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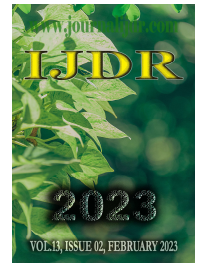
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CASE STUDY

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## SURGICAL APPROACH TO OROANTRAL COMMUNICATION DUE TO RESIDUAL ROOT INTRUSION IN THE MAXILLARY SINUS - CASE REPORT

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### ABSTRACT

The maxillary sinuses are pneumatic pyramidal cavities that can extend to the alveolar process, creating an intimate relationship between the root apex of the upper posterior teeth and its floor; therefore, in tooth extraction procedures, care must be taken not to generate a communication between the maxillary sinus and the intraoral environment, making it a route of infection. This work aims to show the dental community a form of treatment for oroantral communication induced by residual root intrusion in the maxillary sinus. Female patient, Caucasian, 53 years old, attended the Integrated Dental Clinic of the Dental School of Presidente Prudente, complaining of air coming out of the mouth. After anamnesis, clinical examination and radiographic examination, an oroantral communication was diagnosed in the region corresponding to tooth 26, due to intrusion of a residual root into the maxillary sinus. After clarifying the diagnosis and prognosis and signing the free and informed consent term, she will be submitted to the surgical procedure to close the oroantral communication and subsequent removal of the residual root inside the maxillary sinus. Due to the possibility that such an accident may occur via surgical procedures, especially when extracting posterior elements, it is of great importance for the dental surgeon to have complete mastery over the anatomy, as well as to have radiographic exams at hand that will help him throughout the entire procedure. Take special care when removing first molars and, if you suspect that you may have ruptured the sinus floor, be aware of the Valsalva technique.

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## INTRODUCTION

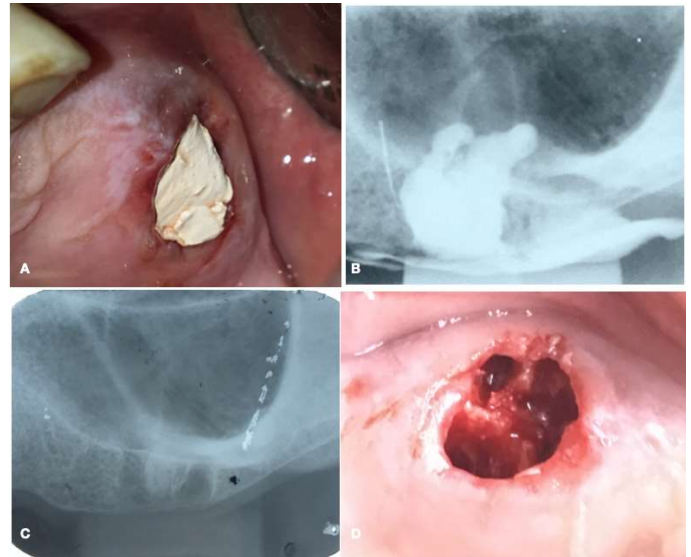
Located bilaterally inside the maxilla, below the orbits, above the alveolar process of the maxilla, laterally to the zygomatic apophysis and medially to the nasal cavity, the maxillary sinuses are extensive pneumatic pyramidal cavities, in addition to being the largest among the paranasal sinuses (Freitas, 2003 and Cordeiro, 2016). In adults, they vary in width from 25 to 35 mm, height from 36 to 45 mm and length measuring 38 to 45 mm (An, 2017). They are covered by a layer of pseudostratified ciliated epithelium, responsible for draining the mucus from the sinus to the sinus ostium, transporting it through the ethmoid infundibulum towards the semilunar hiatus and then towards the middle meatus. Through the middle, maxillary, ethmoid and frontal meatus, sinus secretions drain into the nasopharynx

(Mafee, 1991). Being able to vary in area, as well as format, due to its expansion capacity, it can extend to the edentulous spaces, reaching the alveolar process, thus creating an intimate relationship between the root apex of the posterior upper teeth and the sinus floor, covered only by a thin layer of cortical bone (Roque-Torres, 2016). Thus, in surgical procedures performed inadvertently, it can be a causal agent of communication between the oral cavity and the maxillary sinus (Hernando *et al.*, 2010; Filho, 2010; Scartezini, 2016 and Franco-Carro, 2011). This opening, in turn, becomes a pathway for pathological agents that subsequently cause infections in the antrum<sup>10-12</sup>. Bucosinusal communication (CBS), as it is called, may also occur as a result of other factors, such as benign or malignant maxillary pathological processes, inadequate positioning of osseointegrated implants, infections, and during endodontic or orthodontic procedures (Hernando *et al.*, 2010; Filho, 2010; Scartezini, 2016 and Franco-

Carro, 2011). If the CBS does not close spontaneously or surgically, remaining open for a period of 48-72 hours, migration of the buccal epithelium will occur along the entire perforation, which will begin to epithelize. This phenomenon is called oroantral fistula (FBS), which will progressively organize itself, thus preventing its healing and closure (Khandelwal, 2017 and Scattarella, 2010). Some symptoms are frequently reported by patients with FBS, who complain of nasal regurgitation of liquids, change in vocal timbre, disorders regarding the swallowing of liquids and food, halitosis, runny nose, altered taste, whistling sound when communicating, obstruction and runny nose on the affected side, acute or chronic maxillary sinusitis, and also a nocturnal cough due to drainage of exudate into the pharynx (Freitas, 2003 and Khandelwal, 2017). As for diagnosis, computed tomography is considered the gold standard, providing greater detail and allowing the image of anatomical structures not to overlap, however, other imaging tests, as well as periapical radiography, Water's radiography and orthopantomography, are capable of providing an estimate of the location and integrity of the lamina dura, the structure that separates the root apex from the floor of the maxillary sinus, in addition to the presence of any foreign body that has been dislodged into the antrum<sup>13</sup>. The latter, despite being its occurrence being rare, it occurs due to accidents with firearms or iatrogenesis in surgical procedures in which the dental root is displaced into the sinus (Scattarella *et al.*, 2010; Sverzut, 2005; Mahajan, 2004). Furthermore, the diagnosis can be aided by means of tactile-visual clinical procedures, where air bubbles, blood and/or purulent secretions around the orifice can be observed with the Valsalva Maneuver. This consists of forced expiration of air against the blocked nose, increasing the internal pressure in the antral region, which would generate such findings (Freitas, 2003 and Khandelwal, 2017). In general, when the CBS is smaller than 2 mm, its closure can happen spontaneously or through immediate surgical interventions, however in larger communications and when associated with infectious processes, the infection must first be treated and then perform the surgical procedure for its closure (Parvini, 2019; Ferreira, 2011; Filho, 2010). Therefore, due to the possibility of generating a CBS by intrusion of the residual root into the maxillary sinus during an exodontic procedure, this work aims to show the dental surgeon that in the event of this accident, the immediate surgical approach for closing the CBS with subsequent removal of the foreign body inside the maxillary sinus is feasible, with good results.

## CASE REPORT

Female patient, Caucasian, 53 years old, presented complaining of air coming out of the mouth. After the anamnesis, information was obtained that the patient did not have any underlying pathology or allergy and would have undergone a surgical procedure approximately eight hours ago, to extract tooth 26. However, during the attempt of this procedure, the responsible dentist he claimed not to have been successful in extracting all the roots, in addition to having accidentally intruded one of them into the maxillary sinus, thus justifying the patient's symptoms. The intra-oral clinical examination revealed an unsatisfactory hygiene condition, edentulous spaces, residual roots, dental caries, absence of suture in the operated region and filling of the alveolus in its entirety with surgical cement (Figure 1A). With the periapical radiography of the region, radiopacity of the alveolus was verified due to its filling with surgical cement, making it impossible to visualize the residual root and the loss of continuity of the radiopaque line of the floor of the maxillary sinus (Figure 1B). After removing the material from the interior of the alveolus, it was noted clinically and radiographically that the mesiobuccal root was still present, as well as an oroantral communication of approximately 2.0 mm in the region of the distobuccal root, with a suggestive image of it inside of the maxillary sinus (Figures 1C and 1D). After clarifying the diagnosis, prognosis and signing the informed consent form, the surgical procedure was performed. Considering the short period in which the communication lasted, its size and the clinical absence of infection, an immediate surgical intervention was performed to extract the mesiobuccal residual root, filling the alveolus with a blood clot, fibrin sponge and performing continuous spiral suture for clot stabilization (Figures 2A and 2B).



**Figure 1A - Initial condition: absence of suture in the operated region and filling of the alveolus in its entirety with surgical cement; 1B - radiopacity of the socket due to its filling with surgical cement; 1C - Mesiobuccal root inside the alveolus and suggestive image of the distobuccal root displaced inside the maxillary sinus; 1D - Appearance after removal of the surgical cement and the presence of the mesiobuccal root inside the alveolus**

After seven days, the suture was removed and a panoramic radiograph was requested to inspect the maxillary sinus, thus confirming the residual root inside (Figure 2C).

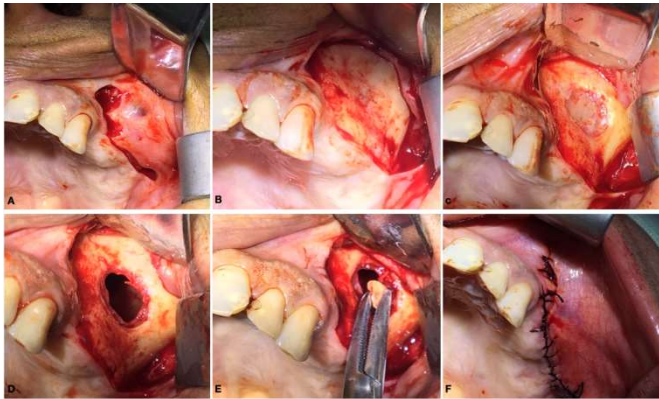


**Figure 2A. Extraction of the mesiobuccal root; 2B - Filling of the socket with blood clot, fibrin sponge and continuous spiral suture for maintenance and stabilization of the clot; 2C - Root apex inside the maxillary sinus**

Given the period of sixty days after surgery, consequent bone repair of the alveolus and closure of the oroantral communication, a second surgical procedure was performed to access the maxillary sinus and remove the residual root inside, a condition possible through the technique of Caldwell-Luc. For this purpose, anesthesia was performed by regional blockade of the posterior superior alveolar nerve and greater palatine nerve, trapezoidal incision in the alveolar ridge (Wasmund) and mucoperiosteal detachment, exposure of the anterior wall of the maxillary sinus, osteotomy with a diamond spherical drill number 4 mounted low rotation under copious irrigation of 0.9% saline solution and disruption of Schneider's



membrane, thus obtaining access to the maxillary sinus. After localization, the foreign body was removed with a hemostat, abundant irrigation of the maxillary sinus with 0.9% saline solution and closure of the surgical wound with simple stitches using Nylon 4-0 (Figure 3).



**Figure 3A.** Trapezoidal incision in the alveolar ridge (Wasmund); **3B** - exposure of the anterior wall of the maxillary sinus; **3C** - osteotomy and visualization of Schneider's membrane; **3D** - rupture of Schneider's membrane; **3E** - removal of the root with a hemostat; **3F** - Suture with 4-0 nylon



**Figure 4.** Radiographic control after 180 days

As soon as both surgical interventions were concluded, antibiotic therapy was used with Amoxicillin 500 mg associated with Metronidazole 400 mg, for seven days and Lisador 500mg for three days in the postoperative period, as well as guidance on post-surgery care. The patient's postoperative period was carried out after seven days, when a satisfactory healing condition and absence of unwanted signs and symptoms were observed. The patient was monitored monthly, and the final radiographic control was carried out after 180 days (Figure 4).

## DISCUSSION

The study presented in this article aimed to investigate and exemplify, through a clinical case, the relationship between pneumaized maxillary sinus and its disruption due to its proximity to the roots of posterior teeth; which, in turn, leads to the process described in the literature as Bucosinusual Communication. At first, it should be said that, although there is still a discussion regarding the location with the highest incidence of this complication, the literature has observed that the sites of predilection are, above all, the first molars, followed by the removal of second molars and, rarely, of third molars. There are also cases already observed of establishment of communication through perforation of the maxillary sinus floor by premolar roots<sup>1</sup>. The maxillary sinus, in turn, reaches its largest size after the third decade of life, especially when there are edentulous spaces in the arch<sup>6</sup>. This statement coincides with the case presented here in this article. Its etiology, although mainly caused by the dental extraction of posterior elements, can also result from the removal of cysts, iatrogenesis arising from curettage and pathological lesions. Trauma

and infections are also some explanations for such misfortune<sup>9</sup>. The case previously presented here indicated the need for surgically extracting the residual root and, for those circumstances in which there was the passage of foreign bodies into the maxillary sinus, the Caldwell-Luc technique has been implemented with great success, a since it allows the inspection and treatment of the sinus without much discomfort for the patient<sup>19</sup>. Also, in theory, when the CBS is smaller than 2 mm, its closure will happen spontaneously or through surgical interventions performed immediately after its origin. However, when these, after clinical analysis, are larger than 2 mm and/or when associated with infectious processes, the infection must be primarily treated and subsequently performed the surgical procedure for its closure<sup>10,17,18</sup>. Therefore, no surgical technique was chosen to remedy the communication itself. Only its accompaniment was really necessary here, due to its diameter.

## CONCLUSION

Due to the possibility that such an accident may occur via surgical procedures, especially when extracting posterior elements, it is of great importance for the dental surgeon to have complete mastery over the anatomy, as well as to have radiographic exams at hand that will help him throughout the entire procedure. Take special care when removing first molars and, if you suspect that you may have ruptured the sinus floor, be aware of the Valsalva technique.

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