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Combined Management of an Intrasinusal Dental Root Complicating a Second Molar Extraction: A Case Report

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Abstract | **Case Report**

Extraction of multi-rooted teeth may, in certain instances, result in multiple complications such as root fractures and the migration of dental roots into the maxillary sinus. We report a case of a dental root migration following a probable oro-antral communication occurring after dental avulsion, managed in our department. The patient had undergone extraction of his 27th tooth by a traditional healer, ten days before his admission, complicated by a neglected oro-antral communication. The panoramic radiograph performed in our department highlighted an oroantral communication and the presence of the 27th tooth's root in the maxillary sinus. A simultaneous surgical treatment of the two complications was performed, allowing the extraction of the root using the Caldwell-Luc approach and the repair of the oro antral barrier using a palatal flap. This case was compared to existing data in the literature. If the dental roots are exceeding 3 mm, or the oro-antral communications are exceeding 10 mm, or are associated to a maxillary antral pathology, a combined technique using septal cartilage or a bone flap after the extraction of the involved root, or a fat grafting or a buccal advancement flap can be very effective strengthening the tissue's support to close the defect. Antibiotic treatments and appropriate antifungals should also be administered before and after the surgical procedure.

Keywords: Tooth root migration, oro-antral communication, maxillary sinus, palatal flap, Caldwell-Luc approach.

INTRODUCTION

Dental extractions of multi-rooted teeth such as molars or premolars (especially maxillary) can in certain cases lead to complications such as root fracture and its migration into the maxillary sinus through a fistula or an oroantral communication (OAC) [1, 2]. Oro-antral communication refers to an abnormal connection between the oral cavity and the maxillary sinus. When this communication is covered by the epithelium, it is called a fistula. Diagnostic confirmation is obtained through imaging, which not only confirms the migration of the dental root but also enables the evaluation of the number, size, and location of the roots within the maxillary sinus. These fistulas or OAC, being a pathway for roots migration, can be repaired by either non-surgical and surgical techniques or both. In cases of complicated communications with bacterial or fungal maxillary sinusitis, simultaneous management of both conditions is crucial in order to heal the infection and prevent recurrence and complications [1-4].

This is an interesting case report of a migration of the 27th tooth's root after a dental extraction, treated by two distinct and simultaneous approaches taking into consideration the extraction of the responsible root, the location and the size of the defect which allowed this migration.

CASE REPORT

A 44-year-old patient with no significant medical history presented to our maxillofacial surgery department for the migration of a tooth's root from the left hemi-maxilla, probably following an oro-antral communication. An extraction of the 27th tooth had been performed by a traditional healer, ten days before his consultation. The procedure was carried out without any intraoperative complications according to the patient. After noticing a liquid passage from his oral cavity to his nasal cavity, the patient came to our structure for a specialized therapeutical care. Furthermore, he did not present any toxic habits (tobacco or alcohol consumption, etc.), or any clinical sign of sinusitis (cacosmia, rhinorrhea, facial pain or nasal obstruction). The clinical examination showed a normal color of the oral mucosa, without any suspicious lesions. The site of the extraction was in the process of healing without a

visible fistula or any signs of communication, and without the presence of pus and secretions. The palpation of the extraction site was slightly painful with a positive Valsalva sign. A panoramic x-ray was performed showing a dental root of the 27th tooth in the left antral cavity of maxillary, as well as an alveolar bone defect measuring 11 mm in a mesio-distal direction (Figure 1).

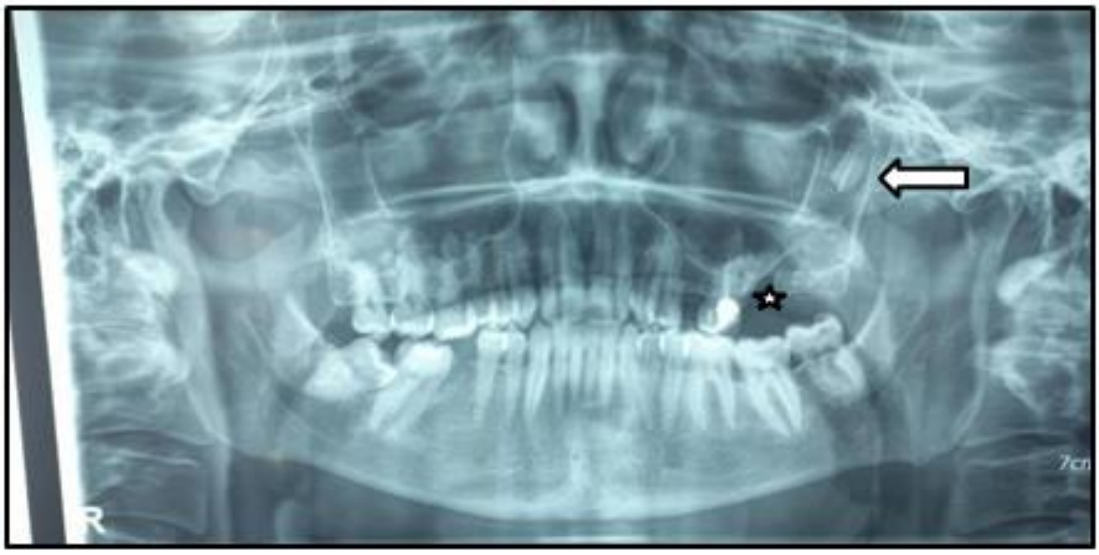

Figure 1: Panoramic radiograph showing: ➔ Dental Rooth, * 11mm bone defect

We have started an antibiotic therapy (Amoxicillin-Clavulanic Acid Association 1g, three times a day), accompanied by a recurrent nasal washing with saline water, and mouthwashes, 3 times a day. The surgical treatment consisted of a vestibular incision starting from the extraction site and going up to the 25th tooth, then we performed a mucoperiosteal detachment using a spatula. The access to the anterior wall of the maxillary sinus via the Caldwell-Luc approach (Figure 2) has allowed a curettage of the cavity and highlighted the responsible root (Figure 3). We also rinsed the maxillary cavity using a mixture saline solution and a metronidazol. As for the OAC, its closure was ensured using a mucoperiosteal advancement flap with a wide base from the palatal mucosa. The patient has continued his medical treatment in addition to oral corticosteroids, with prohibition of intense physical activities, which may increase intra-sinus pressure until healing and of blowing nose and sneezing with closed mouth for two weeks. We have advised the patient to consume only soft foods and liquids and to keep the wound clean by rinsing it with mouthwash daily. The clinical follow-up at seven days then at four weeks haven't revealed any complications and we have noticed a very good oro-sinusal healing.

Figure 2: Drilling the maxillary bone to create a bone flap

Figure 3: Extracted tooth's root

DISCUSSION

Dental extractions can lead to many complications (especially those involving upper molars and premolars), such as root fractures and oro-antral communication (OAC), and in rare cases, the migration of the extracted tooth's root into the sinus cavities [1-3]. Once an OAC is established, with or without a root migration, the oral epithelium can migrate to cover the communication, leading to an epithelialization. However, over time, the defect can sometimes evolve into a chronic fistulous tractus [3, 4].

Several predisposing factors may contribute to the migration of dental roots or even the development of an OAC, such as the use of excessive force during dental extractions, over-pneumatized sinuses, roots forming the floor of the maxillary sinus, divergent roots, posterior maxillary pathologies, and pre-existing sinusitis [4-6].

The second molar is responsible of 45% of OAC cases, followed by the third molars (30%) then the first molars (27.2%). Approximately 2.2% of first molar roots perforate the floor of the maxillary sinus, with only a few similar cases noted for the second molars [7]. The incidence of OAC is highest in the third and fourth decades of life, while it is lowest in the second decade [8]. On the other hand, the migration of dental roots is very rare [7, 8]. OAC can be classified based on their location: alveolo-antral, palato-antral, or antro-vestibular, and by their duration: recent communications, communications lasting more than 48 hours, and chronic communications [2, 9]. In our case, the OAC is classified as a chronic alveolo-antral communication.

The radiological examination uses the orthopantomogram, or the CT scan which allows a better knowledge of the size of the fistula, the bone structure and the maxillary sinus's mucosa (especially in chronical cases), as well as a three-dimensional localization of the root [12]. In our case, panoramic radiography was sufficient to make the diagnosis and to develop the surgical approach and indication.

Some rare cases of simultaneous occurrence of OAC and fungal sinusitis have been reported in the literature. Persistent communication between the oral cavity and the maxillary sinus can provide a pathway of entry for fungi as well as bacteria [9, 10]. This is the reason why a surgical treatment to close the defect is essential to avoid this complication. In our case, the suspicion of OAC as well as the presence of the root in the sinusal cavity were the major arguments for intra-sinusal extraction surgery and a reconstitution of the oral-sinus barrier. If left untreated, patients with an intra-sinusal foreign body and/or OAC can develop a maxillary sinus disease in 50% of cases within 48 hours and in 90% within two weeks. Defects larger than 5 mm or present for more than three weeks generally do not heal spontaneously and require surgical intervention to separate the oral mucosa and the maxillary antral mucosa [9-12]. In certain cases of dental root's migration into the maxillary sinus, therapeutic abstinence is recommended if the size is less than 3 mm and if no sign of infection has been reported [13]. In our case, surgical treatment was instituted, given the chronicity, the size of the defect (11mm) as well as the size of the tooth's root (exceeding 3 mm).

The management of complications following tooth extractions can be divided into non-surgical and surgical approaches. For communications ≤ 2 mm, non-invasive interventions can lead to closure by blood clot formation spontaneously. Other methods involve placing materials to act as mechanical barriers without flap closure. Synthetic grafts, fibrin glue, xenografts, and soft occlusal splints have all been used [3, 4]. For moderate size openings (2–6 mm), placement of gel foam with figure 8 sutures is recommended. Larger defects (>7 mm) generally can require advancement flap repair [3-5]. Surgical closure of the OAC has significant challenges, with long-term success depending on the

technique used, the size and the defect's location, vestibular depth and the presence of sinusal diseases [1, 2].

Regarding the migration of dental roots into the sinus, if the diagnosis is made before the alveolar healing, the crestal approach can be used in order to extract the fragment, this approach allows direct visualization of the fragment concerned but the main disadvantage of this approach is the risk of damaging the alveolar bone. If a migration is diagnosed after alveolar healing, the creation of a bone flap (window) or an endoscopic extraction can be discussed in order to remove the root from the maxillary sinus [13]. The Caldwell-Luc approach (creation of a bone window) remains the most used technique in order to have a complete access and to clearly visualize the fragment in the cavity, however it presents the risk of nerve damage. The endoscopic method through the anterior wall of the maxillary sinus or one of the middle or lower meatus is a minimally invasive and very reliable method compared to conventional ones, it allows access to the sinus cavity with good visibility while minimizing the risk of bleeding and nerve damage but it's efficiency depends on the operator and the equipment [1-3, 13]. Different surgical techniques for repairing the oral-sinus barrier exist, mainly involving local flaps (buccal and/or palatal), distant flaps (temporal muscle and tongue) with or without buccal fat grafts. Various materials, including autogenous bone or cartilage grafts, metal plates, and even synthetic materials, have been described [12]. Buccal fat flaps are particularly suitable for the closure of large posterior OAC, while buccal fat flaps are ideal for anterior communications [3, 12]. The technical choice of the extraction and repair approach are guided by several factors: the size and type of the defect, the nature and size of the intra-antral foreign body, the presence of infection, the morbidity of the donor site and the experience of the surgeon. The chosen method should facilitate the graft support and should minimize the risk of wound resorption or dehiscence [3, 4, 6, 11, 12]. Before any surgical procedure, it is crucial to treat underlying conditions such as: sinusitis or trauma. The first needed requirement is that the sinus must be completely free of any infection, with an established adequate nasal drainage. The second condition is that the closure must be achieved without tension, using a wide-based, well-vascularized soft tissue flap, positioned over an intact bone. For a successful closure of the communications or a complete extraction of the tooth's root, it is necessary to completely treat the fistulous tract, a sinus infections, a degenerated mucosa, and an affected bone [9-11].

In summary, our closure technique had provided an additional stability and support for the compromised alveolar bone while promoting a good vascularization of the graft. By using a bone flap (via the Caldwell-Luc approach) covered by the mucosal one, we ensured that the site was repaired, thus minimizing the risk of complications during the healing process. In the other hand, the combination of corticosteroids and antibiotic therapy ensured a perfect recovery for the patient without any significant signs of infection, following the recommendations in the literature [1-10, 12].

CONCLUSION

In conclusion, root's migration in the maxillary sinus following a tooth extraction constitutes a rare complication, which can have many significant repercussions on the patient's health. Since almost all posterior tooth extractions carry a high risk of OAC, a clinical and a paraclinical evaluation for each patient is essential before any therapeutic decision. If left untreated, the presence of dental roots with or without oro-antral communication can lead to a bacterial or a fungal sinusitis, compromising the spontaneous or the surgical closure of the communication.

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