



VIEWPOINT

Sinus Lift: Analysis of Schneiderian Membrane Perforations

Sir:

Complications appeared during or after the sinus membrane elevation are under meticulous investigation of different specialists.¹ Among peroperative ones are: sinus membrane perforation, hemorrhage/bleeding, buccal bone fracture, nonachievement of primary stability, and infraorbital nerve injury.¹ Postoperative complications are usually divided into acute and chronic:² bleeding, graft leak, wound opening, infections, endosinus extrusion of the implant, and modification of the mucosa.¹

According to Barone et al³ a Schneiderian membrane (*synonym*: mucoperiosteal lining of the maxillary sinus) perforation is the most common complication (noted in the 25 percent of performed sinus lifts). Some studies reported even 56 percent of perforation accidents.¹

Two different classifications of sinus membrane perforations are applied according to a 1) lateral or 2) transcrestal sinus floor elevation. In cases of lateral (*synonyms*: direct, open)⁴ lift the perforations are divided into IV Classes⁵ proposed by Fugazzotto and Vlassis in 2003 which became a simplified version of the 1999's V Classes Classification⁶ developed by the same authors.

The 2003's Classification by Fugazzotto and Vlassis includes Class I, II, III (which can be IIIA [along the lateral or cranial wall of the created window, when a

cavity to be augmented extends a minimum of 4–5 mm beyond the perforation with additional space for performance of a further osteotomy] and IIIB [the same as upon IIIA but without the additional space for osteotomy]), and IV.⁵

In cases of transcrestal lift the perforations are classified by Tavelli et al⁷ into three types:

- Type I_s – small perforation caused by an implant drill.
- Type I_l – large perforation caused by a drill.
- Type II – perforation caused by uncontrolled forces applied during Schneiderian membrane elevation or resulting from membrane collapse during grafting, with the consequent graft migration into the sinus.
- Type III – can occur during dental implant placement and be hidden by the implant body.

HOW TO AVOID PERFORATION?

Becker et al⁸ and Tourbah with Maarek¹ described the factors that can increase the risk of sinus membrane perforation: 1) previous entrance into the sinus (ie, scarring), 2) septa, 3) thin membrane, 4) soft tissue adhesion, 5) cyst/sinus pathology, 6) operator error, and 7) overfilling with the graft material

Kendrick insisted⁹ – to reducing risk of perforation can be achieved by the ultra-careful evaluation of

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preoperative CT for assessment of:

1. The thickness of the sinus bone wall.
2. Location of septa.
3. Membrane thickness: the incidence of perforation is higher when the thickness is less than 1.5 mm.¹

MANAGEMENT

Hernández-Alfaro et al¹⁰ in 2008, presented six solutions for the perforations: suturing (in 11 percent of cases), resorbable collagen membrane (42.30 percent), lamellar bone + resorbable collagen membrane (26.92 percent), lamellar bone (3.84 percent), lamellar bone + buccal fat pad (9.61 percent), and bone block graft (5.76 percent).

Barbu et al¹¹ in 2019 published their two management techniques for tearing: suturing (in 51 percent of cases) and sealing using a low-resorption

collagen membrane (in 49 percent).

Beck-Broichsitter et al¹² in 2020 reported their six ways of perforations' management: no treatment, suture, fibrin glue, collagen membrane, suture + fibrin glue, and suture + collagen membrane. In 56 percent of cases the perforation was covered by membrane and in 20 percent a suture with membrane was applied.

Thus, the results of all three groups of surgeons demonstrate a strong position (42.30, 49, and 56 percent) of resorbable collagen membrane application among other perforation restorative techniques.

In my practice the resorbable collagen membrane is a preventive measure used in all cases of the direct lift, regardless of whether there is a perforation or not (Fig 1). But we should remember the thesis highlighted by Younes and Boukaram: when the perforation reparation is impossible, the lift is aborted and reentry is planned after 3 months.¹³

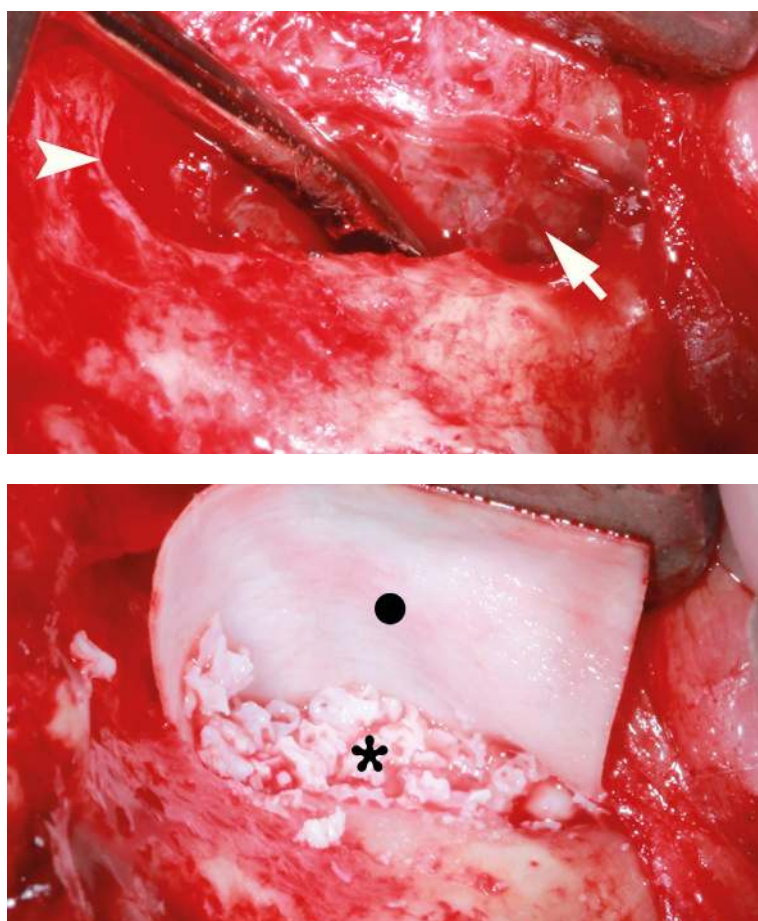


FIGURE 1. Uncomplicated lateral (arrowhead) sinus floor elevation (using a complete osteotomy design)⁴ in a 37-year-old male. No evidence of Schneiderian membrane (arrow) perforations (A) is noted. Bone grafting using spongy bone granules (1–2 mm granules) (asterisk) simultaneously with a 25 × 25-mm resorbable collagen membrane (dot) was used as a preventive measure (B).

PIEZOSURGERY

Considering the data that piezosurgery offers a 75 percent reduction in the expected Schneiderian membrane perforation rate, piezosurgery becomes a must have equipment for all clinics focused on sinus grafting.¹³ As for me, a prolonged transoperative time¹⁴ and a cost of piezosurgical equipment are only two minor disadvantages of that technology.

Summarizing the data, it's important to emphasize the importance of resorbable collagen membrane usage in cases of small (<5 mm), large (5–10 mm), and even complete sinus membrane tears (large dilacerations).¹ Collagen membrane usage even in non-perforated cases is highly recommended taking into account my own experience.

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REFERENCES

1. Tourbah B, Maarek H. Complications of maxillary sinus bone augmentation: prevention and management. In: Younes R, Nader N, Khoury G, editors. Sinus grafting techniques. Cham: Springer; 2015:195–233. https://doi.org/10.1007/978-3-319-11448-4_8
2. Kim J, Jang H. A review of complications of maxillary sinus augmentation and available treatment methods. *J Korean Assoc Oral Maxillofac Surg* 2019;45(4):220–4. <https://doi.org/10.5125/jkaoms.2019.45.4.220>
3. 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;21(1):81–5.
4. Nagorniak IV. Lateral sinus lift. *J Diagn Treat Oral Maxillofac Pathol* 2020;4(9):178. <https://doi.org/10.23999/j.dtop.2020.9.4>
5. Fugazzotto PA, Vlassis J. A simplified classification and repair system for sinus membrane perforations. *J Periodontol* 2003;74(10):1534–41. <https://doi.org/10.1902/jop.2003.74.10.1534>
6. Vlassis JM, Fugazzotto PA. A classification system for sinus membrane perforations during augmentation procedures with options for repair. *J Periodontol* 1999;70(6):692–9. <https://doi.org/10.1902/jop.1999.70.6.692>
7. Tavelli L, Borgonovo AE, Saleh MH, Ravidà A, Chan HL, Wang HL. Classification of sinus membrane perforations occurring during transcrestal sinus floor elevation and related treatment. *Int J Periodontics Restorative Dent* 2020;40(1):111–8. <https://doi.org/10.11607/prd.3602>
8. Becker ST, Terheyden H, Steinriede A, Behrens E, Springer I, Wiltfang J. Prospective observation of 41 perforations of the Schneiderian membrane during sinus floor elevation. *Clin Oral Implants Res* 2008;19(12):1285–9. <https://doi.org/10.1111/j.1600-0501.2008.01612.x>
9. Kendrick DE. Management of complications of sinus lift procedures. In: Tolstunov L, editor. Horizontal alveolar ridge augmentation in implant dentistry: a surgical manual. 1st ed. Hoboken, New Jersey: Wiley; 2016:194–8. <https://doi.org/10.1002/9781119082835.ch19>
10. Hernández-Alfaro F, Torradeflot MM, Marti C. Prevalence and management of Schneiderian membrane perforations during sinus-lift procedures. *Clin Oral Implants Res* 2008;19(1):91–8. <https://doi.org/10.1111/j.1600-0501.2007.01372.x>
11. Barbu HM, Iancu SA, Jarjour Mirea I, Mignogna MD, Samet N, Calvo-Guirado JL. Management of Schneiderian membrane perforations during sinus augmentation procedures: a preliminary comparison of two different approaches. *J Clin Med* 2019;8(9):1491. <https://doi.org/10.3390/jcm8091491>
12. Beck-Broichsitter BE, Gerle M, Wiltfang J, Becker ST. Perforation of the Schneiderian membrane during sinus floor elevation: a risk factor for long-term success of dental implants? *Oral Maxillofac Surg* 2020;24(2):151–6. <https://doi.org/10.1007/s10006-020-00829-8>
13. Younes R, Boukaram M. Lateral sinus grafting approach: overview and recent developments. In: Younes R, Nader N, Khoury G, editors. Sinus grafting techniques. Cham: Springer; 2015:65–103. https://doi.org/10.1007/978-3-319-11448-4_5
14. Comparison between piezosurgery and rotative instruments in maxillary sinus lifting. A systematic review. *Clin Oral Impl Res* 2017;28(S14):476. https://doi.org/10.1111/clr.473_13042