

## Background information

Beat Walkamm:

«In my practice I use the techniques originally described by Boyne and James (1) and by Tatum (2) for sinus floor augmentation with lateral access. To standardise it and thus improve the prognosis, I have simplified a few steps. The modifications concern mainly the incision, transmucosal implant healing and complete removal of the bone wall in the sense of an antrostomy.»

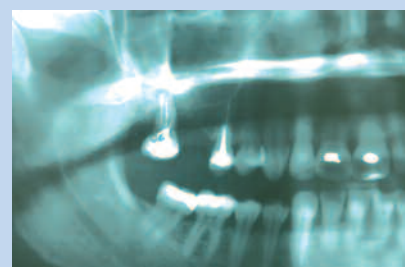
## 2. Main emphasis of this case presentation

- > Clinical procedure in standard cases when there are complications with the sinus membrane and septa.

## 3. Surgical procedure on the basis of different cases

**Case A (A1 – A18): Standard clinical procedure, step by step.** 45 year old patient, healthy, nonsmoker.

**Cases B, C, D, E: pictures from these cases to illustrate alternative situations.**



**A1** Initial radiological situation prior to extraction of tooth 17 because of apical and marginal periodontitis. Tooth 16 was lost years previously.



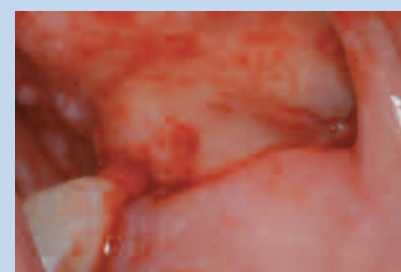
**A2** 3 months after extraction of tooth 17. On the radiograph, residual bone thickness of 5 mm can be seen in position 16 and 6 mm in position 17. A one-stage procedure with lateral approach to the sinus is therefore indicated. Implant planning with film on the OPG.



**A3** Initial preoperative clinical situation



**A4** Free end situation: Alveolar ridge incision with V-shaped releasing incision



**A5** Mesial releasing incision: C-shaped mesio buccal incision over the mesial adjacent tooth



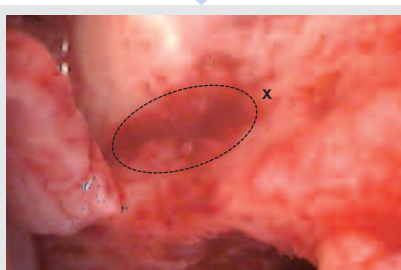
**A6** Raising the mucoperiosteal flap beyond the desired extent of the lateral fenestration. Autologous blood collected in a sterile disposable syringe.



**Alternative** Offset gap situation: Alveolar ridge incision with sulcal releasing incision mesially and distally (case C)



**Alternative** Mesial releasing incision: C-shaped mesio buccal incision over the mesial adjacent tooth or over the next mesial tooth if more space is needed. The papilla is divided at its base. (case B)



**Alternative** Raising the mucoperiosteal flap. The most apical part of the maxillary sinus (x) is located in the region of the so-called 'red zone'. (case B)

## Augmentation material

Beat Walkamm: «Sinus augmentation with Bio-Oss® alone can be carried out with a very good prognosis. This is shown by the literature (3 – 6). In my practice, I prefer to add a small amount of particulate autologous bone in a ratio of 0 – 50 % autologous bone to 50 – 100 % Bio-Oss®. After opening the operation field I obtain the bone from the adjacent bone walls using a bone scraper, especially through the proposed fenestration.»



**A7** Obtaining autologous bone chips with the Safescraper®

## Fenestration

Beat Walkamm: «Today I remove the buccal bone plate in practically every case. That way I can keep the access smaller, have more flexibility if there are septa and the risk of sinus membrane perforation is smaller. A possible disadvantage is the lack of osteogenic potential in the roof of the filled sinus lumen when the bone plate is folded in. Removal of the plate followed by repositioning at the lateral fenestration brings no advantage as this bone plate becomes necrotic anyway.»



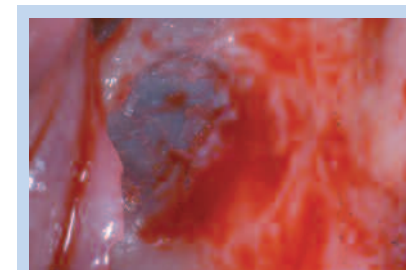
**A8** Preparation of the lateral fenestration with the round diamond bur (diameter 3 – 5 mm). Minimum size approx. 8 x 6 mm. Removal of the entire bone plate.

## Sinus membrane (Schneiderian membrane)

Beat Walkamm: «As soon as the bone wall has been removed from the sinus membrane, the thickness of this membrane and the difficulties associated with detaching it can be assessed.»



**Alternative** Relatively pale appearance: Rather thick membrane. (case B)



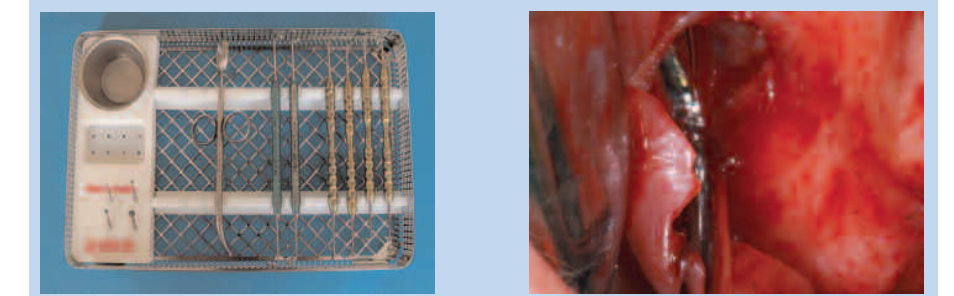
**A9** Membrane of medium thickness appears somewhat darker. (case A)



**Alternative** Rather thin membrane appears dark. (case C)

## Instruments

Beat Walkamm: «I use a basic implant tray from Hu-Friedy. The instruments for elevating the membrane are from Zepf and Friudent. They are available in different curvatures and have rounded ends.»



**A10** Elevating the sinus membrane with rotating movements

## Sinus membrane perforations

Beat Walkamm: «Perforations of the sinus membrane are a frequent complication of sinus floor augmentation. According to the literature, they occur in 35 – 40 % of cases (7, 8). I distinguish between small tears, medium-sized tears and large tears. To manage these tears, I select one of the following treatments depending on the size of the tear:

**Small tears:**  
(up to 5 mm)

Glue the membrane edges with Tissucol or a small piece of collagen membrane (Bio-Gide®). I do not regard Histoacryl as suitable as the glued site becomes relatively stiff.

**Medium-sized tears:**  
(up to about 20 mm)

Glue the edges with a piece of Bio-Gide® (finer compact side towards the sinus membrane). This technique has been described in the literature as the «Loma-Linda Technique» (9).

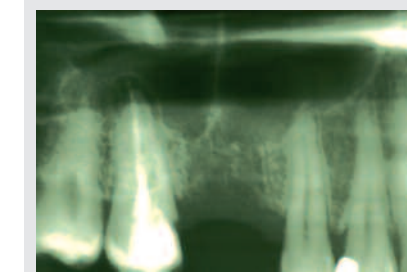
**Large tears:**  
(> 20mm)

If the membrane is no longer sufficient to close the tear, the operation is halted and the lateral fenestration is closed with Bio-Gide®. Repeat operation after 6 months.

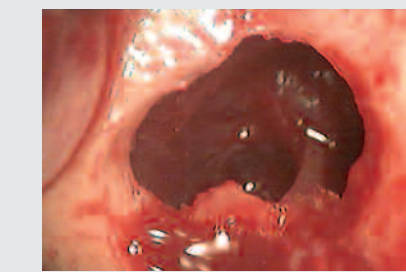
After stabilisation and closure of the tear, the sinus membrane is dissected off on the side away from the tear.»

## Bone septa

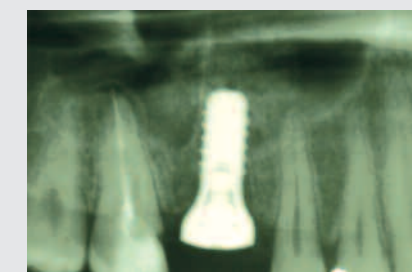
If there is a bone septum in the region of the planned implantation site, the bony window must be removed completely in every case (see sinus membrane, case B, page 3). The further procedure is as follows:



**Alternative** Septum in the implantation region. (case B)



**Alternative** Membrane preparation: 2 spaces are prepared mesial and distal to the septum. (case B)



**Alternative** Implant insertion: The implant can be inserted mesially, distally or even in the region of the septum. (case B)

## Further clinical procedure



**A11** Preparation with protective periosteal elevator

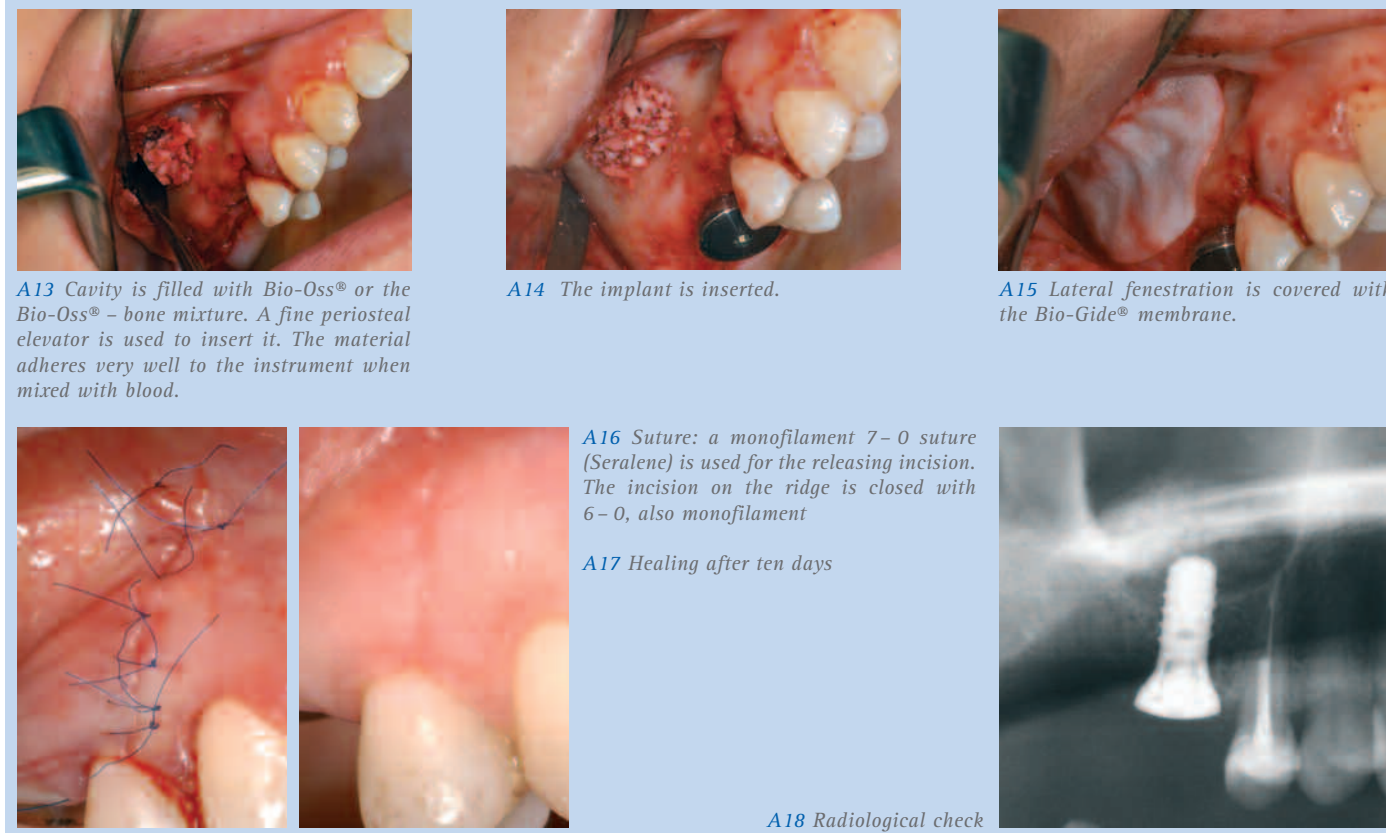


**A12** Checking with the indicator elevator



Indication sheet S1

# Sinus Floor Augmentation



A13 Cavity is filled with Bio-Oss® or the Bio-Oss® - bone mixture. A fine periosteal elevator is used to insert it. The material adheres very well to the instrument when mixed with blood.

A14 The implant is inserted.

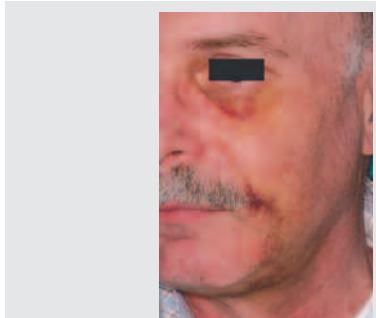
A15 Lateral fenestration is covered with the Bio-Gide® membrane.

A16 Suture: a monofilament 7-0 suture (Seralene) is used for the releasing incision. The incision on the ridge is closed with 6-0, also monofilament

A17 Healing after ten days

A18 Radiological check

## 4. Surgical aftercare



Alternative An occasional side effect is a haematoma in the cheek that can extend to below the eye. (case D)

<b>Medications</b>	- Rinse with 0.1% chlorhexidine for 4 weeks - Antibiotic therapy: amoxicillin / clavulanic acid 1000 mg twice a day for 3 days if penicillin allergic: Zithromax (azithromycin) 500 mg once a day for 3 days - Paracetamol 500 mg or ibuprofen 600 mg for pain - Local cooling
<b>Follow-up appointments</b>	- Week 1 (for suture removal) / Week 2 / Week 6
<b>Opening and taking the impression</b>	- Week 14

## 5. Long-term results

> The long-term prognosis for implants in an augmented sinus is very good (3, 10 - 13).

Alternative This case shows the radiological appearance 7.5 years after bilateral sinus lift. The probing depths around the implants are 2 - 4 mm. The patient was a risk patient, a smoker with loss of maxillary teeth because of periodontitis. The periodontitis in the mandible is under control. Fixed restoration is planned there too at a later stage. (case E)



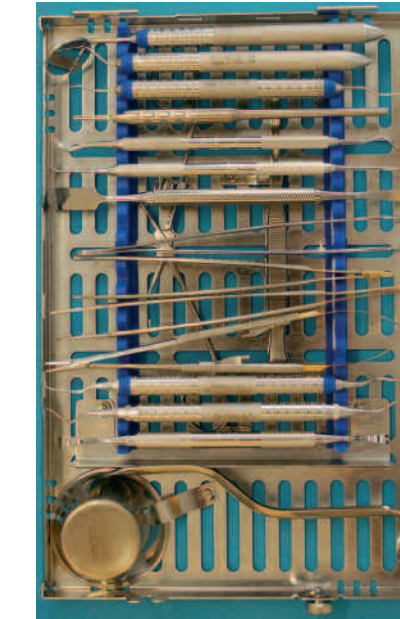
### Clinical procedure of Dr. Beat Walkamm, private practice, Langenthal CH

- > Sinus floor augmentation with lateral access and simultaneous implantation
- > Problems with sinus membrane and septum



## 1. Deciding criteria according to Beat Walkamm

Augmentation technique depending on residual bone thickness	<input type="checkbox"/> Standard implantation without augmentation: > 8 mm residual bone thickness <input type="checkbox"/> Osteotome technique: 6 - 7 mm residual bone thickness <input checked="" type="checkbox"/> One-stage, lateral access: 4 - 5 mm residual bone thickness <input type="checkbox"/> Two-stage, lateral access: < 4 mm residual bone thickness
Addition of autologous bone	<input checked="" type="checkbox"/> yes <input type="checkbox"/> no
Implant loading	<input type="checkbox"/> 2 months after augmentation and implantation <input checked="" type="checkbox"/> 4 months after augmentation and implantation <input type="checkbox"/> 6 months after augmentation and implantation



### Sources of supply

Implant tray	Hu-Friedy Mfg. Co., Inc. Rudolf-Diesel-Straße 8, D-69181 Leimen Tel. +49 (0) 62 24 / 97 00-0   Fax +49 (0) 62 24 / 97 00-98 <a href="http://www.hu-friedy.com">www.hu-friedy.com</a>   E-Mail: <a href="mailto:info@Hu-Friedy.de">info@Hu-Friedy.de</a>
Sinus instrument tray	A Helmut Zepf Medizintechnik GmbH Obere Hauptstrasse 16-22, D-78606 Seitingen-Oberflacht Tel.: +49/ (0) 7464 / 98 88 -0   Fax: +49/ (0) 7464 / 98 88-88 <a href="http://www.zepf-dental.com">www.zepf-dental.com</a>   E-Mail: <a href="mailto:info@zepf-dental.com">info@zepf-dental.com</a> B FRIADENT GmbH Steinzeugstr. 50, D-68229 Mannheim <a href="http://www.friadent.com">www.friadent.com</a>   Tel: +49 621 4302-000
Safescraper® / Micros®	Meta Via E. Villa n.7, 42100 Reggio Emilia, Italy <a href="http://www.metahosp.it">www.metahosp.it</a>   Tel: +39.0522.50.23.11   Fax +39.0522.50.23.3
Tissuol	Baxter One Baxter Parkway, Deerfield, IL 60015-4625, USA, <a href="http://www.baxter.com">www.baxter.com</a>
Seralene suture 6-0 / 7-0	SERAG-WIESSNER KG D-95119 Naila, Zum Kugelfang 8-12 <a href="http://www.serag-wiessner.com">www.serag-wiessner.com</a>   Tel 09282-937-0   Fax 09282-937-9369

## References

- Boyne P.J., James R.A. Grafting of the maxillary sinus floor with autogenous marrow and bone. J. Oral Surg. 1980, 38, 613-616
- Tatum H., Jr. Maxillary and sinus implant reconstructions. Dent Clin. North Am. 1986, 30, 207-229
- Valentini P., Abensur DJ. Maxillary sinus grafting with anorganic bovine bone: A clinical report of long-term results. J Oral Maxillofac Implants 2003, 18, 556-560.
- Hallman M., Sennerby L., Lundgren S. A clinical and histologic evaluation of implant integration in the posterior maxilla after sinus floor augmentation with autogenous bone, bovine hydroxyapatite, or a 20:80 mixture. J Oral Maxillofac Implants 2002, 17, 635-643.
- Artzi Z., Kozlovsky A., Nemcovsky CE., Weinreb M. The amount of newly formed bone in sinus grafting procedures depends on tissue depth as well as the type and residual amount of the grafted material. J Clin Periodontol 2005; 32:193-199.
- John HD., Wenz B. Histomorphometric analysis of natural bone mineral for maxillary sinus augmentation. Int J Oral Maxillofac Implants 2004, 19, 199-207
- Jensen J., Sindet-Petersen S.I., Oliver A.J. Varying treatment strategies for reconstruction of maxillary atrophy with implants: Results in 98 patients. J. Oral Maxillofac Surg. 1994, 52, 210 - 216
- Mazor Z., Peleg M., Gross M. Sinus augmentation for single-tooth replacement in the posterior maxilla: A 3 year follow up clinical report. Int. J. Oral Maxillofac Implants 1999, 14, 55-60
- Proussaefs P., Lozada J. The «Loma Linda Pouch»: A technique for repairing the perforated sinus membrane. Int. J. Periodontics Restorative Dent. 2003, 23, 593-597
- Scarano A., Pecora G., Piattelli M., Piattelli A. Osseointegration in a sinus augmented with bovine porous bone mineral: Histological results in an implant retrieved 4 years after insertion. A case report. J Periodontol 2004; 75:1161-1166
- Sartori S., Silvestri M., Forni F., Icaro Cornaglia A., Tesei P., Cattaneo V. Ten-year follow-up in a maxillary sinus augmentation using anorganic bovine bone (Bio-Oss®). A case report with histomorphometric evaluation. Clin Oral Impl Res. 2003, 14, 369-372.
- Valentini P., Abensur D., Wenz B., Peetz M., Schenk R. Sinus grafting with porous bone mineral (Bio-Oss®) for implant placement: A 5-year study on 15 patients. Int. J. Periodontics Restorative Dent. 2000, 20, 245-252
- Piattelli M., Favero G., Scarano A., Orsini G., Piattelli A. Bone reactions to anorganic bovine bone (Bio-Oss®) used in sinus augmentation procedures: a histologic long-term report of 20 cases in humans. Int J Oral Maxillofac Implants 1999, 14, 835-840

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