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Maxillary Sinus Foreign Body From an Unusual Source

Provisional Prosthesis Material

Daniel Sultan, D.D.S., M.D; Peter Balacky, D.D.S.; Peter Protzel, D.D.S., M.D.

ABSTRACT

Background: Antral foreign bodies disrupt normal sinus drainage and can lead to sinusitis and infection. These foreign bodies can arise from many sources, including several unique to the dental setting.

Case Description: Typical sources, like displaced teeth, roots and root canal filling materials, would be iatrogenically introduced at the time of sinus violation. However, we report the unusual case of displaced provisional prosthesis material introduced via a small and almost invisible oroantral fistula several years following extraction.

Practical Implications: In light of this case, we emphasize the importance of the Valsalva test to diagnose oral antral fistulas following extractions and prior to restoration.

A 28-year-old male presented to our office in 2020 with sinus pain and suppuration coming from a chronic oral antral fistula in the site of previously extracted tooth #14. Although there was a larger bony dehiscence underneath, the gingiva had mostly closed over the

fistula, to such an extent that only a pinpoint orifice was visualized. Tooth #14 was extracted four years prior, in 2016, by another dentist. The oral antral communication was likely created at that time.

The patient was symptom-free until this year. He had a three-unit bridge extending from tooth #13 to tooth #15 with a pontic covering edentulous site #14, which likely provided a partial seal over the fistula. Of note, mild opacification of the sinus can be seen on panoramic radiograph in 2016 (Figure 1).

By the end of 2019, due to recurrent decay, the bridge was removed and the caries were excavated. The teeth were then prepared for a new bridge, and a provisional prosthesis was fabricated using a bis-acrylic-based composite resin. The bis-acrylic resin came in a preloaded cartridge and was either directly injected around the prepared teeth and/or placed in a stent and placed over the prepared teeth and allowed to cure. Two weeks later, the final bridge was cemented in place.

The patient then returned in another two months with severe maxillary sinus pain and pressure, as well as hemopurulent discharge coming from under the bridge. A panoramic radiograph (Figure 2) and CT scan (Figure 3) revealed an antral foreign body and complete opacification of the left maxillary, ethmoid and frontal sinuses. Between visits, serial panoramic imaging showed rotation of the foreign body (Figure 4).

The bridge was sectioned and the pontic #14 was removed. The patient was taken to the operating room for the multidis-

ciplinary approach with oral and maxillofacial surgery and otolaryngology. A transnasal approach with functional endoscopic sinus surgery was utilized to remove the foreign body, and an intraoral approach for closure of the OAF was completed with a local buccal advancement flap (Figure 5). The retrieved foreign body was consistent with cured resin from the provisional prosthesis that was extruded through the fistula into the sinus (Figure 6).

At subsequent follow-up, the patient healed uneventfully and his symptoms had resolved.

Discussion

The floor of the maxillary sinus or antrum consists of the alveolar process and the hard palate. In the posterior maxilla, the bone of the antral floor can be very thin and in some cases the apices of the posterior teeth can project through this bone. In these cases, there may be paper-thin or no bone directly intervening, and the roots may be covered by only the Schneiderian membrane of respiratory epithelium which lines the maxillary sinus.^[1]

Due to the proximity of the roots and the thinness of the antral floor, an oral antral communication (OAC) can result from the extraction of the maxillary posterior teeth.^[2] An OAC is a pathological communication between the oral cavity and maxillary sinus through the loss of the soft tissues and hard tissues that normally separate these cavities. An oral antral fistula (OAF) results from the persistence of this communication as epithelialization occurs and a fistula is formed.^[3]

Cadaver studies have differed as to whether the second premolar^[4] or second molar^[5] are closest in proximity to the sinus. Interestingly, the first molar was found by multiple studies^[6,7] to be the most commonly extracted tooth resulting in an OAC, followed by the second molar, followed by the third molar and second premolar equally. The incidence may be related to not only the proximity but the difficulty of the extraction as well. It is a common complication with a reported incidence of 5%^[8] to 13%,^[9] although most are subclinical and heal spontaneously without intervention.^[10]

Spontaneous closure is less likely when the defect is greater than 5 mm.^[11] The incidence of persistent and clinically significant communications can be as little as 0.3% based on a retrospective study of nearly 30,000 extractions.^[7]

Great care must be taken during dental treatment not to introduce foreign bodies into the antrum via an OAC or OAF. The mechanical obstruction resulting from these foreign bodies disrupts normal sinus drainage and can lead to sinusitis and infection.^[12] While some patients remain asymptomatic, most present with symptoms of facial pain, nasal stuffiness and obstruction, purulent or blood-stained, foul-smelling discharge, postnasal drip, epistaxis, headache and tenderness over the involved sinus.^[13]



Figure 1. Panoramic radiograph in 2016 following extraction of tooth #14.



Figure 2. Panoramic radiograph in 2020 showing antral foreign body.



Figure 3. CT scan, coronal and axial views, in 2020 showing antral foreign body.



Figure 4. Serial panoramic radiograph in 2020 showing rotation of foreign body.



Figure 5. Intraoral approach for closure of the OAF via a local buccal advancement flap.



Figure 6. Retrieved foreign body consistent with cured resin.

In some cases, the antral foreign body can become calcified as mineral salts, especially calcium phosphate and calcium carbonate, precipitate and encrust the foreign body. This phenomenon is known as an antrolith. The core of the antrolith can be composed of endogenous normal or abnormal body tissues like teeth, blood or mucus, or the core could be of exogenous origin involving different materials originating from outside the body.^[13] However, antroliths are very rare, with only a few dozen reported cases described in the literature. Antral foreign bodies without incrustation are not rare, and these non-encrusted foreign bodies are not true antroliths despite sometimes being labeled as such.

The literature documents an impressive variety of displaced materials, including cotton,^[14] paper,^[15] snuff,^[16] glass,^[17] grass,^[18] matchsticks,^[18] and even, a living leech.^[19] In addition, there are several materials that uniquely arise in a dental setting, including dislodged teeth or roots, implants,^[20] dental burs,^[21] extruded calcium hydroxide,^[22] gutta-percha^[23] and impression material.^[24]

As displaced teeth, roots, implants, broken instruments and root canal filling materials would all be introduced at the time the acute communication is created, the complication would likely be detected by the clinician and treated immediately. On the other hand, provisional prosthesis and impression materials would likely be introduced by a second clinician unaware of the possibility of the communication many weeks, months or, even, years later. Further, these patients may have little or no symptoms alerting the second clinician, as in our case.

In light of this, we emphasize the importance of diagnosing sinus communications or fistulas both at the time of surgery and

prior to obtaining impressions and fabricating prostheses. At the time of extraction, the surgeon may notice the perforation directly if the exposure is 2 mm or greater. The sinus membrane may be noted at the apex of the extraction socket moving with respiration. However, for smaller communications, if suspected, one can utilize the Valsalva test.^[25] This can be accomplished by the patient pinching his or her nose and gently attempting to force air through the nostrils. As this is being performed, the surgeon should observe the surgical site closely for any air movement or bubbles emanating from the socket.^[26]

When detected, the communication should be repaired immediately or within 24 hours. There are various surgical techniques for its closure depending on the size of the defect and the presence of infection. Patients may also be prescribed antibiotics and decongestants to aid in healing and prevent infection. In the absence of sinus disease, immediate closure has high success rates for healing, approaching 95%.^[27] Larger defects that are either undiagnosed or left untreated will rarely heal on their own but, rather, will mature into an OAF.

Patients with chronic oral antral defects will generally experience symptoms of nasal regurgitation of liquid, altered nasal resonance, difficulty in sucking through a straw, unilateral nasal discharge, bad taste in the mouth, and a whistling sound while speaking. Some patients, however, will be asymptomatic. Therefore, careful clinical inspection of the healed extraction site is warranted. The fistula may appear as an orifice or a gingival defect, though it may be small and almost invisible. In some cases, the fistula appears not as an orifice but as a polyp or soft-tissue overgrowth. The Valsalva test should again be utilized where air or

a whistling sound may be detected. Air bubbles, blood or mucus discharge may also be seen emanating from the orifice. The escape of air can also be seen on a mouth mirror placed directly over the orifice causing it to fog.^[28] The Valsalva test, along with careful clinical inspection, is quick, easy to perform, and can effectively diagnose OAFs. In light of this case, we recommend its routine usage following extractions and again before obtaining impressions and fabricating prostheses. //

None of the authors reported any disclosures. Queries about this article can be directed to Dr. Sultan at dansulta@gmail.com, dansultan@northwell.edu, sultond2@nychhc.org.

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