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CASE REPORT

Spontaneous clearance of a dislodged root in the maxillary antrum

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Abstract

Dislodgement of maxillary tooth roots into the adjacent maxillary antrum is an unpleasant experience for both the patient and the operator. In the majority of cases, these roots need to be removed from the sinus to avoid further complications such as infection and oroantral fistula formation. A case is described where a dislodged root successfully migrated from the apex of the tooth socket to the ostium of the maxillary antrum via the function of the respiratory epithelium's 'mucociliary escalator'. The indications and contra-indications for sinus exploration and root retrieval are discussed, and a treatment algorithm is proposed to include cases where monitoring for spontaneous exfoliation may be included.

Introduction

Dentoalveolar surgery is not without its complications. The Oral and Maxillofacial Surgeon is often faced with the management of complications both of their own patients, and of patients referred by other practitioners.

One complication dreaded by surgeons is the displacement of tooth roots into adjacent spaces. Mandibular teeth can be displaced into the inferior alveolar nerve canal, sublingual, submandibular or buccal spaces. Maxillary teeth can be dislodged into the infratemporal fossa, nasal cavity and the maxillary antrum.

Displacement of these roots can not only cause pain and introduce infection into deeper fascial spaces, but it can also disrupt nerve function, cause bleeding, and require the need for more invasive surgery.

The relationship between the maxillary dentition and the floor of the maxillary antrum is variable. The canine, first and second molars are most intimately related with the sinus[1,2] and extraction of these teeth in particular may result in an oroantral communication. This risk increases with the pneumatization of the maxillary alveolus which occurs with age and adjacent edentulism[3].

The maxillary sinuses develop as out-pouches of the foetal nasal cavity during the fourth month of embryogenesis[2]. Pneumatization of the maxilla begins after birth and continues to skeletal maturity, where it is pyramidal in shape and has a volume of 15 mL on average[2].

The natural drainage of the maxillary antrum is via the maxillary ostium, which opens into the middle meatus of the lateral nasal wall. This opening is usually hidden by the uncinate process, in the middle of the infundibulum floor. Accessory openings of the maxillary antrum may be present in the anterior and posterior fontanelles, also in the middle meatus[2,4].

The paranasal sinuses are lined with respiratory epithelium (ciliated pseudostratified columnar epithelium with goblet cells). The goblet cells

produce a thick sticky mucous, which is mobilized along the sinus lining via beating of cilia. The mucous is mobilized towards the ostium of the antrum via this so called 'mucociliary escalator'. Via the ostium the mucous can drain into the nose, travel to the nasopharynx and be swallowed. This drainage is facilitated by negative pressure during inspiration[5].

In the event of a root displacement into the sinus, initial attempts may be made to retrieve the fragment via the tooth socket[6]. If initial attempts are unsuccessful, the fragment is small, and the root or sinus are not acutely inflamed, then the root may be left in situ with appropriate patient consultation[7]. In most cases, the root fragment will fibrose into the sinus lining with no further consequence. There is, however, a risk of chronic sinusitis[8] and atypical infection as the oral flora is introduced into the sinus[9]. Ongoing infection may also delay healing, with the formation of an oroantral fistula.

Formal retrieval of the tooth is indicated if[6];

- There is acute or chronic sinusitis
- The tooth was acutely infected
- The tooth fragment was large
- Conservative treatment (leaving the root in situ) has failed.

Retrieval of the tooth can be either via a Caldwell Luc or endoscopic approach.

Case

A 32-year-old male was referred to the Oral and Maxillofacial Surgery (OMFS) Unit by his dental practitioner. The dentist had attempted a surgical removal of the right upper first molar, which had resulted in successful removal of the distobuccal root, retention of the palatal root within the tooth socket, and dislodgement of the mesiobuccal root into the right maxillary antrum. The patient was referred with a periapical radiograph of the tooth prior to extraction and after attempted surgical removal (Fig. 1).

The patient was otherwise healthy, and had no sinus pathology prior to presentation. The tooth in question had irreversible pulpitis, but no acute infection. The dental practitioner attempted to remove the palatal root via the tooth socket, but was unable to do so. They then commenced the patient on oral antibiotics (amoxicillin 500 mg 8-hourly) and referred to OMFS Unit where they were seen 2 days later.

A cone beam computerised tomogram (CBCT) was obtained to determine the location of the dislodged root (Fig. 2). This showed that the mesiobuccal root fragment had in fact migrated to the medial maxillary wall, close to the ostium of the sinus. The sinus lining was mildly thickened but there was no air-fluid level to suggest an acute sinusitis. The CBCT was obtained in a standing position, so the root fragment was established to be adherent to the sinus wall rather than sitting in that position due to gravity.

Figure 1 periapical radiograph after incomplete removal of the right first upper molar showing palatal root in situ, and mesiobuccal root dislodged into the base of the maxillary antrum.

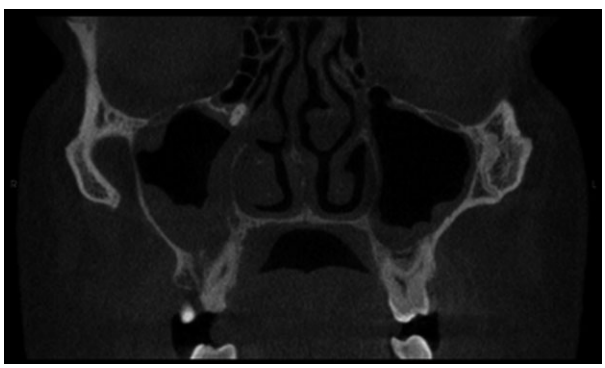

Figure 2 CBCT of the maxillary sinuses (coronal view) showing migration of the mesiobuccal root of the right first upper molar to the medial antral wall, close to the ostium.

There were no localised signs of infection, but as the patient had significant pain and a palatal root still in situ, a decision was made to remove the remaining palatal root and retrieve the dislodged mesiobuccal root.

Under general anaesthetic, the palatal root was surgically removed without complication. The mesiobuccal root could not be retrieved with sinus irrigation and suction via the tooth socket, and so a

Caldwell Luc approach was made. The sinus was visualized in entirety, and again the root could not be visualized. After thorough inspection, including checking the suction solution, the incisions were closed, and the procedure abandoned.

A post-operative Computerised Tomogram (CT) of the sinuses was obtained to ensure the root had not been dislodged into the adjacent sinuses. A Chest X-Ray (CXR) was also obtained to ensure the root had not been aspirated. On retrospective review the patient reported that he had some post nasal drip between the initial attempted extraction and the subsequent procedure and may have swallowed something solid.

The patient was followed up for 6 weeks and had complete resolution of symptoms. It was hypothesized that the mesiobuccal had migrated to the maxillary ostium via the function of the mucociliary escalator, and had subsequently been swallowed prior to the second procedure.

Discussion

In the described case, the displaced root was not acutely infected, and the maxillary antrum was not chronically infected. Both of these are favourable prognostic indicators in management of the displaced root[6]. The root was initially attempted to be retrieved via the socket, and when this was not successful, the dentist correctly abandoned the procedure and referred to the OMF surgeon. As the patient continued to have symptoms, formal retrieval of the root was justified. The surgeon's preference was to use a Caldwell-Luc approach, which allows direct visualization of the maxillary antrum. In the event where the root is not present in the sinus, it's whereabouts must be established. Specifically, aspiration or further displacement into deeper spaces must be ruled out, and these scenarios may have associated morbidity and require further intervention.

The situation where a tooth fragment in the maxillary antrum has been successfully dislodged by the patient's own mucociliary escalator is a diagnosis of exclusion.

The function of the mucociliary escalator requires healthy respiratory lining. In the absence of acute or chronic sinusitis, and in the absence of risk factors such as smoking, exfoliation of a small root fragment from the maxillary ostium is possible.

CBCT 2 days after the displacement of the root into the sinus showed that the fragment had already migrated up the medial antral wall and was sitting close to the ostium. This opens up the possibility of watchful waiting, and repeat imaging (either radiological or via endoscopy) of the sinus to see if the root has been dislodged. Inspection of any expectorated sputum may also be a possibility, but seems unpleasant and cumbersome for the patient.

Watchful waiting carries with it the risk of infection and pain of delaying surgery, but in the event of spontaneous drainage of the root would prevent the morbidity of a second surgical procedure.

Conclusion

An interesting case is described where a root displaced into the maxillary antrum was naturally exfoliated into the nasal cavity by function of the mucociliary escalator. This poses the option of watchful waiting for displaced roots in the sinus that would previously warrant surgical retrieval.

The candidates for watchful waiting would require healthy respiratory epithelium within their maxillary sinus for the root to be exfoliated. This would involve patient selection factors;

- Previously healthy sinus
- No acute infection of displaced root

The function of the sinus mucosa could also be optimised via nasal sprays and decongestants. In the described case, the fragment migrated from the position of the first upper molar to the maxillary ostium in 48 h.

The patient would have to be properly counselled and may still require surgery if the root fails to migrate along the sinus mucosa to the ostium.

In the event where repeat imaging displays that the displaced root is migrating towards the maxillary ostium, and with favourable patient factors as described above, a conservative approach could be advocated for patients who would previously require surgical management.

Conflict of interest

None.

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None.

Informed consent

Informed consent was obtained from the individual involved in the study.

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