Repair of maxillary sinus lateral wall defect after Caldwell-Luc operation : 2 cases report with literature review

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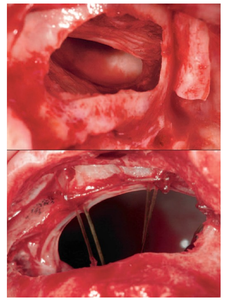
Introduction

- There are cases of advanced chronic sinusitis that persist despite repeated medication and endoscopic treatment or occur in patients with a history of sinus surgery decades ago. In these cases, partial curettage or Caldwell-Luc operations are performed to resolve the inflammation.
- However, after the inflammation subsides, the defect is often **covered only by mucosal tissue without the restoration of the bony wall**.
- To address such bone defects, we present two cases of **sinus wall reconstruction performed simultaneously with inflammation curettage**, accompanied by a review of the literature.

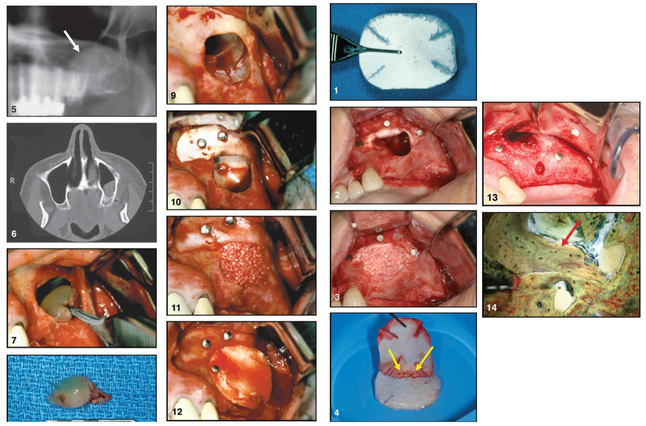


Epithelial regeneration ?

bony regeneration ?

<Literature review ; Repair method of maxillary sinus lateral wall defect >

PIKOS, Michael A. **Maxillary sinus membrane repair: update on technique for large and complete perforations.** Implant dentistry, 2008, 17.1: 24-31



TESTORI, Tiziano, et al. **Repair of large sinus membrane perforations using stabilized collagen barrier membranes: surgical techniques with histologic and radiographic evidence of success.** The International Journal of Periodontics & Restorative Dentistry, 2008, 28.1: 9-17.

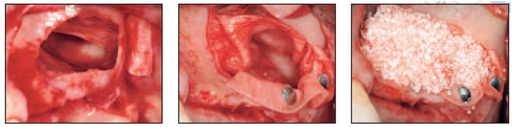
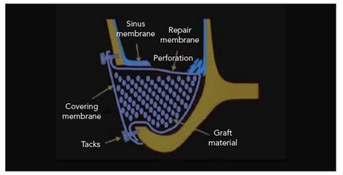


Fig 3a *View of large sinus membrane perforation.*

Fig 3b *Repair membrane is folded into the sinus, creating a pouch.*

Fig 3c *Xenograft is placed into the pouch.*

Fig 3d *Schematic drawing of the repair shown in Figs 3a to 3c.*



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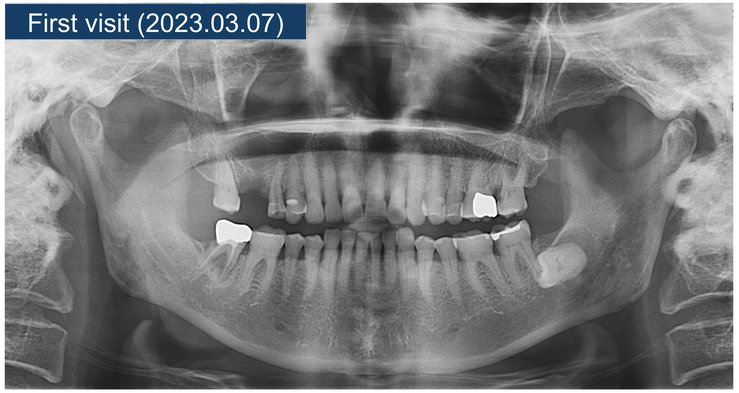
Case 1

- A 74-year old female underwent endodontic treatment of #16 and Incision and drainage due to buccal space abscess 1 month before visit, but after 3 days the symptom got worse therefore #16 was extracted and endodontic treatment of #15 was performed at local clinic.
- She was reffered from local clinic due to the inflammation and pus discharge with facial swelling in right sinus
- Her past dental history(PDH) included the Caldwell-Luc operation in right sinus at ENT clinic about 30 years ago.



- Impression) Chronic sinusitis, Rt. Mx.
- Treatment Plan) Rt. Sinus debridement & defected wall build up under MAC(Monitored Anesthesia Care)

<Surgical note > 2023.05.03

A. Right Sinus wall
- No bony wall status due to infection
- Performed intentional dissection with normal mucosa and inner membrane
- Debridement all infected tissue in sinus
- **Bone build up by Sandwich technique (layer by layer)**
  : Ti-mesh with + Legograft 0.5g & ICB 1g (Purgo Biologics)
  + bio-guide (Geistlich) resorbable membrane onlay

B. i16 implantation (simultaneously fixation)
- Residual bone height was 4mm
- Sinus lift with Legograft 0.5g and osteon3 (Dentium_6x10)
- i16(dentium superline 4.5x8 mm) fixation

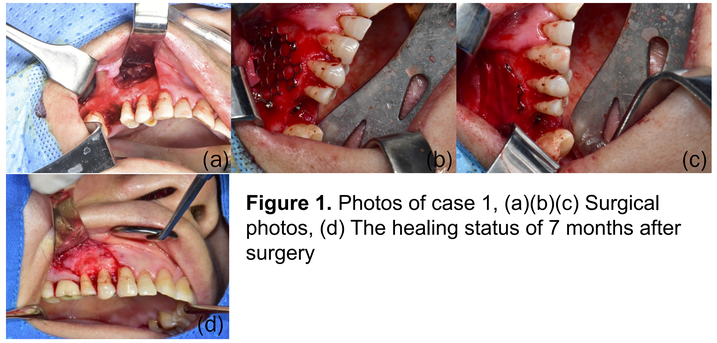


Figure 1. Photos of case 1, (a)(b)(c) Surgical photos, (d) The healing status of 7 months after surgery

<Schematic drawing of simultaneous surgery with sinus lift & implantation >

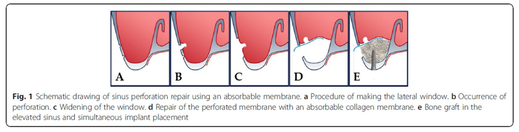


Fig. 1 Schematic drawing of sinus perforation repair using an absorbable membrane. **a** Procedure of making the lateral window. **b** Occurrence of perforation. **c** Widening of the window. **d** Repair of the perforated membrane with an absorbable collagen membrane. **e** Bone graft in the elevated sinus and simultaneous implant placement

◀ Kim et al. Maxillofacial Plastic and Reconstructive Surgery (2016) 38:50

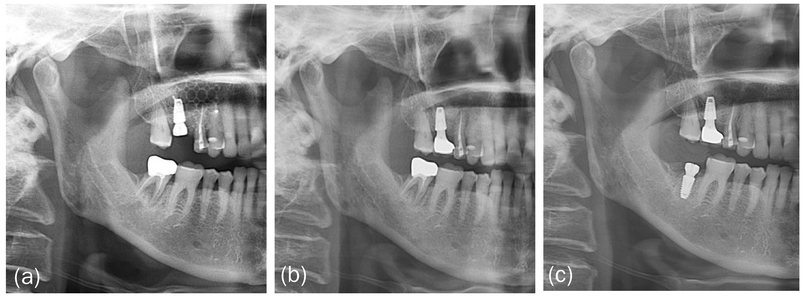


Figure 2. Panoramic view of case 1 patient ; (a) immediate post operation, (b) 7 months after surgery, (c) 14 months after surgery

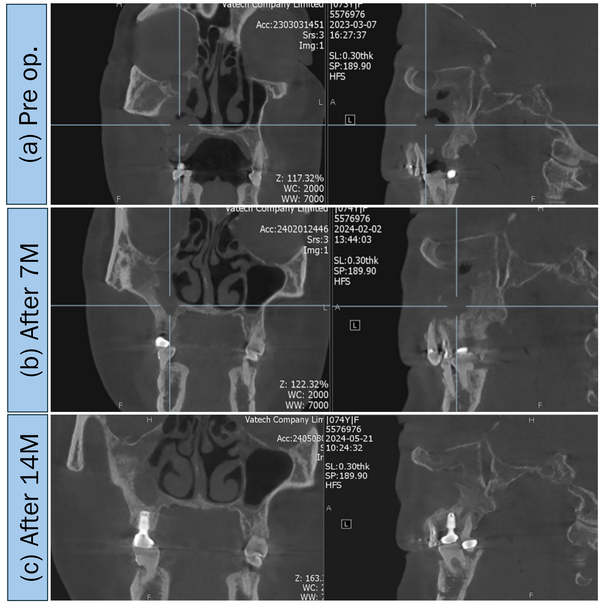


Figure 3. CT view – coronal view & sagittal view of case 1 patient ; (a) pre-operative view (b) 7 months after surgery, (c) 14 months after surgery

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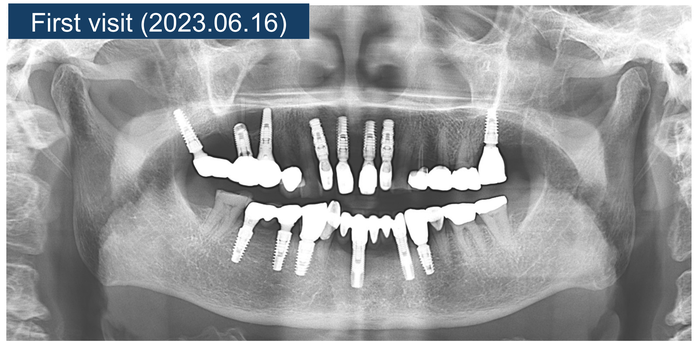
Case 2

- A 81-year-old female patient was referred from Prosthodontics for pus discharge and vestibular swelling at i16 implanted area
- Her past dental history(PDH) included the Caldwell-Luc operation in right sinus at ENT clinic about 30 years ago.
- Her implantation history included that i15, i16 were implanted in 2002 and i17 in 2007 consequently

First visit (2023.06.16)



- Impression) Vestibular space abscess, Mx. Rt. (sinus tract with i15, 16 area)
- Treatment Plan) Rt. Sinus debridement & defected wall build up under general anesthesia
- Incision & Drainage (2023.06.16)
- The result of pus culture)

  Much of Gram (+) cocci (a-streptococcus, staphylococcus epidermidis)

  Candida albicans
- The patient refused surgery due to bad general condition related to her old age, so the operation was delayed while the patient was being treated with antibiotics.

  Pus discharge through the fistula was alleviated/exacerbated repeatedly.

<Surgical note> 2023.10.04

- Performed intentional dissection with normal mucosa and inner membrane
- Right Sinus exploration & debridement
- i15, i16 fixture removal
- Biopsy result of Infected sinus membrane : Inflamed granulation tissue
- **Bone build up by Sandwich technique (layer by layer)**

  : Ti-mesh + Osteon3 1g(Dentium) & ICB 1g(Purgo Biologics)

  + EZ cure(Purgo Biologics) absorbable membrane onlay

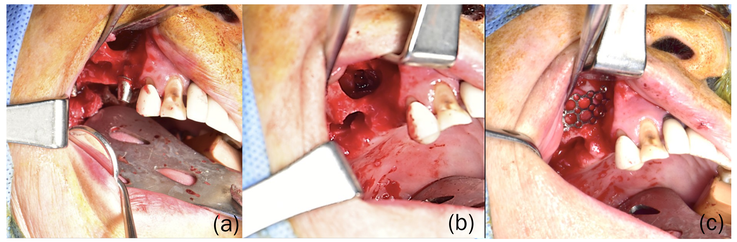


Figure 4. Photos of case 2. (a)(b)(c) Surgical photos, (d) Removed implants of i15, 16

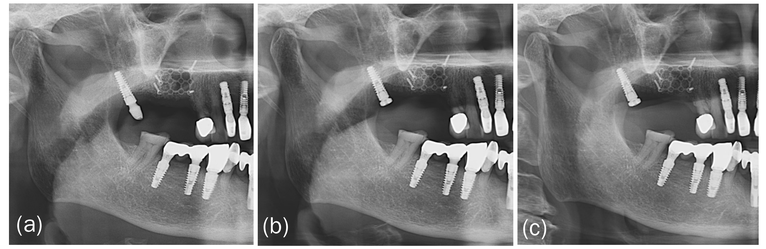


Figure 5. Panoramic view of case 2 patient ; (a) immediate post operation, (b) 10 months after surgery, (c) 14 months after surgery

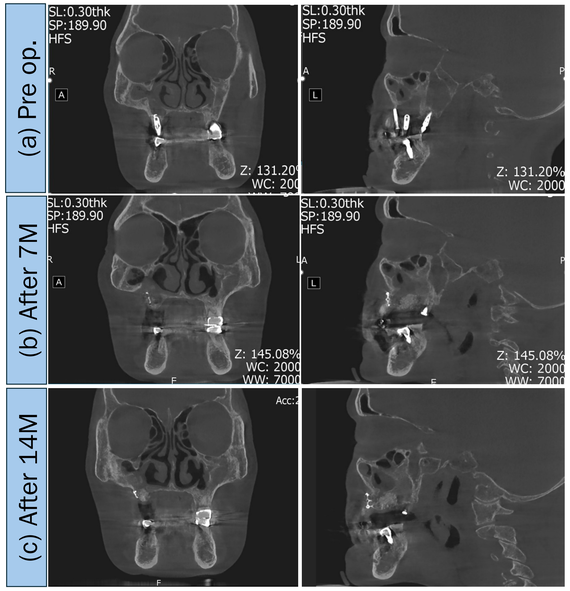


Figure 6. CT view – coronal view & sagittal view of case 2 patient ; (a) pre-operative view (b) 7 months after surgery, (c) 14 months after surgery

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Discussion & Conclusion

- Patients who have previously undergone the Caldwell-Luc operation typically exhibit a reduced sinus size. In cases of infection, the lateral sinus wall lacks bone tissue and consists solely of a soft tissue barrier adherent to the oral mucosa.
- Following debridement of the infected tissue, re-establishing a bony separation between the sinus and oral cavity becomes unfeasible. At this stage, bone reconstruction plays a crucial role, particularly if future implant placement is planned for the defect area. Additionally, reconstruction can contribute to a reduced risk of infection.
- In this study, bone regeneration was attempted using the **"sandwich technique"** at a recipient site where bone formation is challenging. The technique involved the following components:

Titanium mesh ✚ Gel type bone graft ✚ Resorbable membrane onlay

- Titanium mesh was utilized to prevent graft material displacement into the sinus. A moldable gel-type bone graft was employed to maintain stability and minimize migration into the sinus cavity. As the defect site lacked periosteum, a resorbable membrane was applied as an onlay to prevent epithelial migration.

- Limitations : Postoperative evaluation revealed clear evidence of bony wall regeneration. However, partial healing with fibrotic tissue was also observed.

- **Conclusion** : The key finding of this case report is that simultaneous surgical intervention enabled both debridement of inflamed tissue and sinus wall reconstruction. This approach facilitated the potential for future implant placement while also mitigating the risk of infection.

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1. *TESTORI, Tiziano, et al.* **Repair of large sinus membrane perforations using stabilized collagen barrier membranes: surgical techniques with histologic and radiographic evidence of success.** The International Journal of Periodontics & Restorative Dentistry, 2008, 28.1: 9-17.

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4. *Tawil, Georges, Peter Tawil, and Alexandre Khairallah.* "**Sinus Floor Elevation Using the Lateral Approach and Bone Window Repositioning I: Clinical and Radiographic Results in 102 Consecutively Treated Patients Followed from 1 to 5 Years.**" International Journal of Oral & Maxillofacial Implants 31.4 (2016).