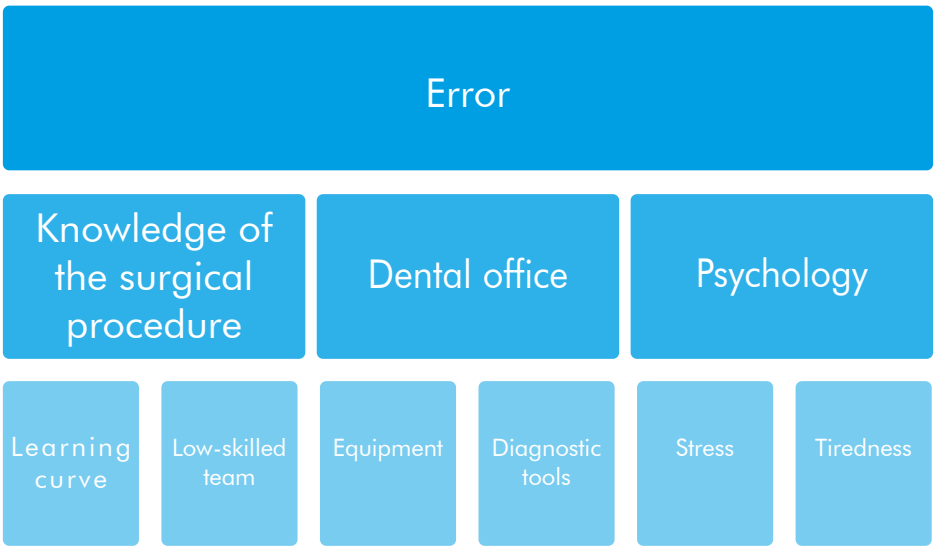


FIG 11

Common error sources that may jeopardize the success of the clinical procedure.

Poor or not-updated diagnostic tools/machinery are the cause of a wrong diagnosis, while a poor instrumentation may bring about difficulties during the surgery. Surgical teams should invest time and resources in deepening their knowledge to be prepared to treat complex cases and face abrupt or unexpected complications. Finally, both patients and the surgical team should work in a comfortable environment.

One-stage crestal sinus lift with OsteoBiol® *Gel 40* in anatomically narrow sinus, in presence of less than 5 mm of residual bone height

Sex: **male** | Age: **59**

Fig. 1 Pre-surgical radiograph. An implant was inserted to replace tooth #16 about 10 years before. The implant subject to this case was placed in position #17

Fig. 2 The narrow anatomy of the sinus (< 12 mm in width measured at 10 mm from the maxillary ridge) and residual bone height between 3 mm and 5 mm allowed a 1-stage surgical approach (crestal sinus lift and contextual implant insertion)

Fig. 3 a-b Injection of OsteoBiol® *Gel 40*

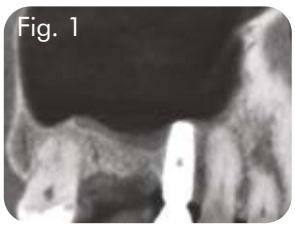
Fig. 4 a-b Panorex and cross-section CBCT at baseline (T0). OsteoBiol® *Gel 40* elevated the sinus membrane in the site of the new implant and also above the apex of the old implant in position 16

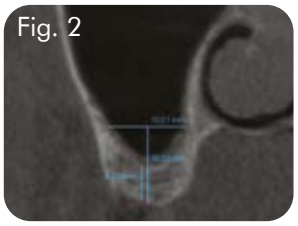
Fig. 5 a-b-c-d Intraoral radiographs: intraoperative (5 a) and at T0 (5b), 2 months (5c), 5 months (5d)

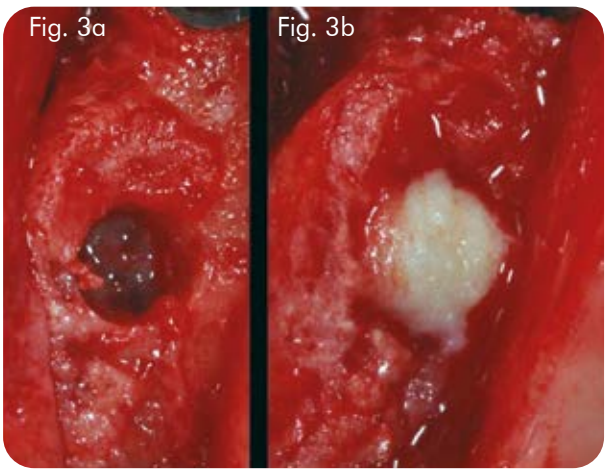
Fig. 6 a-b Radiographs 7 months after surgery, OsteoBiol® *Gel 40* has been remodeled into new bone above the new implant (6a) and above the implant inserted 10 years before (6b)

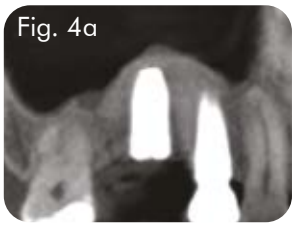
Fig. 7 One year after surgery. Observing the radiograph, it's difficult to identify the transition between pristine and newly formed bone

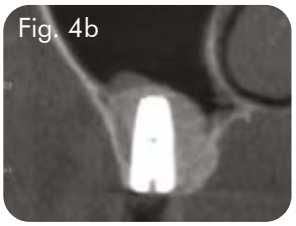
Fig. 8 Follow-up radiograph after one year of prosthetic load

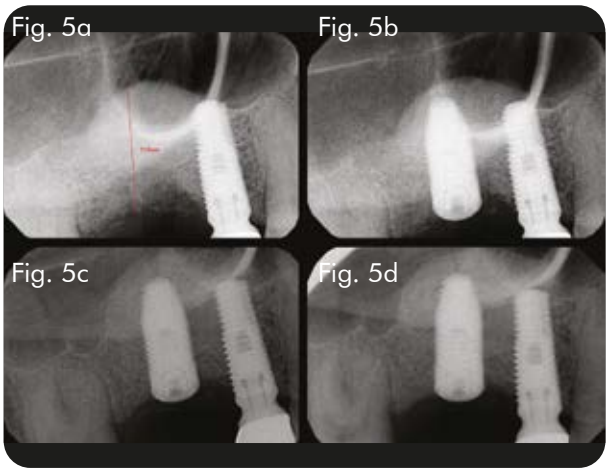


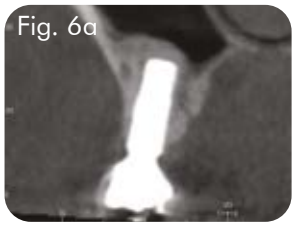


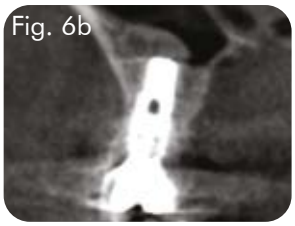


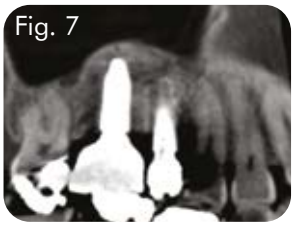


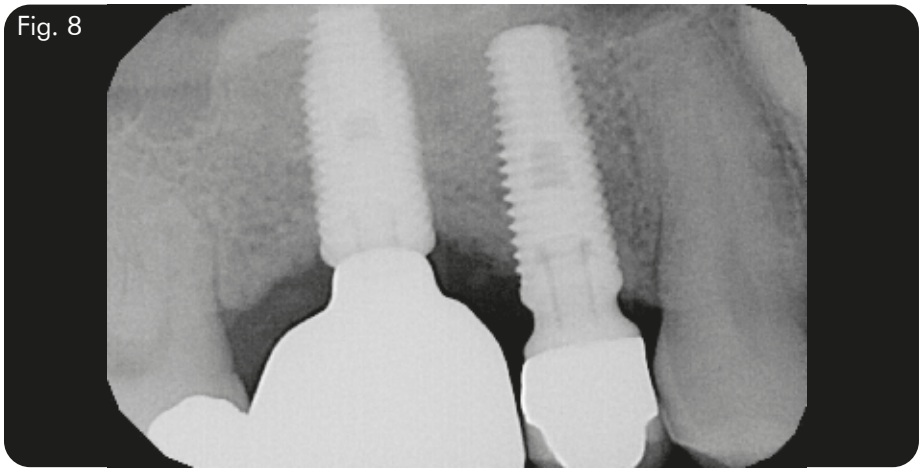












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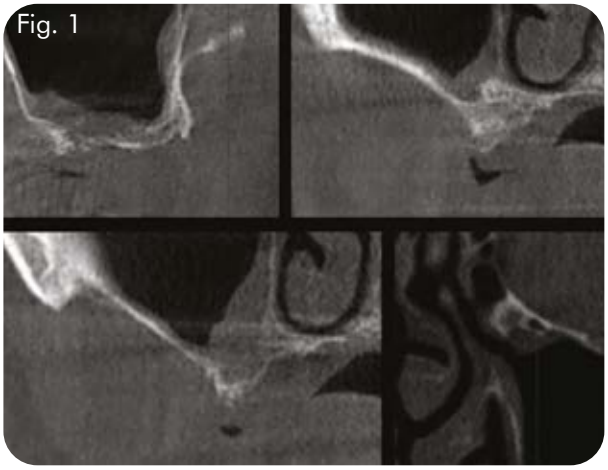
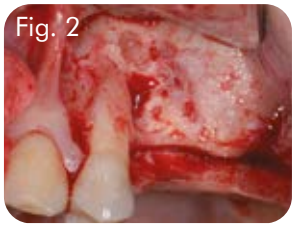
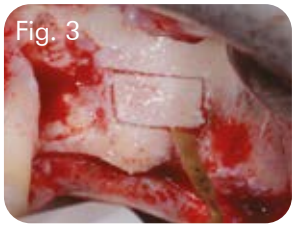
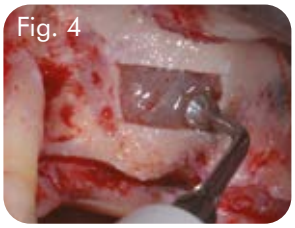
Bone substitute: **OsteoBiol® *Gel 40***

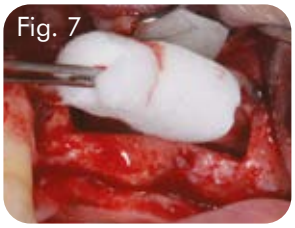
Maxillary sinus elevation: lateral approach with delayed implant placement

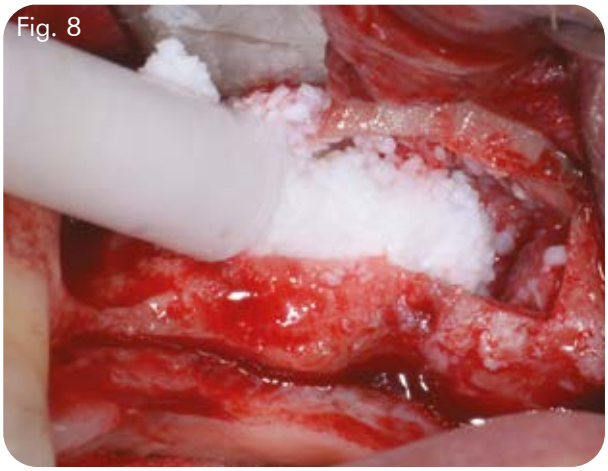


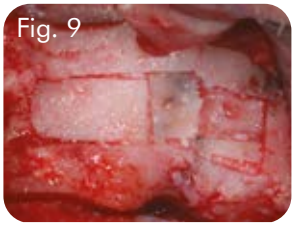


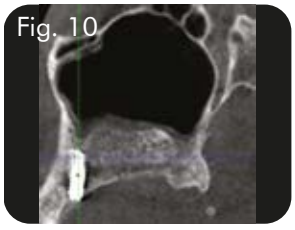


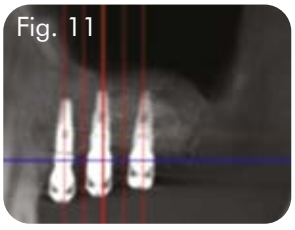


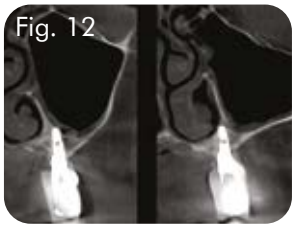












CASE REPORT

LATERAL ACCESS SINUS LIFT

Sex: **male** | Age: **53**

Fig. 1 Pre-op CBCT. Mild thickening of sinus membrane does not represent a contraindication for sinus floor elevation if the ostiomeatal complex is open. In the molar region, the amount of bone is insufficient to stabilize implants. A delayed implant placement approach has been chosen

Fig. 2 Intraoperative view of the surgical site

Fig. 3 Antrostomy preparation with Piezosurgery

Fig. 4 Sinus membrane detachment using a specific piezoelectric insert

Fig. 5 Distal extension of the antrostomy to effectively repair a perforation of the sinus membrane

Fig. 6 Collagen membrane (OsteoBiol® *Evolution*) positioning to protect the sinus membrane perforation

Fig. 7 Collagen sponge positioning to maintain the sinus membrane elevated and distally delimit the graft area

Fig. 8 Biomaterial (OsteoBiol® *mp3*®) injection

Fig. 9 Vestibular bony walls re-positioning and fixing with fibrin glue

Fig. 10 CBCT follow-up at 6-months. During the maxillary sinus elevation, an implant has been placed in the second premolar zone, where a sufficient amount of native bone was already available. Bone remodelling of the xenograft (OsteoBiol® *mp3*®) is morphologically similar to autogenous bone remodelling. It can be noticed that the new sinus floor shows a flat morphology[1]

Fig. 11 6 months CBCT follow-up with one-stage implant placement in the molar region

Fig. 12 5 years CBCT follow-up. A stable graft can be noted. Biomaterial resorption is limited, and regenerated bone is visible up to the apical part of the implant: this type of resorption is comparable to autologous bone resorption

Fig. 13-14 5 years clinical follow-up

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(1) Lo Faro et al. Implants, 2021; 3:1-11

Bone substitute: **OsteoBiol® *mp3*®**

Membrane: **OsteoBiol® *Evolution***

Selected scientific publications

CRESTAL ACCESS SINUS LIFT	ARTICLE NUMBER							
BONE LOSS	N° 15							
BONE GAIN	N° 15	N° 267						
DIMENSIONAL GRAFT CHANGE	N° 255							
DURATION OF THE SURGERY	N°267							
IMPLANT FAILURE	N° 15	N° 267						
SM PERFORATION	N° 228	N° 267						
LATERAL ACCESS SINUS LIFT	**ARTICLE NUMBER**							
BONE GAIN	N° 165	N° 184	N° 187	N° 222	N° 253	N° 257		
BONE LOSS	N° 34	N° 208	N° 287	N° 319				
COMPLICATIONS	N° 4	N° 7	N° 14	N° 58	N°130	N°137	N° 151	N° 153
	N° 211	N° 257						
DIMENSIONAL GRAFT CHANGE	N° 256							
DURATION OF THE SURGERY	N° 14	N° 58	N° 151					
GRAFT VOLUME	N° 166							
IMPLANT FAILURE	N° 34	N° 63	N° 130	N° 134	N° 137	N° 151	N° 208	N° 211
	N° 257	N° 287	N° 319					
ISQ	N° 151	N° 208						
MARROW SPACES	N° 9	N° 41	N° 46	N° 76	N° 188	N° 253	N° 272	N° 283
NEWLY FORMED BONE	N° 4	N° 9	N° 41	N° 46	N° 48	N° 51	N° 68	N° 76
	N° 91	N° 156	N°188	N° 192	N° 222	N° 253	N° 262	N° 272
	N° 283							
RESIDUAL XENOGRAFT	N° 9	N° 41	N° 46	N° 48	N° 63	N° 68	N° 76	N° 91
	N° 188	N° 253	N° 262	N° 272	N° 283			
VEGF EXPRESSION LEVEL	N° 264							

CRESTAL ACCESS SINUS LIFT

N° 15 - BARONE A, CORNELINI R, CIAGLIA R, COVANI U.
IMPLANT PLACEMENT IN FRESH EXTRACTION SOCKETS AND SIMULTANEOUS OSTEOTOME SINUS FLOOR ELEVATION: A CASE SERIES.
INT J PERIODONTICS RESTORATIVE DENT. 2008 JUN;28(3):283-9

N° 228 - BERNARDELLO F, LOMBARDI T, STACCHI C.
CLEARANCE OF BONE SUBSTITUTE IN GEL FORM ACCIDENTALLY DISPERSED 2 INTO THE SINUS CAVITY DURING TRANSCRESTAL MAXILLARY SINUS FLOOR ELEVATION: TWO-CASE REPORT.
SINUSITIS, 2021, 5, 132–140

N° 255 - COMUZZI L, TUMEDEI M, PIATTELLI A, TARTAGLIA G, DEL FABBRO M.
RADIOGRAPHIC ANALYSIS OF GRAFT DIMENSIONAL CHANGES IN TRANSCRESTAL MAXILLARY SINUS AUGMENTATION: A RETROSPECTIVE STUDY.
MATERIALS (BASEL), 2022 APR 19;15(9):2964

N° 267 - LOMBARDI T, LAMAZZA L, BERNARDELLO F, ZIĘTEK G, STACCHI C, TROIANO G.
CLINICAL AND RADIOGRAPHIC OUTCOMES FOLLOWING TRANSCRESTAL MAXILLARY SINUS FLOOR ELEVATION WITH INJECTABLE XENOGENOUS BONE SUBSTITUTE IN GEL FORM: A PROSPECTIVE MULTICENTER STUDY.
INT J IMPLANT DENT. 2022 JUL 22;8(1):32

LATERAL ACCESS SINUS LIFT

N° 4 - BARONE A, CRESPI R, ALDINI NN, FINI M, GIARDINO R, COVANI U.
MAXILLARY SINUS AUGMENTATION: HISTOLOGIC AND HISTOMORPHOMETRIC ANALYSIS. INT J ORAL MAXILLOFAC IMPLANTS.
2005 JUL-AUG;20(4):519-25

N° 7 - BARONE A, SANTINI S, SBORDONE L, CRESPI R, COVANI U.
A CLINICAL STUDY OF THE OUTCOMES AND COMPLICATIONS ASSOCIATED WITH MAXILLARY SINUS AUGMENTATION.
INT J ORAL MAXILLOFAC IMPLANTS. 2006 JAN-FEB;21(1):81-5

N° 9 - ORSINI G, SCARANO A, PIATTELLI M, PICCIRILLI M, CAPUTI S, PIATTELLI A.
HISTOLOGIC AND ULTRASTRUCTURAL ANALYSIS OF REGENERATED BONE IN MAXILLARY SINUS AUGMENTATION USING A PORCINE BONE-DERIVED BIOMATERIAL.
J PERIODONTOL. 2006 DEC;77(12):1984-90

N° 14 - BARONE A, SANTINI S, MARCONCINI S, GIACOMELLI L, GHERLONE E, COVANI U.
OSTEOTOMY AND MEMBRANE ELEVATION DURING THE MAXILLARY SINUS AUGMENTATION PROCEDURE. A COMPARATIVE STUDY: PIEZOELECTRIC DEVICE VS. CONVENTIONAL ROTATIVE INSTRUMENTS.
CLIN ORAL IMPLANTS RES. 2008 MAY;19(5):511-5

N° 34 - SCARANO A, PIATTELLI A, ASSENZA B, QUARANTA A, PERROTTI V, PIATTELLI M, IEZZI G.
PORCINE BONE USED IN SINUS AUGMENTATION PROCEDURES: A 5-YEAR RETROSPECTIVE CLINICAL EVALUATION.
J ORAL MAXILLOFAC SURG. 2010 AUG;68(8):1869-73

N° 41 - SCARANO A, PIATTELLI A, PERROTTI V, MANZON L, IEZZI G.
MAXILLARY SINUS AUGMENTATION IN HUMANS USING CORTICAL PORCINE BONE: A HISTOLOGICAL AND HISTOMORPHOMETRICAL EVALUATION AFTER 4 AND 6 MONTHS.
CLIN IMPLANT DENT RELAT RES. 2011 MAR;13(1):13-8

N° 46 - IEZZI G, DEGIDI M, PIATTELLI A, MANGANO C, SCARANO A, SHIBLI JA, PERROTTI V.
COMPARATIVE HISTOLOGICAL RESULTS OF DIFFERENT BIOMATERIALS USED IN SINUS AUGMENTATION PROCEDURES: A HUMAN STUDY AT 6 MONTHS.
CLIN ORAL IMPLANTS RES. 2012 DEC;23(12):1369-76

N° 48 - BARONE A, RICCI M, GRASSI RF, NANNMARK U, QUARANTA A, COVANI U.
A 6-MONTH HISTOLOGICAL ANALYSIS ON MAXILLARY SINUS AUGMENTATION WITH AND WITHOUT USE OF COLLAGEN MEMBRANES OVER THE OSTEOTOMY WINDOW: RANDOMIZED CLINICAL TRIAL.
CLIN ORAL IMPLANTS RES. 2013 JAN;24(1):1-6

N° 51 - RAMÍREZ-FERNÁNDEZ MP, CALVO-GUIRADO JL, MATÉ-SÁNCHEZ DEL VAL JE, DELGADO-RUIZ RA, NEGRI B, BARONA-DORADO C.
ULTRASTRUCTURAL STUDY BY BACKSCATTERED ELECTRON IMAGING AND ELEMENTAL MICROANALYSIS OF BONE-TO-BIOMATERIAL INTERFACE AND MINERAL DEGRADATION OF PORCINE XENOGRAFTS USED IN MAXILLARY SINUS FLOOR ELEVATION.
CLIN ORAL IMPLANTS RES. 2013 MAY;24(5):523-30

N° 58 - CASSETTA M, RICCI L, IEZZI G, CALASSO S, PIATTELLI A, PERROTTI V
USE OF PIEZOSURGERY DURING MAXILLARY SINUS ELEVATION: CLINICAL RESULTS OF 40 CONSECUTIVE CASES.
INT J PERIODONTICS RESTORATIVE DENT. 2012 DEC;32(6):E182-8

Selected scientific publications

N° 63 - SILVESTRI M, MARTEGANI P, D'AVENIA F, FARNETI M, CAPRI D, PAOLANTONI G, LANDI L
SIMULTANEOUS SINUS AUGMENTATION WITH IMPLANT PLACEMENT: HISTOMORPHOMETRIC COMPARISON OF TWO DIFFERENT GRAFTING MATERIALS. A MULTICENTER DOUBLE-BLIND PROSPECTIVE RANDOMIZED CONTROLLED CLINICAL TRIAL.
INT J ORAL MAXILLOFAC IMPLANTS. 2013 MAR-APR;28(2):543-9

N° 68 - TRAINI T, PIATTELLI A, CAPUTI S, DEGIDI M, MANGANO C, SCARANO A, PERROTTI V, IEZZI G
REGENERATION OF HUMAN BONE USING DIFFERENT BONE SUBSTITUTE BIOMATERIALS.
CLIN IMPLANT DENT RELAT RES. 2015 FEB;17(1):150-62

N° 76 - CASSETTA M, PERROTTI V, CALASSO S, PIATTELLI A, SINJARI B, IEZZI G
BONE FORMATION IN SINUS AUGMENTATION PROCEDURES USING AUTOLOGOUS BONE, PORCINE BONE, AND A 50 : 50 MIXTURE: A HUMAN CLINICAL AND HISTOLOGICAL EVALUATION AT 2 MONTHS.
CLIN ORAL IMPLANTS RES. 2015 OCT;26(10):1180-4

N° 91 - CORBELLA S, TASCHIERI S, WEINSTEIN R, DEL FABBRO M
HISTOMORPHOMETRIC OUTCOMES AFTER LATERAL SINUS FLOOR ELEVATION PROCEDURE: A SYSTEMATIC REVIEW OF THE LITERATURE AND META-ANALYSIS.
CLIN ORAL IMPLANTS RES. 2016 SEP;27(9):1106-22

N° 130 - ESPOSITO M, DAVÓ R, MARTI-PAGES C, FERRER-FUERTES A, BARAUSSE C, PISTILLI R, IPPOLITO DR, FELICE P
IMMEDIATELY LOADED ZYGOMATIC IMPLANTS VS CONVENTIONAL DENTAL IMPLANTS IN AUGMENTED ATROPHIC MAXILLAE: 4 MONTHS POST-LOADING RESULTS FROM A MULTICENTRE RANDOMISED CONTROLLED TRIAL.
EUR J ORAL IMPLANTOL. 2018;11(1):11-28

N° 134 - FORABOSCO A, GHENO E, SPINATO S, GARUTI G, FORABOSCO E, CONSOLO U
CONCENTRATED GROWTH FACTORS IN MAXILLARY SINUS FLOOR AUGMENTATION: A PRELIMINARY CLINICAL COMPARATIVE EVALUATION.
INT J OF GROWTH FACTORS AND STEM CELLS IN DENTISTRY, 2018;1:2-7

N° 137 - DAVÓ R, FELICE P, PISTILLI R, BARAUSSE C, MARTI-PAGES C, FERRER-FUERTES A, IPPOLITO DR, ESPOSITO M
IMMEDIATELY LOADED ZYGOMATIC IMPLANTS VS CONVENTIONAL DENTAL IMPLANTS IN AUGMENTED ATROPHIC MAXILLAE: 1-YEAR POST-LOADING RESULTS FROM A MULTICENTRE RANDOMISED CONTROLLED TRIAL.
EUR J ORAL IMPLANTOL. 2018;11(2):145-161

N° 151 - BECHARA S, KUBILIUS R, VERONESI G, PIRES JT, SHIBLI JA, MANGANO FG
SHORT (6-MM) DENTAL IMPLANTS VERSUS SINUS FLOOR ELEVATION AND PLACEMENT OF LONGER (≥10-MM) DENTAL IMPLANTS: A RANDOMIZED CONTROLLED TRIAL WITH A 3-YEAR FOLLOW-UP.
CLIN ORAL IMPLANTS RES. 2017 SEP;28(9):1097-1107

N° 153 _ CHIRILĂ L, ROTARU C, FILIPOV I, SĂNDULESCU M
MANAGEMENT OF ACUTE MAXILLARY SINUSITIS AFTER SINUS BONE GRAFTING PROCEDURES WITH SIMULTANEOUS DENTAL IMPLANTS PLACEMENT - A RETROSPECTIVE STUDY.
BMC INFECT DIS. 2016 MAR 8;16 SUPPL 1(SUPPL 1):94

N° 156 - NOAMI SA, ELMOSY K, ASKAR N
EVALUATION OF PRE-HYDRATED COLLAGENATED CORTICO-CANCELLOUS GRANULES (MP3®) IN AUGMENTATION OF THE MAXILLARY SINUS (PRELIMINARY STUDY).
J OF DENT, ORAL DISORD AND THERAPY, 2014;2(3): 1-8

N° 165 - KAWAKAMI S, LANG NP, IIDA T, FERRI M, APAZA ALCCAYHUAMAN KA, BOTTICELLI D
INFLUENCE OF THE POSITION OF THE ANTROSTOMY IN SINUS FLOOR ELEVATION ASSESSED WITH CONE-BEAM COMPUTED TOMOGRAPHY: A RANDOMIZED CLINICAL TRIAL.
J INVESTIG CLIN DENT. 2018 NOV;9(4):E12362

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 (BASEL). 2018 AUG 17;11(8):1457

N° 184 - KAWAKAMI S, LANG NP, FERRI M, APAZA ALCCAYHUAMAN KA, BOTTICELLI D.
INFLUENCE OF THE HEIGHT OF THE ANTROSTOMY IN SINUS FLOOR ELEVATION ASSESSED BY CONE BEAM COMPUTED TOMOGRAPHY- A RANDOMIZED CLINICAL TRIAL.
INT J ORAL MAXILLOFAC IMPLANTS. 2019 JANUARY/FEBRUARY;34(1):223–232

N° 187 - HIROTA A, LANG NP, FERRI M, FORTICH MESA N, APAZA ALCCAYHUAMAN KA, BOTTICELLI D
TOMOGRAPHIC EVALUATION OF THE INFLUENCE OF THE PLACEMENT OF A COLLAGEN MEMBRANE SUBJACENT TO THE SINUS MUCOSA DURING MAXILLARY SINUS FLOOR AUGMENTATION: A RANDOMIZED CLINICAL TRIAL.
INT J IMPLANT DENT. 2019 AUG 19;5(1):31

N° 188 - TANAKA K, IEZZI G, PIATTELLI A, FERRI M, MESA NF, APAZA ALCCAYHUAMAN KA, BOTTICELLI D
SINUS FLOOR ELEVATION AND ANTROSTOMY HEALING: A HISTOMORPHOMETRIC CLINICAL STUDY IN HUMANS.
IMPLANT DENT. 2019 DEC;28(6):537-542

N° 192 - ADILOGLU S, GIRAY CB, KULAC I, USUBUTUN A, AKTAS A
CLINICAL AND HISTOPATHOLOGICAL COMPARATIVE STUDY OF TWO EQUINE-DERIVED BONE GRAFT: A HUMAN STUDY.
J PAK MED ASSOC. 2019 NOV;69(11):1617-1622

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.
INT J ORAL MAXILLOFAC IMPLANTS. 2020 JUL/AUG;35(4):808-815

N° 211 - FELICE P, BARAUSSE C, DAVÓ R, PISTILLI R, MARTI PAGES C, FERRER FUERTES A, FERRI A
IMMEDIATELY LOADED ZYGOMATIC IMPLANTS VERSUS CONVENTIONAL DENTAL IMPLANTS IN AUGMENTED ATROPHIC MAXILLAE: THREE-YEAR POST-LOADING RESULTS FROM A MULTICENTRE RANDOMISED CONTROLLED TRIAL.
CLINICAL TRIALS IN DENTISTRY, 2020;02(3):5-25

N° 222 - LOPEZ MA, PASSARELLI PC, RELLA E, ALTAMURA FR, SANTACROCE L, CASALE M, D'ADDONA A
SINUS PACK FOR MAXILLARY SINUS AUGMENTATION: A NEW TECHNIQUE.
J OSSEOINTEGR, 2021;13(2):51-55

N° 253 - CORREIA F, POZZA DH, GOUVEIA S, FELINO AC, FARIA-ALMEIDA R
ADVANTAGES OF PORCINE XENOGRAFT OVER AUTOGRAFT IN SINUS LIFT: A RANDOMISED CLINICAL TRIAL.
MATERIALS (BASEL). 2021 JUN 21;14(12):3439

N° 256 - COMUZZI L, TUMEDEI M, PIATTELLI A, TARTAGLIA G, DEL FABBRO M
RADIOGRAPHIC ANALYSIS OF GRAFT DIMENSIONAL CHANGES AFTER LATERAL MAXILLARY SINUS AUGMENTATION WITH HETEROLOGOUS MATERIALS AND SIMULTANEOUS IMPLANT PLACEMENT: A RETROSPECTIVE STUDY IN 18 PATIENTS.
MATERIALS (BASEL), 2022 APR 22;15(9):3056

N° 257 - PISTILLI R, CANULLO L, PESCE P, PISTILLI V, CAPONIO C, SBRICOLI L
GUIDED IMPLANT SURGERY AND SINUS LIFT IN SEVERELY RESORBED MAXILLAE: A RETROSPECTIVE CLINICAL STUDY WITH UP TO 10 YEARS OF FOLLOW-UP.
J DENT. 2022 APR 21;121:104137

N° 262 - MORIMOTO A, KOBAYASHI N, FERRI M, IEZZI G, PIATTELLI A, FORTICH MESA N, BOTTICELLI D
INFLUENCE ON IMPLANT BONE HEALING OF A COLLAGEN MEMBRANE PLACED SUBJACENT THE SINUS MUCOSA-A RANDOMIZED CLINICAL TRIAL ON SINUS FLOOR ELEVATION.
DENT J (BASEL). 2022 JUN 8;10(6):105

N° 264 - TETÈ S, ZIZZARI VL, VINCI R, ZARA S, DI TORE U, MANICA M, CATALDI A, MORTELLARO C, PIATTELLI A, GHERLONE E
EQUINE AND PORCINE BONE SUBSTITUTES IN MAXILLARY SINUS AUGMENTATION: A HISTOLOGICAL AND IMMUNOHISTOCHEMICAL ANALYSIS OF VEGF EXPRESSION.
J CRANIOFAC SURG. 2014 MAY;25(3):835-9

N° 272 - TETÈ S, ZIZZARI VL, VINCI R, ZARA S, DI TORE U, MANICA M, CATALDI A, MORTELLARO C, PIATTELLI A, GHERLONE E
EQUINE AND PORCINE BONE SUBSTITUTES IN MAXILLARY SINUS AUGMENTATION: A HISTOLOGICAL AND IMMUNOHISTOCHEMICAL ANALYSIS OF VEGF EXPRESSION.
J CRANIOFAC SURG. 2014 MAY;25(3):835-9

N° 283 - HIROTA A, IEZZI G, PIATTELLI A, FERRI M, TANAKA K, APAZA ALCCAYHUAMAN KA, BOTTICELLI D
INFLUENCE OF THE POSITION OF THE ANTROSTOMY IN SINUS FLOOR ELEVATION ON THE HEALING OF MINI-IMPLANTS: A RANDOMIZED CLINICAL TRIAL.
ORAL MAXILLOFAC SURG. 2020 SEP;24(3):299-308.

N° 287 - CORREIA F, GOUVEIA SA, POZZA DH, FELINO AC, FARIA-ALMEIDA R
A RANDOMIZED CLINICAL TRIAL COMPARING IMPLANTS PLACED IN TWO DIFFERENT BIOMATERIALS USED FOR MAXILLARY SINUS AUGMENTATION.
MATERIALS (BASEL). 2023; 16(3):1220.

N° 319 - CORREIA F, GOUVEIA S, FELINO AC, FARIA-ALMEIDA R, POZZA DH
MAXILLARY SINUS AUGMENTATION WITH XENOGENIC COLLAGEN-RETAINED HETEROLOGOUS CORTICO-CANCELLOUS BONE: A 3-YEAR FOLLOW-UP RANDOMIZED CONTROLLED TRIAL.
DENT J 2024, 12, 33

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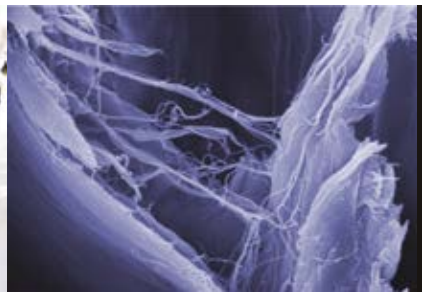

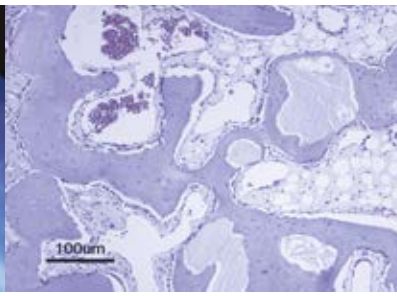

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