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Endoscopy Assisted Retrieval Of Accidental Oro-Antral/ Oro-Nasal Displacement Of Roots – A Report Of 2 Cases And Review Of Literature.

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Abstract:
Background*: Due to the proximity of palatal and buccal roots of upper premolars and molars to the maxillary sinus, apical displacement of root fragments to the antrum is common in dental practice. This article explains the possible anatomical variations and immediate management of retrieval of roots displaced into the antrum/ nasal cavity by the novel endoscopic approach rather than conventional removal. Clinical parameters like the size of the defect, position of the foreign body, and access to the anatomical location are imperative to be noted before choosing an approach for retrieval. Endoscopes had wide applications in the maxillofacial field, by utilizing that one can provide, minimally invasive and negligible surgical morbidity to the patient. A literature review is included to explain various retrieval techniques and the advantages and pitfalls of each procedure.*
Key Word*: Endoscope; displaced tooth retrieval; Oro-antral/ nasal communication; Minimally invasive; fascial spaces;*

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I. Introduction

OAC can be defined as an unnatural communication between the maxillary antrum and oral cavity [1,2]. This occur due to various etiological factors and one amongst is maxillary molar/Premolar extraction especially where its roots are in close proximity to sinus floor. Maxillary posteriors share the close anatomical relationship with maxillary antrum [3]. So, the displacement of fractured roots / foreign body has potential chance to slip into the sinus cavity. Majority of reported cases in the literature complaints of pain with concomitant acute sinusitis [3]. Another clinical scenario which maxillofacial surgeon would frequently encounter is impacted canine removal. Impacted Maxillary canines are second common after mandibular third molars. Deeply impacted maxillary canines has close proximity to lateral nasal cavity as well as maxillary antrum [4]. The surgical anatomy in both clinical scenarios thin bone separating from sinus and nasal cavity prone to produce displacement of root and an abnormal communication[5]. Immediate appropriate clinical decision, imaging and planning can result in easy removal, reduce postoperative complications. Here we report two different complications happened during a routine dental minor oral surgery. Authors experience with Minimal access technique with endoscope will be of help in removal of roots and foreign bodies very easily which can avoid radical exploration and further post operative complications.

II. Case Report:

Case report I

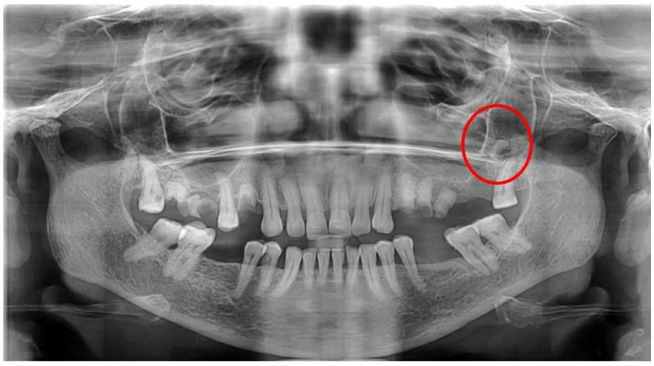
A 58-year female reported for extraction of carious upper left 2nd molar tooth with no relevant systemic co-morbidities. The tooth was grossly decayed. While attempting to remove the tooth, the distal root got broken and retrieval was planned to be done by open method (trans alveolar extraction). Suddenly one of the roots was found to be missing from the surgical site. Clinical examination of the extraction socket revealed Oro- antral communication which was 4 mm in size.

IOPA revealed that the root fragment was displaced more laterally and posteriorly in the maxillary antrum. Local retrieval through the socket failed, hence alternate retrieval methods were sought. OPG was taken and the location of the displaced root was confirmed (Figure1). Considering the age of the patient, a minimal

access retrieval by endoscope was planned. Through an 8mm minimal access hole in the anterolateral wall of the antrum, the root piece was retrieved by using an endoscope. Soft tissue closure of extraction defect was done with a buccal advancement flap simultaneously (Figure2,3). Appropriate instructions were given to the patient to prevent the establishment of an Oro-antral fistula postoperatively.

The patient's postoperative course was uneventful and she was discharged from our care after 6 weeks.

Figure 1

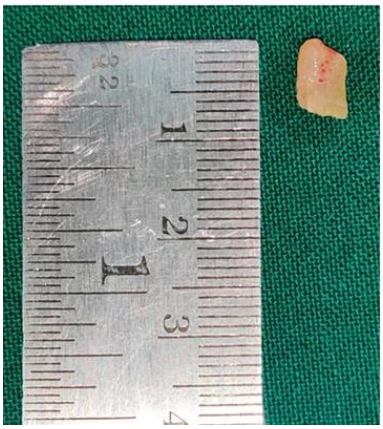


OPG showing displaced root fragment in the maxillary antrum

Figure2

Endoscopic-assisted removal from maxillary antrum through antrostomy.

Figure 3

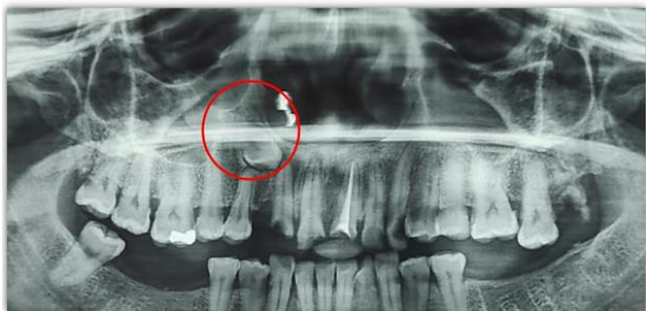


Retrieved root fragment which was measuring 8mm in size.

Case report 2

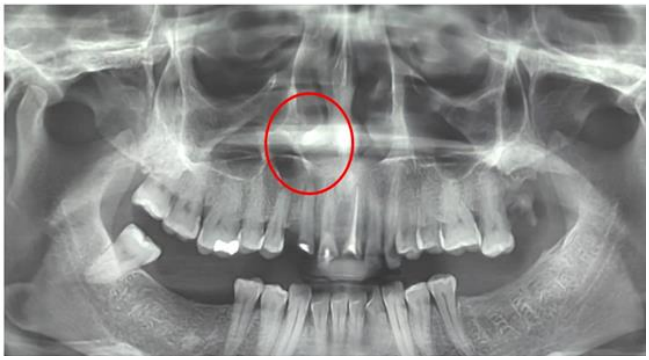
A 40-year-old female reported with pain in her right upper front tooth region. OPG revealed an impacted maxillary canine close to the maxillary sinus as well as the lateral nasal cavity (Figure 4). A window was created on the buccal cortex to expose the impacted canine. After splitting the tooth for ease of removal, sectioned portions were removed carefully to avoid encroaching on the maxillary sinus. During the removal of root tips, it was observed that they had got displaced into adjacent tissue spaces. Since it was near the maxillary antrum and lateral nasal cavity, we could not confirm the location of the displacement immediately. Orthopantomogram (OPG) revealed the tooth dislodged into the nasal floor (Figure 5). A 3-Dimensional CT was done to pinpoint the displaced root which revealed the root displaced into the nasal floor in the middle portion, beneath the inferior turbinate breaching the lateral wall of the nasal cavity (Figure 6 a, b, c). Again, in this case, an endoscope-assisted removal was planned via anterior nares and the displaced fragment was removed from the nasal floor beneath the inferior turbinate with ease.

Figure 4:



OPG Reveals The Impacted Canine In Close Proximity To The Maxillary Antrum And Lateral Nasal Cavity

Figure 5



OPG Reveals The Root Fragment Displaced To The Nasal Floor.

Figure 6a

Figure 6b

Figure 6c

CT Scan Reveals Displaced Root Fragment Was Dislodged Into The Anterior Nasal Floor Beneath The Inferior Turbinate Breaching The Lateral Nasal Wall.

III. Discussion

Oro-antral communication (OAC) is unnatural communication between the maxillary antrum and the oral cavity that occurs due to various etiological factors and one amongst them is maxillary molar/Premolar extraction [(1)], especially where its roots are close to the sinus floor with or without periapical pathology. Maxillary posteriors share a close anatomical relationship with the maxillary antrum [(2,3).] So, the displacement of fractured roots / foreign bodies can potentially slip into the sinus cavity. Another clinical scenario that maxillofacial surgeons would frequently encounter is impacted canine removal. Deeply impacted maxillary canines have proximity to the lateral nasal cavity as well as the maxillary antrum [(4)]. The surgical anatomy in both clinical scenarios is thin bone separating from the sinus and nasal cavity prone to produce displacement of root and abnormal communication [(5).]

Of the published reports of patients who had undergone extraction of maxillary third molars which were impacted/ completely erupted with displacement into the maxillary antrum, retrieval was done by trans antral / Caldwell -Luc / endoscopic approaches[(3,6–8)].

After the displacement of the root, the patients could be asymptomatic and need not undergo any procedure. But many of the patients presented with infection, sinus tenderness, and chronic sinusitis and certainly needs a surgical procedure to retrieve it[(3)]. A conventional method of retrieving iatrogenic displacement of tooth/root/ foreign body into the sinus was the trans antral method[(9).] But it is associated with pitfalls like creating a large surgical window (the same or larger than the size of the displaced tooth crown), and the requirement of an additional surgical field. Comparatively, removal via the Alveolar socket approach is feasible but access and visibility are a big challenge.

Applications of Endoscopes in maxillofacial surgery include the treatment of chronic sinusitis, nasal polyps, sinus polyps, choanal atresia, CSF leak closure, identifying the source and control of epistaxis, biopsy for selected tumors, intraoral TMJ fixation, and recently for many osteotomies. Advancements in this field have made it possible to use the endoscopic approach to visualize and possibly remove root fragments / foreign bodies from the adjacent facial spaces [(10–12).]

Traditional Trans alveolar method and Caldwell-Luc method are very easy to perform and may not require scope-assisted removal in all situations. Trans alveolar method is preferred when the roots are in close vicinity to communication. So that roots can be retrieved and followed by the closure of communication using local/distant flap. When there is presence of two vital teeth adjacent to the communication and when displaced roots are dislodged far away from the communication conventional techniques are cumbersome. Another disadvantage of this method would be that the defect's enlargement for root removal may also result in flap failure[(10,13–15).]

In comparison, the Caldwell-Luc method through canine fossa is associated with complications like the additional surgical site, infraorbital nerve damage due to excessive retraction, and pain/discomfort/paresthesia of the cheek region.

In published reports, endoscopically assisted retrieval has been more successful in cases where the foreign body is displaced into the infratemporal fossa and Pterygopalatine fossa. More accuracy and precise access are essential in these cases, considering the complex anatomy of this area and the high vascular supply. [(8)]

Endoscopes are minimally invasive, helps in accurate localization due to lighting, has decreased morbidity, can be done along with navigation, aids in flapless procedures, and are efficient, non-traumatic procedure resulting in scarless outcomes. Moreover, these parameters should be taken into consideration before retrieval of any roots displaced to adjacent cavities or spaces: the size of the root or tooth, size of the communication, accessibility of the area, zero visibility within antrum and nose as hollow dark cavities, age factor with medical comorbidities, morbidity ratio if left behind and alternative methods. No doubt that dental specialists may find it easy to remove these displaced root pieces by simple scope procedures if there is an associated ENT specialist who normally possesses an endoscope for their routine examination and interventional procedures. The first consideration should be given in such circumstances to perform removal with a cost-effective and less cumbersome technique rather than inviting larger surgical complications postoperatively in everyday clinical practice.

IV. Conclusion

Endoscopic retrieval of teeth or roots displaced into the antrum or adjacent soft tissues is an effective technique with negligible surgical morbidity. The immediate, appropriate clinical decision, imaging, and planning can result in easy removal and reduce postoperative complications. The author's experience with the Minimal access technique with an endoscope helped in the removal of roots and foreign bodies very easily which can avoid radical exploration and further postoperative complications. It helps in the accurate localization of the displaced tooth and is easy to use for retrieval without injuring adjacent vital structures.

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