
Caldwell-Luc procedure for retrieval of displaced root in the maxillary sinus

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Objective. The aim of this study was to describe the standard diagnostic procedure and the application of the Caldwell-Luc approach for the retrieval of a displaced root from the maxillary sinus and to share our experience in treating this complication.

Study design. Twenty-four patients with a fractured root accidentally displaced into the maxillary sinus were referred by general dentists to our department from 2005 to 2008. All were managed by a standardized diagnostic procedure and a Caldwell-Luc approach. We recorded the age of each patient, the gender, the tooth, the size of root fragment, the type of displacement, the delay between displacement and retrieval, the length of operating time, and any complications.

Results. Over a 4-year period, we treated 24 patients, 14 being male and 10 female. Ages ranged from 14 to 55 years (average 26.4). The commonest tooth involved was the maxillary first molar; the length of the root fragments ranged from 3 to 7 mm. Seventeen of these roots were mobile and 7 fixed (4 being located between the sinus membrane and the bone and 3 immobilized by the sinus membrane). Twenty-three of the operations were completed in 30 minutes, and only 2 patients had a temporary complication of sinusitis. No infraorbital paresthesia occurred.

Conclusions. The standardized diagnostic procedure and Caldwell-Luc approach for the retrieval of a displaced root from the maxillary sinus is a safe, simple, and fast method with minimal complications. (*Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2011;112:e59-e63)

Displacement of a fractured root into the maxillary sinus is one of the complications of extraction of maxillary posterior teeth. It occurs accidentally and may cause severe problems with oroantral fistula, sinusitis, cellulitis, and subdural empyema.¹

Extraction is the commonest surgery in a dental clinic and the dentist should be able to manage this complication. Diagnosis of the displaced root in the maxillary sinus depends on imaging, evaluating the root size, and its location within the sinus. Surgical retrieval is considered first, even though some studies suggest leaving the root fragment in the sinus if it is <3 mm in size and in the absence of sinusitis or other local disease.² Surgical approaches include retrieval via the extraction socket² or the Caldwell-Luc approach, which can avoid enlarging the oroantral communication

(OAC) and potentially causing an oroantral fistula. We reviewed the literature and found the standard Caldwell-Luc operation to be well documented, although most papers did not describe in detail the application of the Caldwell-Luc approach to root retrieval. The aim of the present paper is to describe the standard diagnostic and surgical procedure and to share our experience of retrieval of roots displaced into the maxillary sinus.

MATERIAL AND METHODS

Basic Patient Data

This retrospective study reviews those patients referred to our department from general dental practices because of root fragments displaced into the sinus during extraction of maxillary posterior teeth.

Four oral surgeons were involved, with lengths of experience in oral and maxillofacial surgery ranging from 4 to 20 years; they treated these patients following a standardized diagnostic and surgical plan. Each surgeon treated ≥ 3 cases. We recorded the gender and age of each patient, the tooth extracted, the root fragment size, root location, and whether the root was mobile or fixed in position, the delay between extraction and referral to our department, presence of infection, complications of operation, and the length of operation

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time. This retrospective study was exempted by the Institution Review Board.

Standardized diagnostic procedure

On presentation to our clinic, the patient with a root displaced into the maxillary sinus has a panoramic radiograph to confirm the presence of the root, its size, and its location. The patient is then asked to shake his or her head and a repeated radiograph was taken to check for any change in position of the root. We have found that the root condition could be divided into 3 types: mobile type: root changed location at 2 different image examination after shaking head position; fixed type A: root located between sinus membrane and bone; and fixed type B: root in the sinus cavity and fixed by adherent membrane. In our view, these types need varying surgical procedures.

Surgical procedure

We do not recommend enlarging the OAC to retrieve the displaced root via the extraction socket. We place the patient in the supine position to allow the root to fall into the posterior and narrowest part of the sinus. Surgery is performed under local block anesthesia (posterior superior alveolar nerve, greater palatine nerve, and buccal infiltration from the canine to the first molar). A vestibular incision is made from the canine to the first molar region, and a full-thickness mucoperiosteal flap is reflected to expose the canine fossa. A bone window ~4-5 mm in diameter is made distal to the apex of the canine and above the apices of the premolars by 5 mm (Fig. 1); if the root's smallest diameter exceeds 5 mm this window can be widened, but with care to avoid injury to the infraorbital nerve.

Patients with the 3 different root types are treated differently.

The mobile type. We use a straight metal suction tip going from the bone window directly to the posterior sinus, where the root fragment is usually located when the patient is supine (Fig. 2). The suction apparatus is set on high, and it is easy to retrieve the root.

The fixed types. We elevate the membrane from the bone first if the root lies between the membrane and the bone (fixed type A). It is usually adjacent to the socket of the extracted tooth and is usually removed without difficulty. If this fails—or if the fixed type B is present (with the membrane adjacent to the root)—we use a curette to loosen the fragment and let it fall into the posterior sinus (Fig. 3), and then we complete the removal as for the mobile type. In using the suction tip or curette, one must be aware of the infraorbital nerve and the anterior superior alveolar artery. The wound is closed primarily. If the patient has no OAC on presentation several days after extraction, it is not necessary to treat the extraction socket.

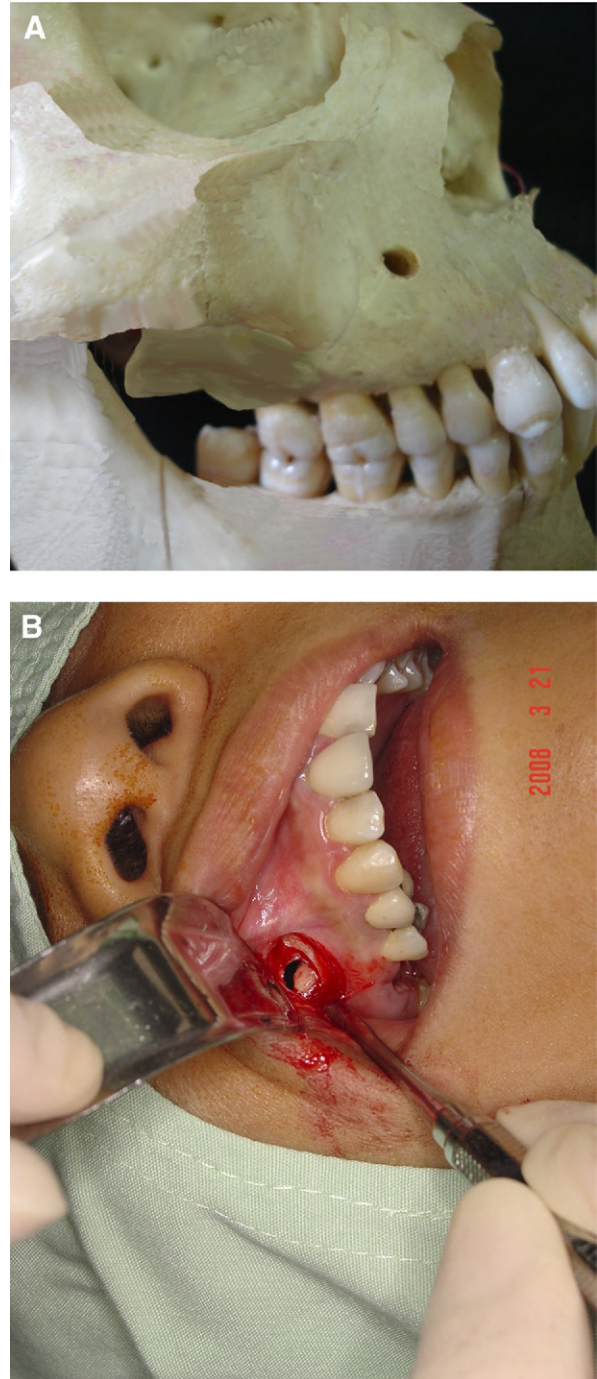


Fig. 1. A and B, We make a bone window ~4-5 mm in diameter at the canine fossa, distal to the apex of the canine and superior to the apex of the premolars by ~5 mm. Patient is in the supine position.

If the patient presents a few hours after extraction and if the orontral communication is >5 mm, then gelfoam and wound suturing will suffice. If the OAC is <5 mm, gelfoam alone may suffice.

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