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Review Article

FRACTURES OF MAXILLARY TUBEROSITY DURING EXTRACTION OF MAXILLARY MOLAR- A CASE REPORT AND REVIEW

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Abstract

Fractures of maxillary tuberosity during extraction of molar teeth can be a common occurrence in dental practice. However, very few cases are reported and discussed in the literature. These fractures can lead to serious complications. Depending on its dimensions, it can present both as a surgical as well as the prosthetic problem. From the prosthetic point of view, the anatomic area of maxillary tuberosity is extremely important for providing desired retention and stability of upper denture. This article presents a case of an extensive fracture of maxillary tuberosity during extraction of the maxillary second molar tooth and its treatment outcomes.

Keywords: Maxillary molar extraction, Dentoalveolar trauma, Maxillary tuberosity fracture, miniplate fixation.

Introduction

Peri-operative complications can occur due to multiple factors, including patient and iatrogenic factors. Some of these complications happen relatively often, and some are extremely rare.

At the time of extraction of maxillary molars number of complications can occur and fracture of maxillary tuberosity is one such complication encountered. In a study conducted to investigate and compare the prevalence of complications of 8455 simple tooth extractions, 0.15% of the complications proved to be tuberosity fractures.[1] The maxillary tuberosity plays an important role in stabilization and retention of the prosthetic dentures, allows proper prosthetic rehabilitation, thus its fracture constitutes a very significant prosthetic problem.

For extraction of a tooth, expansion of surrounding alveolar bone is required so as to allow an unimpeded pathway for tooth removal. However, this leads to removal of small bone parts with the tooth rather than being expanded.[2] Fracture of a large portion of the bone in the maxillary tuberosity area is a situation of special concern. The maxillary tuberosity is especially important for the stability of maxillary dentures.[3]

Large fractures of the maxillary tuberosity should be viewed as severe complications. The major therapeutic goal of management is to salvage the fractured bone by maintaining it in place and to provide the best possible environment for healing.[3]

Routine treatment of the large maxillary tuberosity fractures is to stabilize the mobile part(s) of bone with one of the rigid fixation techniques for 4 to 6 weeks. Following adequate healing, a surgical extraction procedure can be attempted. However, if the tooth is infected or symptomatic at the time of the tuberosity fracture, the extraction should be continued by loosening the gingival cuff and removing as little bone as possible while attempting to avoid separation of the tuberosity from the periosteum. If the attempt to remove the attached bone is unsuccessful and the infected tooth is delivered with the attached tuberosity, the tissues should be closed with watertight sutures because there may be a clinical oro-antral communication. The surgeon may elect to graft the area after 4 to 6 weeks of healing and advise postoperative antibiotic therapy. If the tooth is symptomatic but there is no frank sign of purulence or infection, the surgeon may elect to attempt to use the attached bone as an autogenous graft.[4]

The aim of this paper is to show the surgical therapeutic approach using miniplate in the treatment of the maxillary tuberosity fracture occurred during extraction of the maxillary second molar.

Case Report

The patient was referred to the Department of Oral and Maxillofacial Surgery by an outpatient oral surgery clinic following mobility in relation to the tuberosity region during extraction of a maxillary left second molar. Extraoral examination revealed mild swelling with tenderness in the left malar region. Intraoral examination revealed laceration on the palatal mucosa with the mobility of tuberosity. Occlusion was deranged. Root fragments were seen in the socket of attempted second molar (Figure 1). Radiographic examination revealed a maxillary right tuberosity fracture including three molar teeth (Figure 2). After local anesthesia, the tuberosity and third molar tooth were repositioned to their original location, tooth fragments were extracted surgically and fractured tuberosity fragments were fixed with 1.5 mm 2 - holed miniplate secured with 2 screws (Figure 3). Lacerations were sutured (Figure 4).

Postoperatively, a 5-day course of Amoxiclav 625mg and a 7-day course of Chlorhexidine Gluconate mouthwash with adequate analgesics was prescribed. In addition to the usual post-extraction instructions, the patient was advised to avoid blowing his nose for two weeks to prevent an oroantral fistula from developing. The patient had an uneventful recovery. After a 2-month healing period of the tuberosity, the patient was assessed clinically (Figure 5) and radiographically (Figure 6).

Figure 1- Fractured site with root fragments

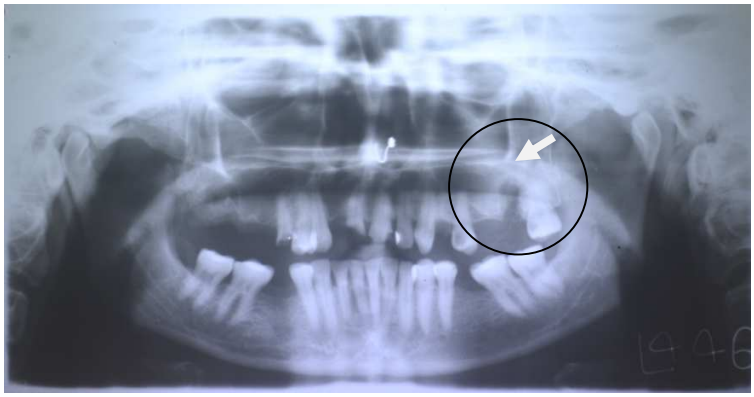

Figure 2- Orthopantomogram with fractured tuberosity

Figure 3- Fixation with a miniplate

Figure 4-Closure

Figure 5- Intraoral healing

Figure 6- follow up Orthopantomogram

Discussion

The fracture of the maxillary tuberosity is one of the peri-operative complications which may occur during tooth extraction in the maxillary molar region. Several therapeutic procedures can be implemented depending on different factors such as patient's general health and age, the indication for tooth extraction, the existence of oro-antral communication, the condition of the alveolar process, fracture line, the presence of the antagonistic tooth etc.[5]

Various etiological factors listed in the literature resulting in fracture of maxillary tuberosity during upper molar extraction include:[3]

1. Large maxillary sinus with thin walls/sinus extension into the maxillary tuberosity and/or large projection lengths of root apices in the sinus cavity [2,6,7]. Sectioning of the tooth and removal of one root at a time would be the most appropriate technique in these cases.[6,8] It is also important to support the alveolar bone segment of the maxillary molar teeth during extraction with the fingers thus enabling greater stability during bone dislocation. [9]
2. Early loss of a maxillary tooth (frequently the first molar) may be followed by a resorption of the alveolar process, bringing the antral lining into close or immediate proximity with the oral mucoperiosteum. This resorption may isolate the second and third molars and any attempt at extraction may fracture the tuberosity bearing these two teeth [6].

3. The maxillary third molar may be unerupted and may even be fused to the second molar, creating a further source of weakness in the tuberosity region[6].
4. Isolated tooth [7-9]
5. Teeth with large divergent roots [2,6]
6. Teeth with an abnormal number of roots [2,6,9]
7. Teeth with prominent or curved roots [7-9]
8. Teeth with dental anomalies, such as tooth fusion and over-eruption [8, 9]
9. Tooth ankylosis [6-9]
10. Hypercementosis of upper molar teeth [6-9]
11. Chronic periapical infection [2, 6 - 9]
12. Radicular cyst [7-9]
13. Multiple extractions [6]. It is desirable that a correct order is followed in multiple extractions to ensure that the maxillary tuberosity receives maximum support.
14. Malpractice by the dentist: inadequate planning related to excessive force during tooth luxation.[6, 9]

Intraoral periapical and panoramic radiographs are routinely used in dental practice. Upon noticing any of the above-mentioned features prompt decision should be made by the dentist regarding treatment plan and a referral to an oral and maxillofacial surgeon should be considered as soon as they face difficulties.

With regards to the size of the fractured bone fragment, three degrees of fracture can be distinguished:

1. **Mild/small tuberosity fracture**: Along the extracted molar, a small portion of the adherent bone fragment of the tuberosity adjacent to the root is attached.
2. **Moderate/medium tuberosity fracture**: Along the extracted molar, a greater part of the adherent tuberosity is attached covering the area adjacent to the root, but also greater in width.
3. **Severe/ catastrophic tuberosity fracture**: The fracture line entails a great part of the tuberosity and the adjacent tissue, pterygoid plate, blood vessels, and muscles. [10].

On discovering that a maxillary tuberosity has fractured, the dentist must stop the procedure before inadvertent laceration of the adjoining soft tissues occurs and determine the extent of the fracture by palpating the mobile fragment.[8]

If the fractured tuberosity segment is small, or if the tooth is infected or symptomatic at the moment of fracture, the fragment must not be left in situ.[5,9]

When a large bony fragment is present, four procedures can be followed depending on the experience of the practitioner and the clinical situation.[3]

1. It is recommended that the extraction should be abandoned and surgical removal of the tooth performed by means of root sectioning.[9]
2. The dentist may try to detach the fractured tuberosity from the roots. One frequently stated the reason for conserving the fractured tuberosity is that its removal makes later denture reconstruction difficult, although this finding has been questioned in some studies as the preservation of the alveolar bone in the maxillary tuberosity area can also provide a better osseous support for later rehabilitation through dental implants.[6]
3. Provided that adequate periosteal attachment has been maintained, the dentist may attempt to stabilize the mobile part(s) of the bone using a rigid fixation technique for 4–6 weeks and later try to surgically remove the tooth (or teeth) without the use of a forceps. The successful treatment of alveolar fractures is based on proper reduction, repositioning of the fractured segment and its satisfactory stabilization. Either closed or open reduction techniques can be used.[5,6]

4. When a large fragment is already detached from the maxilla, the segment may, in some cases, not be properly repositioned because primary stabilization may not have been achieved.[5] It is commonly advised that if a decision is made to remove the fractured large tuberosity, the soft tissue attachments should be carefully removed from the hard tissue fragment.[7] This soft tissue is important for the proper closure of the region to avoid excessive traction of adjacent soft tissues.

Some complications may occur with the removal of the fractured maxillary tuberosity. The removal of a tuberosity will most likely increase the difficulty of future denture fittings and may also make a later rehabilitation with dental implants more difficult.[2.8]

Communication between the maxillary sinus and the oral cavity may also occur. The maxillary sinus reaches its largest size during the third decade of life; consequently, the incidence of OAC in oral surgery is commonly higher after the third decade of life.[11] If not treated adequately, tract might get epithelialized and form a fistula.[12]

Deafness, the most frightening complication, may also occur because of tuberosity fracture. Cattlin reported that, after maxillary tuberosity fracture, deafness occurred from the disruption of the pterygoid hamulus and the tensor villi palatine, in turn collapsing the opening of the eustachian tube. The patient also suffered permanent restricted mandibular movements because of the disruption of the pterygoid muscles and ligaments.[13]

Conclusion

Fracture of the maxillary tuberosity is a serious complication that creates difficulties for the subsequent prosthetic rehabilitation. Moreover, it may provoke serious secondary complications (bleeding, maxillary sinus infection, etc). The dentist must estimate and predict its possible creation and refer the patient for oral surgery intervention. Use of mini plates in large tuberosity fractures results in an early return to function and decreases the prolonged period of intermaxillary fixation.

Clinicians must inform the patient of the potential risks and possible benefits of treatment alternatives before making the final treatment plan and early diagnosis of impacted teeth is essential for treatment. Studies reveal that large tuberosity fractures should be attempted to be salvaged but immediate removal of the small fractures including a tooth or two teeth with small bone complex may be a better choice because of the difficulty in attempting to retain the bone.

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