

Complications related to surgical remove of lower third molar

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ABSTRACT

Surgical removal of the impacted lower third molar tooth is one of the most commonly performed procedures in oral and maxillofacial surgery. Complications are reported with this procedure and are said to affect the quality of life of patients. Literature search was conducted to identify the complications associated with lower third molar surgery and the different modalities available for its management. In this review article the various complications that can occur in impacted lower third molar surgery and its management are discussed. Also the cause of complications and the methods to prevent them are elaborated. Pain, swelling and trismus are common complications associated with third molar surgery. It is concluded that complications after lower third molar surgery still remains an important factor in quality of life in post-operative periods. Oral and maxillofacial surgeons should be aware of the different modalities available in reducing the complications and to make post-operative recovery more comfortable for the patients.

Keywords: Lower third molar surgery, trismus, pain, complications, infection, bleeding, impacted teeth, swelling.

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INTRODUCTION

Teeth that are unable to erupt in an expected time in the dental arch are known as impacted or a tooth which is placed against soft tissues or hard tissue (bone) or both and its unlikely to erupt further in the dental arch is called impacted tooth¹. Generally, the eruption time of this tooth is between 17 to 21 years.^[1]

A tooth may become impacted but the most common and the highest impaction rate is of mandibular third molar followed by maxillary 3rd molar, maxillary canine and mandibular premolar. Lower third molar is the last tooth which erupts between the age of 17 to 25 years and most of the times maligned, with curved or hooked roots all this happen due to lack of space between mandibular ramus and second molar.

The problems which can occur due to impaction are pericoronitis the most common followed by dental caries of third molar or adjacent second molar, root resorption of the second molar, periodontal problems, odontogenic cysts and tumors, other factors that need considered is bad oral hygiene.^[1,2,3]

Mandibular third molar surgery is the most common surgical procedure performed after simple extraction in the outdoor patients. During surgical removal of impacted lower 3rd molar intra-operative accidents and postoperative complications are not uncommon. The intra-operative complications can occur like profuse bleeding, injury to inferior dental canal, injury to adjacent tooth, displacement of tooth in the adjacent structure, fracture of the root apex, fracture of mandible and jaw dislocation.^[1,2,3,4,5]

Type of impaction, existing infection (pericoronitis), relationship with the inferior alveolar nerve, root morphology, density of the bone surrounding the impaction or any pathology associated with impaction are the tooth related factors which may cause the postoperative complication.^[1,2,6,7]

The factors involving surgery are the use of drugs i.e local anaesthesia, type of extent of the incision, bone removal or tooth sectioning, the technique of closure of the wound, surgeons experience and time spent during the surgery. The bone density also needs attention, difficulty level of impaction.^[1,2,3]

Immediate complications which occur on the first day following surgery include pain, trismus, swelling, dysphagia while delayed complications include bleeding, dry socket, wound dehiscence, delayed wound healing, infections, periodontal pocketing of adjacent tooth and nerve injury. In addition, other rare complications such as fracture and jaw dislocation also have been reported.^[1-9]

Complications related to third molar extraction range from 4.6% to

30.9%. They may be occurring intraoperatively or develop in the postoperative period. The four most common postoperative complications of third molar extraction are localized alveolar osteitis (AO), infection, bleeding, and paresthesia. Mandibular fracture, severe hemorrhage, or displacement of third molar teeth, Surgical removal of third molars is often associated with postoperative pain, swelling, and trismus. They are expected and typically transient and are not considered complications.^[1,2,3,8-11]

Age, gender, medical history, oral contraceptives, presence of pericoronitis, poor oral hygiene, smoking, type of impaction, relationship of third molar to inferior alveolar nerve, surgical time, surgical technique, surgeon experience, use of perioperative antibiotics, use of topical antiseptics, use of intra-socket medications, and anesthetic technique are all thought to influence the incidence of complications after third molar removal . .[12,13]

In this review article the various complications that can occur in impacted lower third molar surgery and its management are discussed. Also the cause of complications and the methods to prevent them are elaborated. Pain, swelling and trismus are common complications associated with third molar surgery. It is concluded that complications after lower third molar surgery still remains an important factor in quality of life in post-operative

Bleeding and hemorrhage

Clinically significant bleeding as a result of third molar extraction has been reported in the range of 0.2% to 5.8%, and can be classified as intra- or postoperative, with local or systemic causes, the investigators found an intraoperative frequency of unexpected hemorrhage of 0.7 percent and a postoperative frequency of unexpected or prolonged hemorrhage of 0.1 percent in the recent

American Association of Oral and Maxillofacial Surgeons Age-

Related Third Molar Study. Bui and colleagues found that the frequency of clinically significant bleeding was 0.6 percent in a sample of 583 individuals, and that the variation in reported rates is at least partly due to varied definitions. .[14,15] This value is similar to what Chiapasco and colleagues found. Hemorrhage can be caused by either local or systemic causes. Hemophilia A or B, as well as von Willebrand's disease, are generally diagnosed early in a patient's life, and extractions can be done in a systematic way to maximize the patient's ability to form a stable clot. Patients with severe hemophilia A who have previously been treated with plasma-derived or recombinant factor VIII products may develop inhibitors to the factor products, making management challenging. Alloantibodies against foreign factor VIII develop in 25% to 30% of patients with severe hemophilia A who receive therapeutic infusions of factor VIII. Local factors resulting from soft-tissue and vessel injury are the most common cause of postoperative hemorrhage, and they respond best to local control, which includes meticulous surgical technique that avoids the inferior alveolar neurovascular bundle and particular care to the mandible's distolingual aspect. If postoperative bleeding continues, patients should be told to apply gauze pressure to the extraction site for 45 minutes. Re-examine the patient's medical history, and keep an eye on his or her vital signs. If applying pressure does not work, the patient and the extraction site should be

thoroughly checked. To allow proper diagnosis of the origin of bleeding, local anesthetic should not contain a vasoconstrictor at this time. The extraction site can be gently suctioned and curetted. If the bleeding is caused by soft tissue and is arterial in origin, but does not involve the neurovascular bundle, cautery is usually an option. Bone wax or various hemostatic compounds can be used to treat bleeders on the bone as. Sutures can be used to support and preserve these materials within the socket. .[1,2,3]

In some cases, salivary enzymes may cause oral fibrinolysis, and fibrin-stabilizing agents such as epsilon-aminocaproic acid (Amicar) or tranexamic acid (Cyclokapron) may be helpful . Massive intraoperative bleeding is a rare occurrence and can be secondary to a mandibular arteriovenous malformation, which can be either low flow (venous) or high flow (arterial), The presence of such a malformation in the maxilla or mandible might be life-threatening since it causes uncontrollable bleeding when a tooth is extracted. In the study by Guibert-Tranier and colleagues, 8% of patients died as a result of excessive bleeding following tooth extraction. Arteriovenous malformations are rare in the maxillofacial region, but they are more common in other parts of the body. Physical examination and panoramic radiography are frequently used to detect arteriovenous malformations in the maxillofacial region. .[12-17]

A history of recurrent spontaneous bleeding from gingival is the most frequent objective sign. Other physical findings include gingival discoloration, hyperthermia over the lesion, subjective feeling of pulsation, the presence of a palpable bruit. Mandibular arteriovenous malformations usually appear as multinodular radiolucencies on radiographic studies, although significant lesions may be nonapparent. Angiography is necessary and essential to confirm the diagnosis and assess the extent and vascular architecture of the lesion. Treatment of mandibular arteriovenous malformations involves either embolization or surgical excision. Many reports describing the use of permanent embolic agents support their use and suggest that many arteriovenous malformations with angioarchitecture that supports a transvenous approach can be treated without surgery. .[12-19] '

Damage to adjacent teeth

The incidence of damage to adjacent restorations of the second molar has been reported to be 0.3% to 0.4%. Teeth with carious lesions large restorations are always at risk of fracture or damage upon elevation. Correct use of surgical elevators and bone removal can help prevent this occurrence. .[9-21]

Mandibular fracture

Mandibular fracture after third molar extraction is a well-known complication with important medicolegal and patient-care implications. It should be included on all consent forms for third molar extraction. A rare yet

serious consequence of surgical third molar removal is mandibular fracture. Mandibular fracture is reported to occur 0.0049 % after or after third molar removal. According to some studies, the incidence is significantly lower. In a retrospective study, Alling and colleagues found that 1 in 30,583 patients had a preoperative mandibular fracture and 1 in 23,714 had a postoperative mandibular fracture, whereas Nyul found one fracture in 29,000 cases. Predisposing factors include increasing age and mandibular atrophy. The presence of a cyst or tumor, as well as osteoporosis, have all been linked with an increased risk of mandible fracture. The preangular region of the mandible is an area of lowered resistance to fracture secondary to its thin cross-sectional dimension, and an impacted tooth occupies a relatively significant space within the bone of this region. The concurrent presence of a dentigerous or follicular cyst around third molar or a radicular cyst around second molar and removal of the tooth and any surrounding bone necessary to mobilize it further mechanically weakens this area. [11-16]

Displacement of third molars

Iatrogenically displaced of mandibular third molars can be seen in the sublingual, submandibular, pterygomandibular, and lateral pharyngeal spaces. Anatomic considerations such as distolingual angulation of the tooth, a thin or dehiscence lingual cortical plate, and excessive or uncontrolled force upon luxation can all contribute to this complication. Lower third molars that pass through a perforation in the thin lingual alveolar bone are usually pushed inferiorly to the mylohyoid muscle. Pogrel recommended that the operator put his or her thumb underneath the inferior border of the mandible in an attempt to direct the tooth back along the lingual surface of the mandible. The lingual gingiva may be reflected as far as the premolar region and the mylohyoid muscle incised to gain access to the submandibular space and deliver the tooth. In this approach, care should be taken to avoid injury the lingual nerve in this anatomic region. [21-28]

Locating the displaced tooth is challenging secondary to limited working area and hemorrhage with resultant compromised. [1,2,3]

visualization and blind probing that may result in further, displacement. Yeh described a technique that is a combination intraoral and lateral neck approach in which the original wound is extended lingually to distal of the first molar. A 4-mm skin incision is made in the submandibular region and a hemostat placed along the lingual surface of the mandible to stabilize the tooth while the surgeon palpates tooth with an index finger. A Kelly clamp can be inserted to deliver the tooth upward into the mouth. [22-28]

The author believed this method prevents additional displacement of the tooth and limits length of lingual flap reflection necessary. Displaced roots Maxillary and mandibular root tips rarely may be displaced into the aforementioned spaces. The management of these

displaced roots remains much the same. A mandibular third molar root may be displaced into inferior alveolar canal. Attempts at retrieval may further injure the neurovascular bundle and should be limited to one attempt with suction. [21-28]

Aspiration

Tooth aspiration is a danger with all third molar extraction procedures. The use of intravenous deep sedation by definition compromises the protective reflexes of the airway. The aspiration or swallowing of a tooth or portion of a tooth is usually the result of a patient gagging or coughing. [1,2,3]

Note: should give appointment to the patient after one week to remove suturing, and give instruction to patient such as eating soft food, not spitting. [1,2,3]

Postoperative Complication

Alveolar osteitis

AO is a clinical diagnosis characterized by the development of severe, throbbing pain several days after the removal of a tooth and frequently is accompanied by halitosis. extraction socket is commonly filled with debris and is conspicuous by partial or complete loss of the blood clot. The frequency of AO ranges from

0.3% to 26% AO is known to occur more frequently with lower wisdom extraction sockets, although the exact reason is not clear. The cause of AO is also poorly understood. (Birn) suggested that. [22-29]

AO is the result of release of tissue factors leading to activation of

- 35 -plasminogen and the subsequent fibrinolysis of the blood clot. This could also may explain the apparent increased incidence of AO when surgery is more difficult and traumatic. (Nitzan) suggested that.

A localized bacterial infection is the primary cause of AO. A complex pathophysiology involving a localized bacterial infection and subsequent fibrinolysis is likely to cause AO. [1,2,3]

In an extensive review of the literature, (Alexander) discovered multiple research that supported increasing age, female gender, oral contraceptives, smoking, surgical trauma, and pericoronitis as risk factors for AO.

although a significant number of studies also refuted these purported associations. same author found a majority of studies that supported the use of generous intraoperative lavage, perioperative antiseptic mouth wash, intra-alveolar medicaments & systemic antibiotics to reduce the incidence of AO. [21-27]

Swelling

The extraction of impacted mandibular third molars is one of the most common surgical events. Patients' postoperative facial swelling following third molars extraction is very common. The severity of the facial swelling is depending on the case and the facial

swelling originated in an inflammatory process that initiated by surgical trauma. The facial swelling is more likely occurring in those patients who received impacted mandibular third molars extraction with utilizing flap operation and bone removal. The factors thought to influence the incidence of facial swelling after third molar removal include patients' age, gender, physique and oral hygiene. In addition, the incidence of facial swelling is related to the type of third molar, the degree of impaction, and ease of extraction operations. As far as a specific patient is concerned, most of oral surgeons could predict the incidence of the facial swelling solely based on their personal experience . [23-30]

Trismus

is one of the common complications which occur following the extraction of mandibular imandibular impacted third molars, a routine outpatient surgery performed by oral and maxillofacial surgeons. The most severe cases of trismus usually occur at 2 days post-operatively. The primary causes include elevation of flap beyond the external oblique ridge, low-grade infection following local anesthesia and repeated stimulation of the medial pterygoid muscle (inferior alveolar nerve block), as well as other causes. The symptom of trismus is alleviated by the post-operative local injection of dexamethasone. Generally, trismus is gradually alleviated or disappears within approximately 1 to 2 weeks post-operatively; however, in very rare cases, trismus persists for >1 month. The present study reports the case of a patient who exhibited trismus for 45 days following mandibular third molar extraction. The patient received local and systemic anti-inflammatory treatment, as well as incision and drainage therapy under local anesthesia. Furthermore, the factors associated with the occurrence and development of trismus were also analyzed, and appropriate management strategies are discussed in order to provide an effective treatment method for affected patients, as well as to prevent the occurrence of trismus in the future . [23-31]

Dry socket

The incidence of dry socket varies a lot from study to study. According to a 2014 systematic review shows a median incidence of 2.9% when using a triangular flap or 10% with an envelope flap. *Treponema denticola* and other spirochetes are sometimes implicated in the condition and have been shown to produce fibrinolytic enzymes which break down the all-important blood clot. Many risk factors are including, such as female gender, surgeon's skill and difficulty of extraction. Surgical removal presents a risk of nine times greater than normal forceps extraction. Smoking is thought to be a significant risk factor: one study demonstrated that smoking following surgery tripled the risk of developing dry socket. A recent randomized controlled trial gave an overall incidence of 4% in lower third molar surgery. In this study an incidence of 10% was had observed in control group, this was reduced to 2%

when chlorhexidine gel was applied to the socket and there were no cases paste Coronectomy Once the investigations have been assessed the surgeon can then advise the patient of the risks and benefits between surgical removal and Coronectomy. [23-31]

Paresthesia

is an altered sensation of the skin, manifesting as numbness, partial loss of local sensitivity, burning, or tingling. Facial paresthesia has a known etiology in 83% of cases, and 48% of these have been attributed to a dental procedure [2]. In paresthesia resulting from dental procedures, the inferior alveolar nerve (IAN) and lingual nerves are the most commonly implicated nerves

IAN paresthesia occurs in 0.35% to 8.4% of patients, and the neurologic symptom duration varies greatly from days or weeks to several months. In general, neurosensory deficits after third molar surgery spontaneously recover in the first 6 postoperative months and the incidence of permanent sensory disturbance was reported as 0.12%. Direct trauma to the IAN during dental procedures and indirect trauma from edema or hematoma are reported mechanisms of IAN paresthesia.

The altered sensation is usually noted by the patient on the day of surgery, once the effects of any local anesthetic have resolved. However, on rare occasions, patients report onset of paresthesia a few days to months after the procedure. Delayed paresthesia was represented by only 5% of the 60 cases of paresthesia reported in a study of 1477 third molar surgeries. The biggest difference between classic paresthesia and delayed paresthesia is that the former begins immediately after the procedure and healing is not guaranteed, while the latter occurs later, with restoration to original condition. [21-31]

Infections

Are Reportedly One Of The Possible Complications After This Procedure, But Few Studies Have Considered A Follow-Up Beyond The First Week After Surgery, Which Is Usually When Patients Return For Suture Removal.

Delayed-Onset Infections (Doi) After Mandibular Third-Molar

Extractions have been described as a rare complication

with postoperative application of non-resorbable eugenol based characterized by swelling, usually with a purulent discharge at the extraction site, developing approximately a month after surgery. The incidence of such DOI reported in the literature ranges between 0.5% and 1.8%. The risk factors identified as being associated with this complication are gender (female) and tooth position (mesioangular or vertically tilting, with total mucosa retention, or deep bony impaction). It is not clear whether the ability of the surgeon can influence the occurrence of this complication. [1,2,3]

In most cases, the treatment of choice involves systemic antibiotics (generally amoxicillin clavulanate) and local antimicrobial mouthwashes (e.g., chlorhexidine 0.2%). When the antibiotic treatment is ineffective, then surgical debridement of the extraction site becomes necessary. The bacteria identified in DOI are *Fusobacterium*, *Prevotella*, *Bacteroides*, and *Peptostreptococcus*. DOI usually occur about thirty days after the extraction, but they may also develop much later on. [23-31]

Temporomandibular joint complications

There is currently little evidence to support a causal association between third molar extraction and temporomandibular (TMJ) damage, it has been suggested that because the extraction of mandibular third molars requires the patient to open his or her mouth wide for an extended period of time and exerting a varied amount of force on the mandible, it is possible to overload or injure one or both temporomandibular joints. This result would be the case especially if the surgeon did not use correct surgical technique or failed to support the mandible while removing the mandibular third molars or if the patient's protective mechanism for opening was exceeded while under general anesthesia. Oral and maxillofacial surgeons should include an examination of the temporomandibular region, including the evaluation of joint sounds, opening and excursive movements, temporal/masseter/ pterygoid muscle tenderness in all preoperative third molar extraction patients. Care should be taken in judicious application of force and a bite block should be used to stabilize the mandible upon surgical mobilization of the lower third molar teeth. [28-32]

CONCLUSION

Lower third molar surgery is a very common procedure, but it is associated with many risks and complications. Fortunately, significant complications are rare but needs to be diagnosed and managed early in order to reduce morbidity and mortality rate. Morbidity increases with age of the patient, duration of the surgical procedure, depth of the impacted tooth in the bone and sex of the patient [complications are more in females]. Thus complications after lower third molar surgery still remains an important factor in quality of life in post-operative periods. Oral and maxillofacial surgeons should be aware of the different modalities available in reducing the complications and to make post-operative recovery more comfortable for the patients.

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