

## Educational Article

# Maxillary sinus floor augmentation and sinonasal polyposis: a multidisciplinary management

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**Abstract – Introduction** Maxillary sinus pathologies, such as sinonasal polyposis, is a risk factor for complications of maxillary sinus floor augmentation procedures or sinus lift. No studies in the literature have investigated sinus lift candidates with sinonasal polyposis. **Clinical case:** A 65-year-old woman was referred to oral surgery for implant rehabilitation at site 15. Sinus lift was indicated but sinonasal polyposis was diagnosed. After medical-surgical treatment of the sinonasal polyposis with an ear, nose and throat surgeon, sinus lift surgery was successfully performed. **Discussion:** Sinonasal polyposis is a diffuse chronic rhinosinusitis characterized by bilateral inflammatory polyps in nasal cavity or middle meatus. According to the latest guidelines of the French Society of Otorhinolaryngology and Head and Neck Surgery, the sinus lift surgery is possible with stable controlled sinonasal polyposis. **Conclusion:** Sinus lift surgery for patients with sinonasal polyposis is a multidisciplinary treatment involving ear, nose and throat and oral surgeons. Stable controlled sinonasal polyposis patients receive the same pre-implant management as healthy patients.

## Introduction

The maxillary sinus floor augmentation or sinus lift surgery is a highly successful bone graft procedure. However, infectious complications can occur. The literature identifies several risk factors [1]. These include the patient's health status, anatomical variations, dental infections, and a pre-existing rhinosinusitis disease.

Sinonasal polyposis (SNP) is a chronic diffuse rhinosinusitis (CRS) characterized by bilateral edematous polyps in the sinonasal mucosa. Polyps are pseudo-inflammatory tumors of varying number, size and topography. Depending on the severity of the disease, they can lead to a limitation or even total absence of the drainage of the maxillary sinuses by obstruction of the middle or superior meatus, whose permeability is a key element in sinus homeostasis.

According to the guidelines of the French Society of Otorhinolaryngology and Head and Neck Surgery (SFORL), SNP is a temporary contraindication to sinus lift procedures [2]. However, there are no studies on the pre-implant management of patients with SNP.

The purpose of this article is to present a protocol for the multidisciplinary management (ENT and oral surgeon) of patients with SNP who are candidates for sinus lift, illustrated with a clinical case.

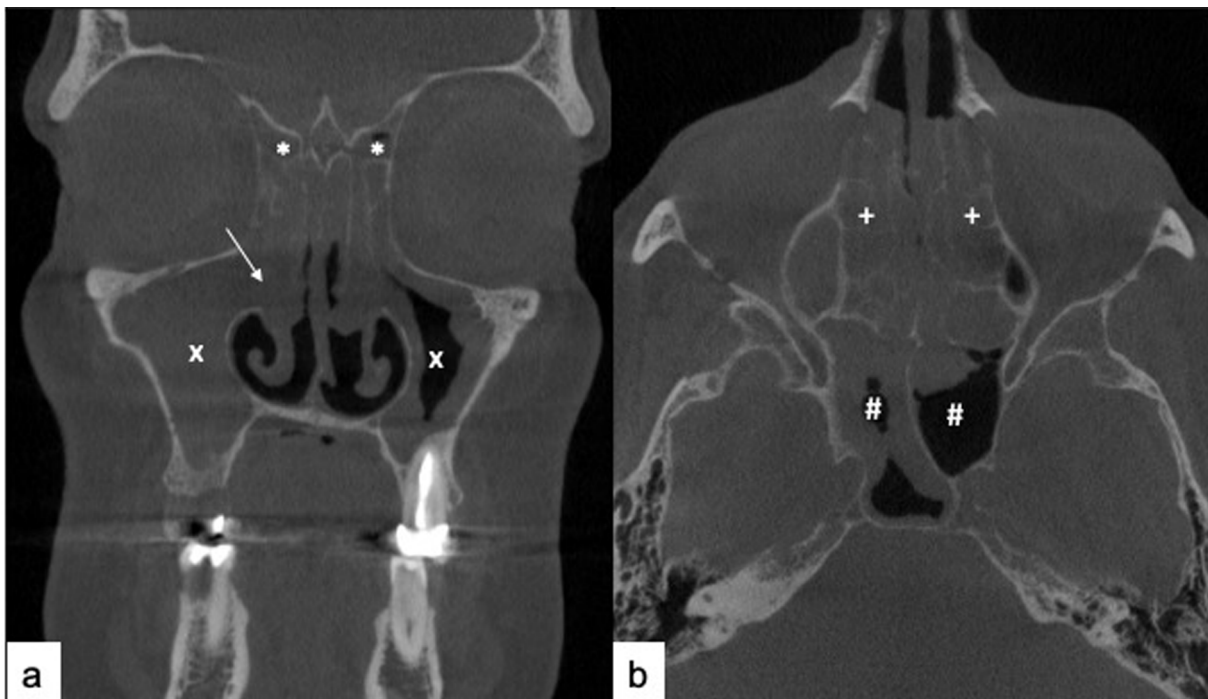
### Clinical case

A 65-year-old woman was referred to oral surgery for sinus lift at site 15. The patient's medical history included hypertension, chronic hearing loss, adenoidectomy, and appendectomy. She reported a history of chronic nasal congestion associated with a very disabling hyposmia. The initial CT scan (Fig. 1) revealed pansinus opacities with obstruction of the ostio-meatal. The bone ridge at site 15 showed a non-uniform remaining bone height ranging from 3 to 6 mm (Fig. 2). Because of the rhino-sinus symptoms and imaging findings, the patient was referred for otolaryngology (ENT) consultation.

Nasal endoscopy revealed stage 3 polyps on the left side and stage 2 on the right side confirming the diagnosis of SNP. Local corticosteroid therapy with fluticasone furoate (one spray in each nostril twice a day), combined with saline nasal washes (20 mL in each nasal cavity morning and evening), was initiated.

At 3 months follow-up appointment, the patient noticed a recurrence managed by the administration of systemic corticosteroids (prednisolone 40 mg in the morning for 7 days). Nasal

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**Fig. 1.** Initial CT scan of a 65-year-old female. She was referred for implant rehabilitation at site 15. CT scan revealed pan sinus opacities associated with chronic nasal congestion and severe disabling hyposmia. (a) Coronal section: opacities of the right frontal (\*) and maxillary (x) sinuses, and partially on the left side. Obstruction of the right middle meatus (arrow); (b) Axial section : opacities of the sphenoidal (#) and ethmoidal (+) sinuses.



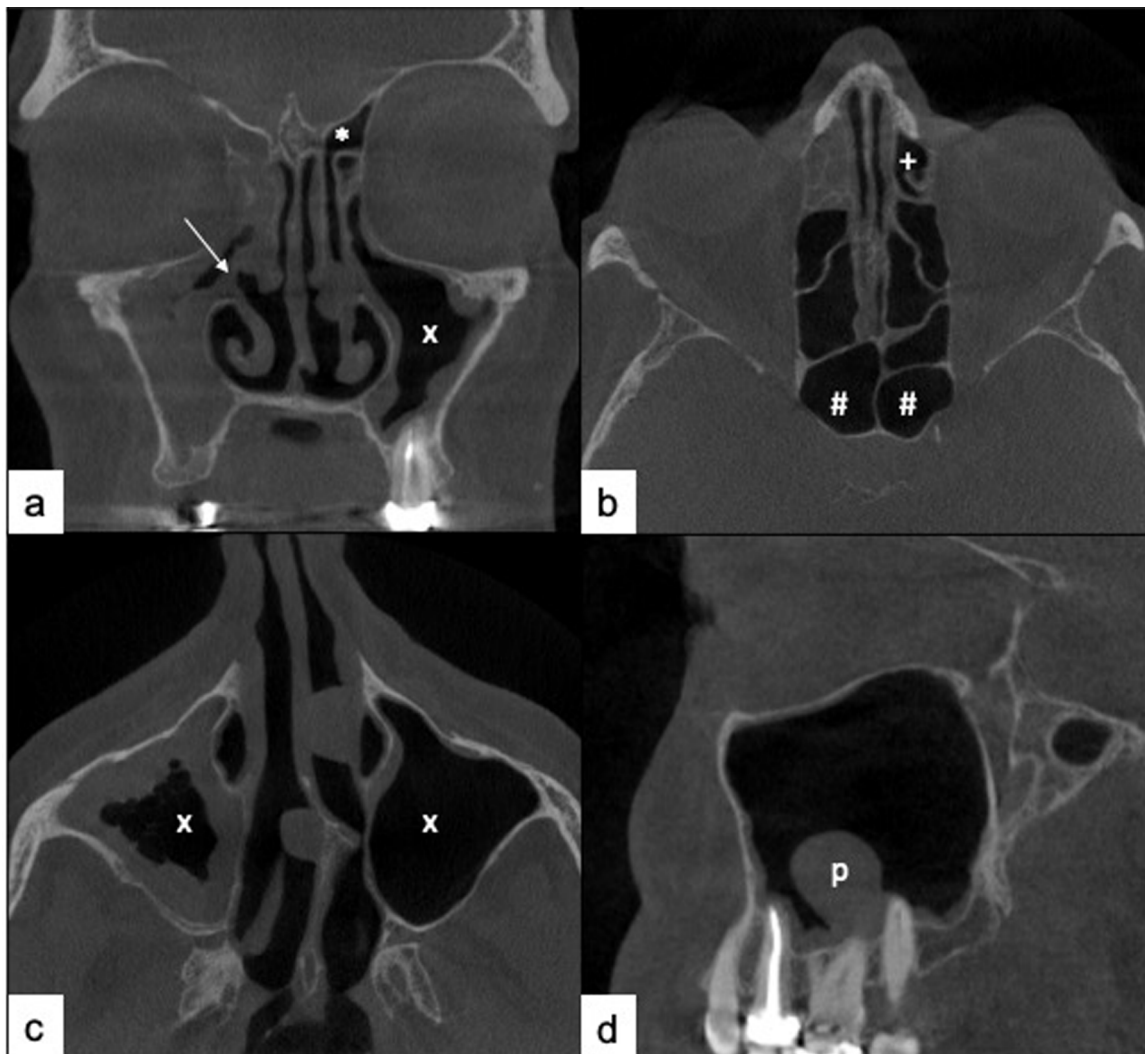
**Fig. 2.** Sagittal section of the 3D imaging of a right maxillary sinus. The residual bone height is evaluated from 3 to 6 millimeters. Sinus-lift surgery is indicated before implantation but the sinonasal polyposis temporarily contra-indicated the surgery. Ear, nose and throat specialist initiated a local corticosteroid therapy associated with nasal irrigations.

endoscopy performed 3 weeks after oral corticosteroid therapy revealed stage 1 polyps on the right side and stage 2 on the left side. CT scan showed a reduction in polyposis severity despite continued obstruction of the right meatus (Fig. 3) with persistent hyposmia.

ENT and oral surgeons reviewed the case and it was decided to proceed with bilateral polypectomy, middle meatotomy and anterior ethmoidectomy prior to sinus lift. Anatomopathological samples showed a respiratory-like layer of cells without any abnormalities, situated above a swollen and fibrous layer. This layer contained a large number of inflammatory eosinophilic polymorphs.

One month after the surgery, the patient’s sense of smell recovered to 80%. The nasal endoscopy showed patency of the middle meatus and absence of polyp. A CT scan at 3 months confirmed the permeability of the ostio-meatal complex and showed a non-obstructive polyp on the floor of the left maxillary sinus (Fig. 4). With the polyposis stabilized, pre-implant management was possible.

Sinus lift was performed under local anesthetic. Antibiotic prophylaxis was administered (amoxicillin 2 g starting 2 hours before surgery and followed by a dose of 1 g twice a day for 7 days after the surgery), combined with systemic corticosteroid therapy (started on the morning of the surgery, at a dose of 1mg/kg, and maintained for 3 days after the surgery). After local anesthesia, a vestibular mucoperiosteal flap was created with a crestal incision at site 15, as well as two additional incisions made distal to site 16 and mesial to 15. The lateral access window was delineated using a diamond burr attached to a handpiece, while being irrigated with saline solution. The sinus membrane was gradually separated using sinus curettes. As no perforation was observed, bone filling was performed using deproteinized particulate bone derived from



**Fig. 3.** CT scan 3 months after local and systemic corticosteroid therapy. (a) Coronal section : subnormal left frontal (\*) and maxillary sinuses (x). Right middle meatus obstruction (arrow); (b) Axial section : right ethmoidal cells (+) and sphenoid (#) are free; (c) Axial section : opacity of the right maxillary sinus; (d) Sagittal section : Stage 1 polyp in the left maxillary sinus (p). Insufficient improvement with disabling hyposmia: indication for bilateral polypectomy, middle meatotomy and anterior ethmoidectomy.

bovine sources (Bio-oss®) (Fig. 5). Post-operatively, local corticosteroids and nasal irrigation were continued. The patient underwent post-treatment assessment after 7 days and presented no nose or sinus-related complaints. One month after surgery, a CT scan confirmed the stability of the bone graft and the absence of sinus inflammation on the right side (Fig. 6).

## Discussion

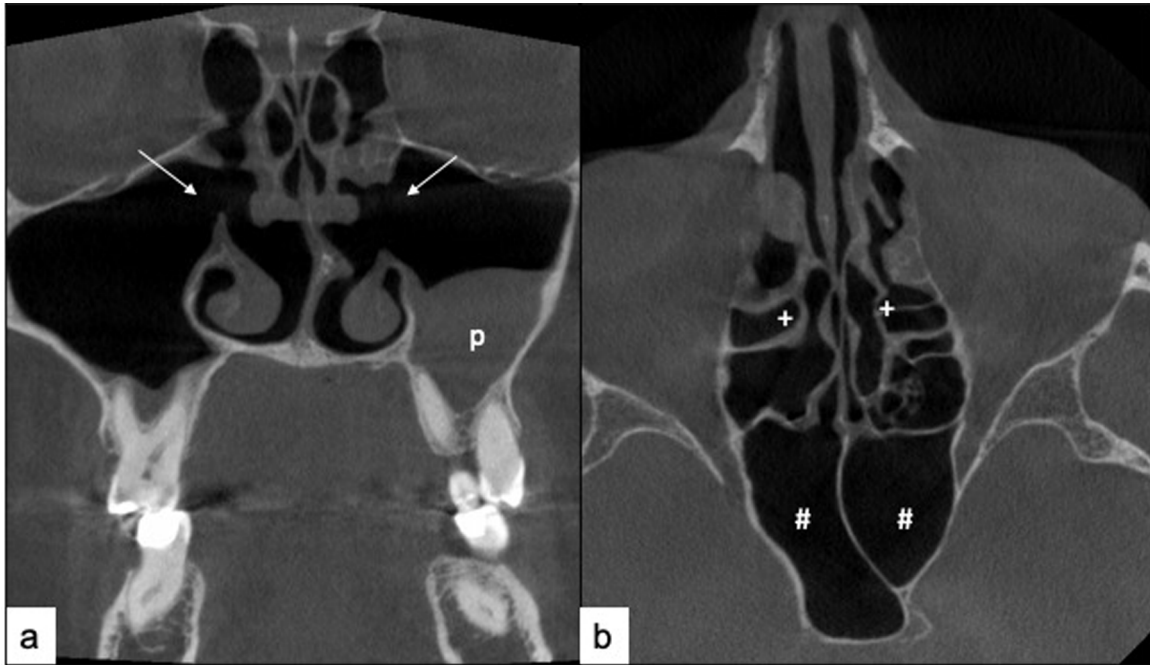
### Sinus-lift and SNP

Post-operative acute rhinosinusitis occurs as a complication in 8.4% of cases following a sinus lift [3]. It is more common in patients with a history of chronic rhinosinusitis (CRS) [4,5]. Thus, SNP can be considered as a risk factor for complications of sinus lift surgery. The prevalence of

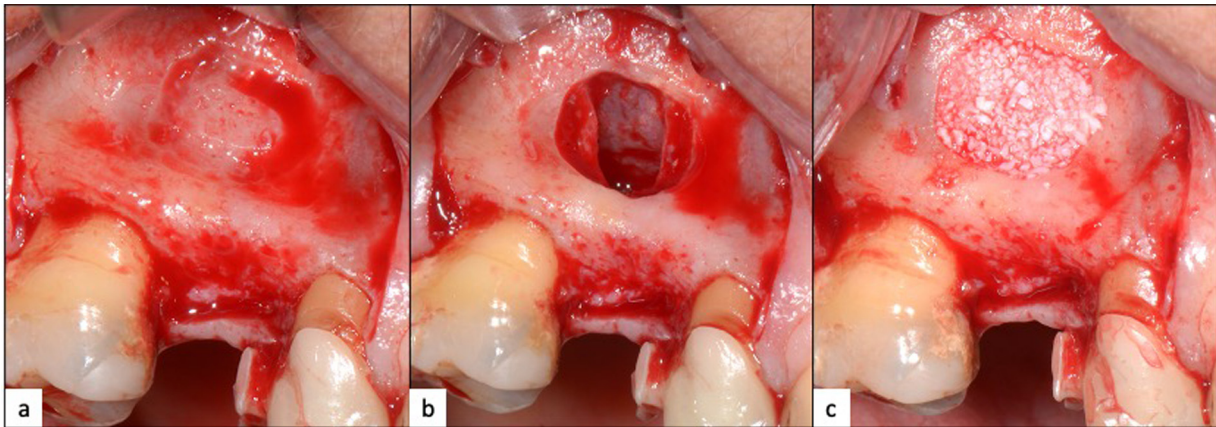
post-operative CRS is estimated to range from 4% to 8%. However literature remains limited and study populations are generally small [6].

### Treatment of SNP and stabilization criteria

According to SFORL recommendations, a sinus lift can be performed if ENT specialist confirms that polyposis is stabilized [2]. Continuous local corticosteroid therapy combined with saline nasal irrigation is the background treatment. Severe forms may be treated with short courses of systemic corticosteroid therapy (1 mg/kg prednisolone 7 to 15 days). If the infection worsens, broad-spectrum antibiotic treatment may be used [7]. Surgery is recommended if symptoms do not respond to oral corticosteroids or if more than 3 short courses of treatment are needed per year. Comprehending the



**Fig. 4.** CT scan 3 months after surgery. Healthy nasal endoscopy is associated with 80% recovery of sense of smell. (a) Permeabilization of both middle meatus (arrows). The right maxillary sinus is free. Persistence of a stage 1 non-obstructive polyp of the floor of the left maxillary sinus (p); (b) Ethmoidal (+) and sphenoidal (#) sinuses are free. The SNP is controlled and sinus lift surgery can be performed.



**Fig. 5.** Surgical protocol. Wide-spectrum preoperative antibiotic prophylaxis associated with corticosteroid therapy were initiated before the surgery. (a) Lateral access window was created with a diamond ball burr with saline irrigation ; (b) The sinus membrane was carefully elevated from proximal to distal using sinus curettes, with no orbiting perforation; (c) Filling with deproteinized bovine bone (Bio-oss®).

pathophysiological mechanisms of SNP has resulted in therapeutic progress through biotherapy, creating new possibilities in patient care.

The literature reports recurrence rates ranging from 5% to 40%, often limited to the anterior ethmoidal area. SNP is considered stabilized if symptoms and quality of life have improved, and the number of short courses of systemic corticosteroid therapy is 3 or fewer per year.

### Pre-implant radiographic assessment

Maxillary cone beam CT, which includes imaging of the maxillary sinus and ostiomeatal complex, is the gold-standard for pre-implant analysis due to its accuracy and lower radiation exposure. The incidental discovery of a radiological image in the maxillary sinus is common in pre-implant assessments [8] and estimated at 63.5% according to the study by Salari *et al.*



**Fig. 6.** Postoperative CT scan. Coronal section of CT scan 3 weeks after sinus lift showing graft (g) stability and absence of sinus inflammatory reaction. The patient was asymptomatic.

The most frequently encountered pathology is mucosal thickening (31.4%) [9]. A mucosal thickening of 2–3 millimeters is considered healthy [2]. SNP corresponds to bilateral diffuse, non-specific opacities with possible meatus obstructions but there are also cases of unilateral involvement (Fig. 2). It should be performed at least 1 month after corticosteroid therapy, to avoid minimizing the damage, and at least 1 month after an episode of exacerbation, to avoid increasing the severity of the disease.

### Antibioprophylaxis

Prophylactic antibiotic therapy is recommended for all patients undergoing a sinus lift [10]. The graft is placed in a septic environment (oral bacterial flora), thus antibiotic therapy for 7 days after the surgery seems to be relevant, especially in patients with SNP. Hemosinus is frequently observed after sinus lift procedures, which also justifies the need for antibiotic treatment after the surgery [2].

Literature remains heterogeneous regarding the molecule selections. French National Agency for Medicines and Health Products Safety (AFFSAPS 2011) [10] recommends the use of amoxicillin but some authors prefer wide-spectrum antibiotic prophylaxis with amoxicillin and clavulanic acid [11]. Moreover, the first-line treatment of acute rhinosinusitis, which is an apprehended complication, is also based on broad-spectrum antibiotic therapy [12].

### Surgical protocol

Surgical protocol, as presented in our clinical case, is identical to that used for patients with no history of polyposis.

### Follow-up

Patients with SNP can be scheduled for follow-up appointments at 15 days and 1 month, as the sinus mucosa typically heals within 3 weeks [2]. A cone-beam CT can be used to assess the graft's stability and the presence of any pathological inflammation in the sinus mucosa. The patient will only be examined by the oral surgeon and ENT specialist if there is a worsening of rhinosinus symptoms, with imaging.

### Conclusion

Sinus lift surgery can be performed for patients with well-managed SNP. A multidisciplinary approach and dialogue between otolaryngologists and oral surgeons/dentists are necessary. The pre-implant management of these patients is similar as that of patients without a history of SNP. However, increased vigilance will be necessary during follow-up to detect any recurrence that could jeopardize the success of the reconstruction. A retrospective study of patients with SNP who have undergone sinus lift surgery could be of interest.

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### Conflicts of interest

The authors do not declare any conflicts of interest.

### Data availability statement

The data were extracted from publicly available studies accessed through the Medline® (PubMed).

### References

1. Valentini P, Hadchiti W, Abensur D, Testori T, Herman P. Maxillary sinus grafting: a proposal for avoidance of postoperative complications. *Ann ORal Maxillofac Surg* 2013;1:23–28.
2. De Gabory L, Catherine JH, Molinier-Blossier S, Lacan A, Castillo L, Russe P, *et al.* French Otorhinolaryngology Society (SFORL) good practice guidelines for dental implant surgery close to the maxillary sinus. *Eur Ann Otorhinolaryngol Head Neck Dis* 2020;137:53–58.
3. Schwarz L, Schiebel V, Hof M, Ulm C, Watzek G, Pommer B. Risk factors of membrane perforation and postoperative complications in sinus floor elevation surgery: review of 407 augmentation procedures. *J Oral Maxillofac Surg* 2015;73:1275–1282.
4. Kayabasoglu G, Nacar A, Altundag A, Cayonu M, Muhtarogullari M, Cingi C. A retrospective analysis of the relationship between rhinosinusitis and sinus lift dental implantation. *Head Face Med* 2014;10:53.
5. Timmenga NM, Raghoobar GM, Boering G, van Weissenbruch R. Maxillary sinus function after sinus lifts for the insertion of dental implants. *J Oral Maxillofac Surg* 1997;55:936–939.

6. Fischer JL, Riley CA, Kacker A. Sinonasal complications following the sinus lift procedure. *TJ* 2023;23:147–151.
7. Bartier S, Coste A, Béquignon E. Biotherapy and treatment of adult primary chronic rhinosinusitis with nasal polyps: cellular and molecular bases. *Eur Ann Otorhinolaryngol Head Neck Dis* 2021;138:355–362.
8. Friedland B, Metson R. A guide to recognizing maxillary sinus pathology and for deciding on further preoperative assessment prior to maxillary sinus augmentation. *Int J Periodontics Restorative Dent* 2014;34:807–815.
9. Salari A, Seyed Monir SE, Ostovarrad F, Samadnia AH, Naser Alavi F. The frequency of maxillary sinus pathologic findings in cone-beam computed tomography images of patients candidate for dental implant treatment. *J Adv Periodontol Implant Dent* 2021;13:2–6.
10. AFSSAPS (Agence Française de Sécurité Sanitaire des Produits de Santé) Recommandations de bonne pratique. Prescription des antibiotiques en pratique bucco-dentaire. [Internet]. Disponible sur: <https://ansm.sante.fr/uploads/2021/02/04/reco-prescription-des-antibiotiques-en-pratique-buccodentaire-septembre2011.pdf>
11. Testori T, Drago L, Wallace SS, Capelli M, Galli F, Zuffetti F, *et al.* Prevention and treatment of postoperative infections after sinus elevation surgery: clinical consensus and recommendations. *Int J Dent* 2012;2012:1–5.
12. Haute Autorité de Santé HAS. Choix et durée de l'antibiothérapie: Sinusite de l'adulte [Internet]. Saint-Denis La Plaine; 2021. Disponible sur: [https://www.has-sante.fr/jcms/c\\_2722806/fr/choix-et-duree-de-l-antibiotherapie-sinusite-de-l-adulte](https://www.has-sante.fr/jcms/c_2722806/fr/choix-et-duree-de-l-antibiotherapie-sinusite-de-l-adulte)

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