The use of bone flap for removal of residual tooth root from the maxillary sinus

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ABSTRACT

Among the techniques to access the sinus cavity, the Caldwell-Luc approach has been extensively used since the 19 century. New techniques have been developed as an attempt to reduce morbidity caused by this type of surgery, but also trying to promote an excellent access to the cavity. This case report presents an alternative technique to the approach, through a bone flap, intending to remove a residual teeth root dislodged into the interior of maxillary sinus. This new technique offers adequate access and reduced associated morbidity.

Key words: maxillary sinus; residual root; oro-antral communications; oral surgery

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INTRODUCTION

Displacement of teeth, dental or instrumental remains to nearby anatomical structures is a possible complication in exodonty. Regarding the inferior teeth, projection of these elements may occur to the sublingual, submandibular and pterigomandibular spaces. Intervention in the superior arch may lead to invasion of the temporal, pterigomaxilar (Peterson et al., 1996), oral spaces and the maxillary sinus (Chooug & Choug, 1997); Gregori, 1996; Killey & Key, 1975 and 1964; Lee, 1978; Navarro, 1997; Peterson et al., 1996; Sims, 1985).

The projection of a dental fragment into the maxillary sinus may occur due to the close relation between the roots of the superior teeth and the sinus floor (Navarro, 1997). Most commonly there is just a thin cortical bone layer and the sinus mucosa separating these structures. Inade-

quate exodontic maneuvers and/or the use of inadequate instruments may provoke rupture of these structures and, thus, occurrence of such accident (Güven, 1998; Killey & Key, 1975; Lee, 1978; Navarro, 1997).

The most used surgical access to remove such foreign bodies from the maxillary sinus is that of Caldwell-Luc based on a wide ostectomy in the anterior wall of the maxilla. However, many sequelae are linked to this access, including sensory loss and chronic inflammatory and infectious picture (Lee, 1978; Choung & Choung, 1997). Choung & Choung (1997) demonstrated a technique based in an osteotomy that bounds a segment of the antero-lateral wall of the maxillary sinus, which is fractured and laterally displaced instead of being removed. The author signaled this procedure as vascularized bone flap and also emphasizes the advantages of this procedure.

In this study it is presented a clinical case of removal of dental fragment from the maxillary sinus using an access similar to the one reported by Choung & Choung (1997).

CASE REPORT

A white, 24 years old female was refered to the Surgical Clinics of the Dentistry School of the Sacred Heart University – Bauru, due to a projection of a residual dental root to the maxillary sinus occurred during the extraction of the first right superior molar. After four hours of the accident the case was clinically and radiographically evaluated. There was presence of sutures in the affected region as well as intralveolar blood cloth (FIGURE 1). Through an ortopantomography (FIGURE 2) the diagnosis was confirmed, identifying an apical remnant of one of the roots inside the maxillary sinus. In order to precise its localization, other projections were taken: posterior-anterior of the face (Caldwell), Waters' posterior-anterior, lateral telerradiography, occlusal and periapical.

FIGURE 1: Preoperative clinical aspect

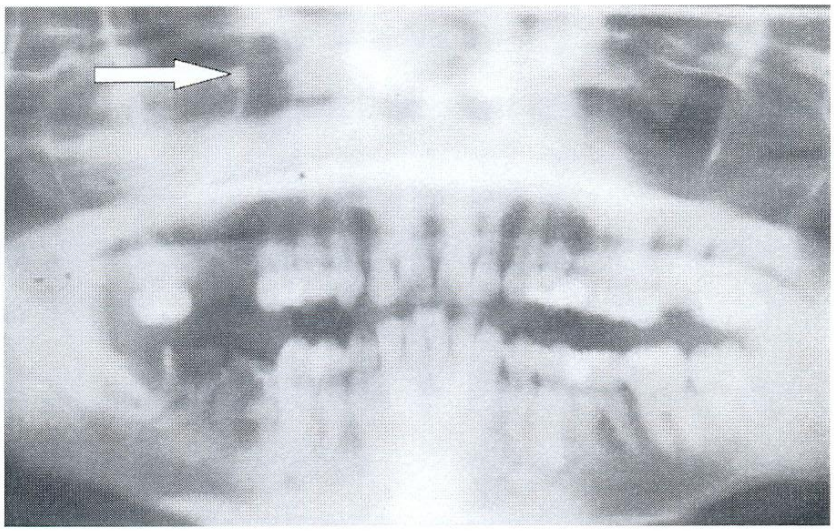

FIGURE 2: Panoramic radiographic view. Residual root in the superior and medial region of the right maxillary sinus (arrow).

Facing this clinical situation its was decided to surgically remove the residual root form the maxillary sinus. Antibiotics were started (amoxicilin 500 mg every 8 hours), topic nasal decongestionant and analgesic (dipirone). The surgery was set for the next day.

After infiltration of the posterior superior alveolar nerve and the superior anterior and medial alveolar nerves and the palatine mucosa with 2% mepivacaine cloridrate with epinephrine, a Newman incision was done with oblique and vertical loosening incisions in the mesial portion of the right superior canine. The mucoperiosteal layer was undermined exposing the lateral wall of the maxillary sinus (FIGURE 3). The osteotomy in the anterolateral wall was marked with a # 1/2 spherical bur on low rotation continuously irrigated with saline. Afterwards, with a 699 bur these holes were linked to each other in a "U" shape, leaving intact the superior region (FIGURE 4). With a curette the bone flap was displaced to the vestibular region taking care not to break the upper attachment. This was made possible by means of a careful green stick fracture (FIGURE 5). After inspection, an intrasinual clot was removed as well as the residual root inside the maxillary sinus (FIGURE 6).

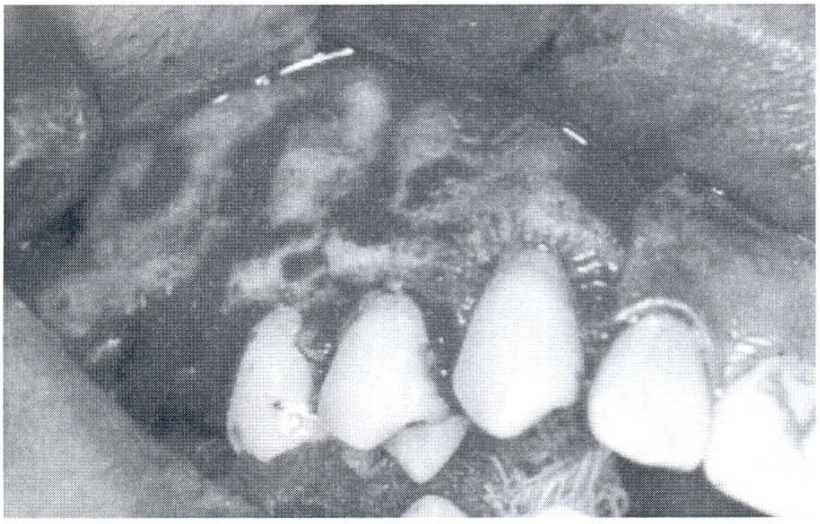

FIGURE 3: Aspect of the lateral wall of the maxilla after incision and undermining of the mucoperiosteal tissue.

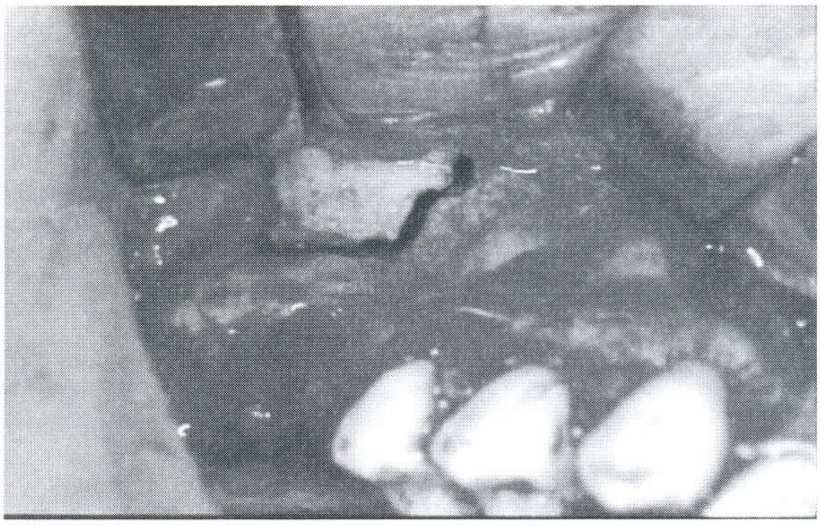

FIGURE 4: A U-shaped osteotomy was made without involvement of the upper region.

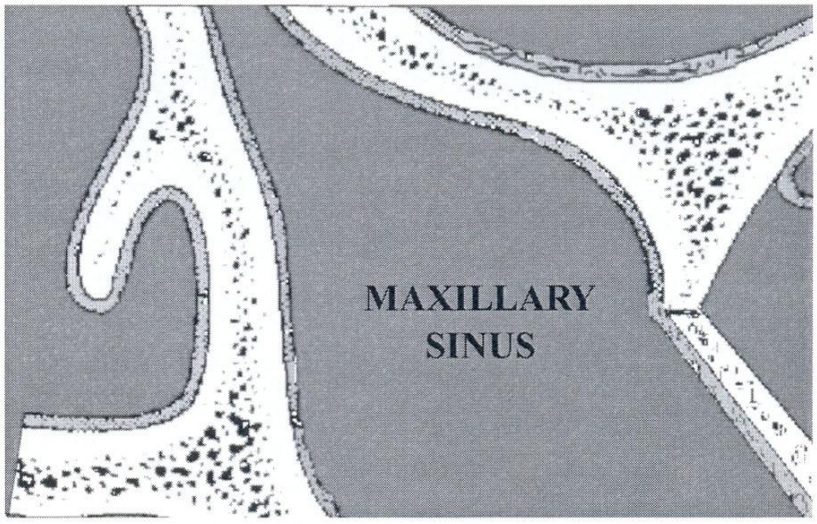

FIGURE 5: Drawing showing the undermining of the bone flap to the later region without harming the upper part connection.

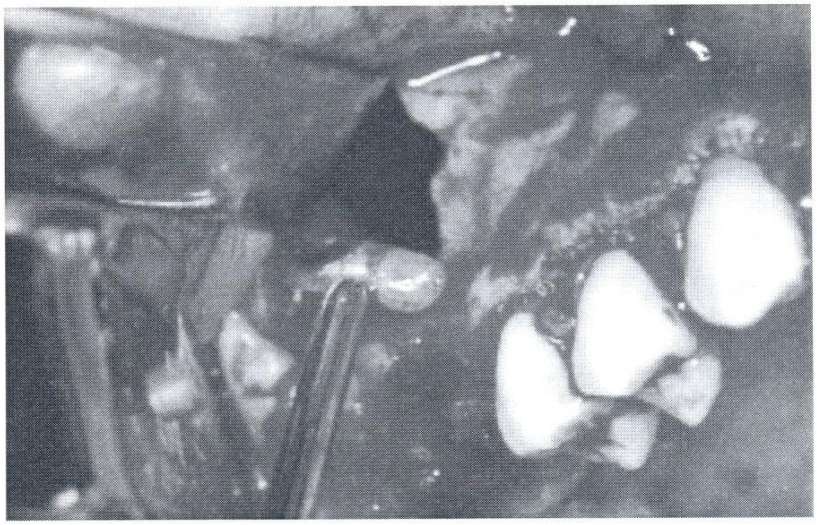

FIGURE 6: The residual root is removed from the maxillary sinus.

The integrity of the sinusal mucosa was assessed prior to the irrigation with saline and Rifocina M* 150mg. The bone flap was restored to its original position and four holes were performed, two in the flap and two in the fixed portion of the maxilla, to allow osteosynthesis with 1-0 steel sutures (Aciflex**) (FIGURE 7). The mucoperiostal flap was sutured with poliglactine 910 3-0 (Vycril***).

* Rifamida 150mg, Merrel Lepetit

** Aciflex 1-0: Monofilament steel suture. *Sutupak*, trade mark

*** Vicryl 3-0: Polyglactine suture. *Ethicon*, trade mark.

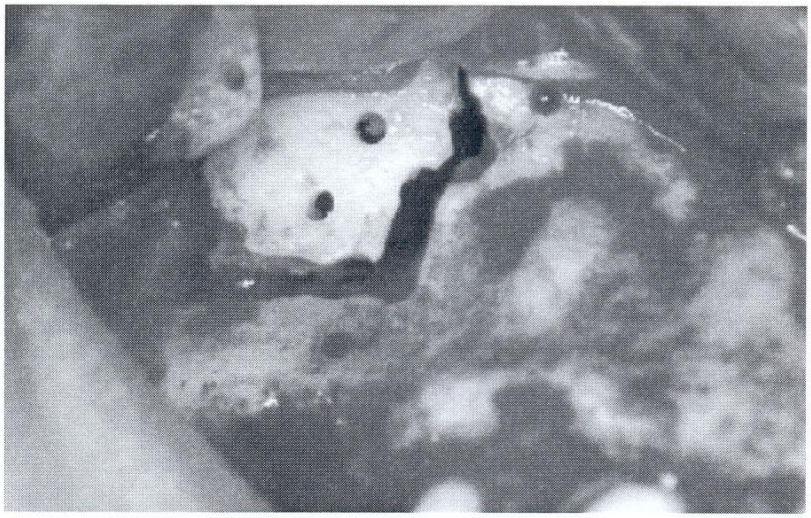

FIGURE 7: The bone flap prior to osteosynthesis.

Amoxicilin 500mg every 8h was used for 7 days as well as topic nasal decongestionant, dipirone 40 drops every 6h and inhalation with saline for 20 minutes every 12 hours for 7 days. Sutures were removed in the 7th postoperative day. Six months later, in the follow-up visit, there was adequate morphology of the maxillary sinus, without radiological or functional alterations. At this period the steel sutures were removed due to discomfort to the patient. During the surgical removal it was possible to identify new bone formation in the area of the osteotomy (FIGURE 8).

FIGURA 8: View of the area 6 months later.

DISCUSSION

Planing is essential to prevent accidents and/or complication in the trans or postoperative period. However, accidents such as buco-sinusal communication and projection of teeth elements in the cavity of the maxillary sinus may be inevitable (Peterson et al., 1996; Güven, 1998). A reason for that could be the close relation of teeth roots and the sinusal space, separated, most of the time, by a thin layer of bone or even just by a membrane (Navarro, 1997).

Such anatomical characteristic accounts for high rate of communication found in exodontic procedures.

Stelimach & Frenigel, in 1972, reported accidental buco-sinusal communication in 13% of cases of teeth removal. This occurs more commonly with the pre-molars and superior molars (Schaffer, 1910; Von Bonsdorff, 1925; Mustain, 1993; Killey & Kay, 1964; Punwutikorn et al., 1994; Güven, 1998), which may suggest that the maxillary morphology plays an important role in this regard besides the issues related to the surgical technique. For the same reason it is possible to identify the projection of residual roots and/or teeth to the inside of the maxillary (Choung & Choung, 1997; Killey & Kay, 1964; Lee, 1978; Sims, 1985). Thus, dentists should be aware to diagnose and treat such accidents as well its sequelae. The diagnosis of such accidents (Choung & Choung, 1997; Killey & Kay, 1964; Lee, 1978; Sims, 1985) can be made by the clinical history, clinical examination and radiological exams. CT scan can be also used (Gregori, 1996).

Killey & Kay (1975) report 362 cases of buco-sinusal fistula; 31.2% (113) out of them showed intrusion of a tooth or residual root to the inside of the maxillary sinus.

Presence of these materials in the inside of the sinus or even its positioning between the mucosa and the bone wall may cause problems to the patient (Killey & Kay, 1964; Lee, 1978; Sims, 1985). According to Sims (1985), the problems include acute or chronic sinusitis, thickening of the sinusal mucosa, sinusal polyps, reagudization of stable sinusitis and retention mucous cyst. It is also possible the extrusion of the material to the oral cavity through a buco-sinusal fistula or to the nasal cavity via ostio sinusal or through a naso-sinusal fistula. Subdural empiema was reported by Wooley & Patel em 1997.

However, Sims (1985) stresses that the dental root may remain in the lumen or under the sinusal mucosa without harm. Reading et al. (1955) report a case of dental root that remained under the sinusal mucosa for 20 years without any complaint. Therefore, an expectant procedure may be adopted in these cases, but close surveillance should be implemented or the early removal of the fragment should be indicated (Killey & Kay, 1964; Lee, 1978) due to the reported complications.

Techniques for entry in the maxillary sinus have been described since the 19th century. Caldwell in 1893 and Luc in 1897 described similar techniques for this operation. It is based in a straight incision in the alveolar mucosa with mucoperiostal undermining and an ostectomy in the antero-lateral wall of the maxillary sinus close to the fossa of the canine

tooth. This intervention is indicated in cases which one aims to get directly into the cavity or there is a need to access other neighboring anatomical structures (Kruger, 1974; Moreno et al., 1997).

Lee (1978) reported a technique specific for the removal of residual root in the interior of the maxillary sinus. A trapezoidal mucoperiostal flap is elevated from the alveolar crest exposing the region above to the involved alveolus. A circular ostectomy is performed above the specific alveolus with access to the inner part of the maxillary sinus in order to remove the residual root.

DeFreiras & Lucent (1988) e Stefansson et al. (1988) demonstrated the side effect of the access proposed by Caldwel-Luc. They mention, for instance, sinusal pathologies, scar sequelae with alteration in the gingival mucosa, buco-sinual fistula, alteration in the sensibility such as paresthesias, hypersthesia or even neuralgia as well as chronic inflammation. Risks for lesions to close structures are also reported such as the lachrymal duct (Zapala et al., 1992). From observation of the ENT practice, which recommend the endoscopic access for such operation preventing a major ostectomy of the anterior wall (Ikeda et al., 1996; Narkio-Makela & Qvarnberg, 1997), it is verified a reduction in the number of postoperative complications in comparison to the traditional access such as the one by Caldwell-Luc. Therefore, it seems clear that part of the morbidity associated to sinusal surgery is related to the approach to the anterior wall of the maxilla. It is possible that this assumption has stimulated studies for alternative techniques such as the endoscopic approach or more conservative osteotomies.

More recently, Choung & Choung, in 1997, reported a technique for anterior approach to the maxillary sinus through a bone flap. They succeed in 27 cases, attesting the easiness of execution, adequate access and no complications at all. This is the technique described and presented in this study. The only variation was the incision that, in this case, was marginal, i.e., a Neumann flap due to the need to close the alveolar portion where the exodontic procedure started.

This technique of Choung & Choung (1997) seems to be a good alternative to the Caldwell-Luc approach since it saves the vestibular bone wall, reducing the morbidity of the procedure. However, it may not be adequate to most cases due to the limitation in extending the anterior window.

In cases such as the one reported in this study, where the alien body did not remain for a long period leading to alteration in the anatomical structures, this technique seems to be adequate. Furthermore, this technique does not prevent a future use of the Caldwell-Luc approach, if necessary.

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