Review Article

Complications of Impacted Lower Third Molar Surgery and its Management

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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. n 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.

INTRODUCTION

Surgical removal of the impacted lower third molar tooth is one of the most commonly performed procedures in oral and maxillofacial surgery. The common indications for removal of third molar teeth are pain, recurrent swelling and infection. There are many general and local factors that contribute to the impaction of a third molar such as position and size of the adjacent teeth, abnormal eruption pattern, excessive soft tissue abnormality or the density of the overlying bone.[1] Impactions can be classified as complete and partial impaction. Complete impaction is said to occur when the tooth is completely covered by bone and mucosa and when the tooth is unable to obtain its normal functional position. Partial impaction on the other hand is defined when the tooth is partially visible and it comes in communication with the oral cavity, but it is has failed to erupt fully into normal functional position[2] the commonly impacted teeth are the mandibular and maxillary third molars, followed by maxillary canines and mandibular premolar. There are many factors which can be distinguished as the causative agents of a third molar impaction such as soft food diet and less usage of masticatory apparatus.[3] Many authors have also suggested that age and gender also contribute to mandibular third molar impaction. The age of the patient plays an important role in occurrence of impaction. Impaction is common in the age group of 20 to 30 and the phenomenon reduces with the increase in age and at the age about 50 the occurrence is only about 14%.[4] Its occurrence is more common in Caucasians and females are more predisposed to develop impacted teeth than males. Any surgery is not without complications. Several factors in the facial region can cause complications during and after impacted lower third molar surgery. It is essential for the surgeon to have an adequate idea about the various complications that can occur and the measures to manage them.

Pain, Trismus and Surgical Edema

Pain, trismus and surgical edema are the most common complications that occur following impacted lower third molar surgery. Surgical edema or swelling occurs immediately after the removal of third molar and it reaches to maximum level 2 to 3 days postoperatively and resolves by 7 days.[5] Application of excessive forces for retraction of soft tissues results in unnecessary swelling. Preoperative and postoperative systemic corticosteroids and postoperative ice application extra-orally has proven to limit the postoperative swelling and improves patient's comfort. Low level laser therapy also has been attributed to be useful in reducing postoperative edema. Trismus is often the result of surgical trauma which occurs secondary to masticatory muscle inflammation [especially medial pterygoid muscle].Preoperative steroids, postoperative mouth opening exercises and muscle relaxants like chlorzoxazone are useful in trismus management. Pain caused by third molar surgery usually begins after the anesthesia given during the procedure subsides and reaches peak levels 6 to 12 hours postoperatively. Analgesics like paracetamol and non-steroidal inflammatory drugs either alone or in combination with steroids and narcotics has been advocated for management of pain.[6] Pain and swelling is lower with secondary wound healing when compared with primary wound healing. If the duration of the

surgery is longer, then the severity of pain, swelling and trismus also increases.

Post-Operative Infections

Post-operative infections after third molar surgery occur due to the presence of large variety of indigenous oral flora. Achieving adequate hemostasis, meticulous tissue management, and complete lavage of extraction site can decrease the occurrence of post-operative infection. The overall incidence of infection from third molar extraction has been reported to be in the range of 3% to 5%. The rate of post-operative infection is higher in mandibular bony impactions. Systemic administration of antibiotics has been proved to prevent post-operative infections.[7]

Alveolar Osteitis

Alveolar osteitis, also known as dry socket is a very painful complication which occurs post extraction. The incidence of dry socket ranges from 0.5%-5% for all routine extractions. In this condition healing may occur in few weeks by sequestration or resorption of the necrotic bony walls of the socket and secondary intention with epithelialization delayed. Birn's fibronolytic theory and the bacterial theory are two main theories stipulated currently for the etiopathogenesis of alveolar osteitis.[8]

Dry socket occurs more frequently in females than males, pointing to a possible hormonal cause. Sweet and Butler (1978) found the incidence of dry socket to be 4.1% in females versus 0.5% in males. Oestrogen in oral contraceptives has been shown to increase plasma fibrinolytic activity and it is hypothesized that this may contribute to instability of blood clot in the socket.[9] Following removal of the tooth, patient will report an initial improvement or reduction in pain experienced at the first 24 hours and then subsequently develops a constant pain that continues throughout the night, becoming more intense at 72 hours post extraction. Clinically an empty socket with exposed bone is seen and there may or may not be halitosis present. The socket may be filled with a mixture of saliva and food debris.[10]

Management of alveolar osteitis

Dry socket is a self-limiting condition. Thus it requires only symptomatic treatment. The range of treatment for a dry socket includes:

1. In appropriate cases, radiographs should be taken for elimination of retained roots and bony fragments.
2. The socket should be irrigated with warm 0.2% chlorhexidine digluconate to remove necrotic tissue and so that any food debris can be removed. Local anaesthesia occasionally may be required during this procedure.
3. The socket can be lightly packed with an abundant dressing [zinc oxide eugenol pack] to prevent food debris entering and causing local irritation of the exposed bone.
4. Non-steroidal anti-inflammatory drug (NSAID) should be prescribed to patients if there is no contraindication according to their medical history.
5. Patients should be kept under review until the pain subsides and instructions can be given to patient to irrigate the socket with chlorhexidine digluconate 0.2% with a syringe at home.[11]
   Several studies have shown pre and post-operative use of chlorhexidine mouthwash rinses and application of chlorhexidine gel into the alveolus will decrease the incidence of dry socket.

Postoperative Bleeding

Excessive postoperative bleeding is defined as bleeding that occurs beyond expectation after extraction or continued bleeding which occurs beyond the postoperative window for clot formation. Excessive bleeding and hemorrhage occurs in a range of 1-6% in third molar surgery. Excessive bleeding is said to occur most commonly in mandibular third molar surgery when compared to the maxillary counterparts and is seen more in older patients than younger patients. This maybe because in older patients vascular fragility is common and the coagulation mechanism is less effective when compared to younger patients. Deeply positioned and distoangular or horizontally positioned lower third molars have a high risk for haemorrhage. Identification of patients at risk is a critical step in appraising the likelihood of bleeding complications after third molar surgery. Careful soft tissue management and local haemostatic measures can control most bleeding problems.[12] the risk of haemorrhage is lower in cases where primary wound healing occurs with promptly secured sutures. Hematoma as a complication can occur and is managed by antibiotic therapy for 3-5 days. Surgical emphysema, another complication which occurs due to forceful entry of air into soft tissues during surgical procedure through the reflected mucoperiosteal flaps is a self-limiting disease which subsides on its own within a week.

Delayed Healing and Wound Dehiscence

Extraction of impacted teeth involves manipulation of both soft and hard tissues. Thus after raising mucoperiosteal flap, ostectomy will be done. The flap is usually placed in its previous position and sutured after removal of the teeth.[13, 14] This is called as primary wound healing. There are many designs for raising the mucoperiosteal flap and exposing the impacted lower third molar but the most commonly used flap design is modified triangular flap and the envelope/sulcular flap. Many authors have given opinion that modified triangular flap gives better results, being significantly less likely to develop wound dehiscence and thus secondary healing of the wound.[7] Although, secondary healing might be responsible for longer periods of discomfort and possibly increase incidence of alveolar osteitis along with loss of gingival attachment distal to second molar, however has some advantages like reduction of swelling, pain and

trismus after the surgery.[15] According to one study, flap design has no influence upon periodontal healing post-operatively and it is up to the operator to choose the flap design for Mandibular third molar surgery.[16]

Mandibular Fracture

Mandibular fracture during or after lower third molar removal isa major complication and it occurs at the angle region. The reason for this major complication is believed to be multifactorial and includes age, gender, degree of impaction, relative volume of tooth in the jaw, preexisting bony lesions, failure of maintaining soft diet in the post-operative period and surgical technique. The higher incidence of fracture was reported to be among patients over 40 years mostly in males.[17, 18] this is because aging is a main factor that leads to weakening of mandible and reduction in bone elasticity. Ankylosis of the impacted tooth among older patients also may complicate tooth removal and weaken the mandible. In order to reduce the amount of bone removal sectioning of tooth is also advised. Risk of fracture is also high in patient with full dentition. Patients with full dentition are able to produce high level of biting forces that are transmitted to the weak mandible during mastication and consequently producing high risk of fracture. Moreover the degree of impacted also plays an important role in mandibular fracture. Fully impacted teeth will have higher incidence of mandibular fracture, due to greater volume of bone necessary to be removed during the surgery, weakening the mandible. Bony lesions such as periodontal disease, cyst or recurrent pericoronitis also may weaken the mandible and cause fracture.[19] During maxillofacial trauma, mandible angle fractures are more likely to occur if there is an associated deeply impacted lower third molar tooth as it weakens the mandible.

Treatment modalities

Treatment methods for mandibular angle fractures are:

a) Reduction and fixation using inter maxillary fixation
b) Wire osteosynthesis
c) Lag screws
d) Mini plates and screws

Besides this many studies have shown that, of the different techniques used to fix mandibular angle fractures, the single miniplate at the upper border has the least morbidity, with the lowest number of complications. Therefore, the single miniplate has become the standard technique used to fix fractures of the mandibular angle.

DAMAGE TO ADJACENT TEETH

Damage to adjacent teeth is a common complication during third molar surgery. This occurs because of the high force required to remove third molar, it is possible to damage the adjacent tooth.[20] Fracture of the adjacent teeth can be minimized if care is taken to visualize the entire operating field rather than the tooth or teeth to be extracted. However fractures still may occur even with adequate awareness and careful surgical technique. If an adjacent tooth is luxated or gets avulsed the most common treatment is repositioning of tooth followed by fixation and immobilization for 3-4 weeks. Fixation includes using of sutures laterally across the occlusal surface, dental wires, arch bars and composite splint. Soft diet is advised.[21] Care should be taken to prevent accidental displacement of lower third molar into submandibular, lingual or pterygomandibular spaces during the surgical procedure. Distolingual angulated lower third molar teeth are more prone for displacement.

Periodontal Defects in Third Molar Surgery

Surgical extraction of third molars usually requires a gingival flap and ostectomy which may lead to other complications like gingival changes, loss of bone, development of periodontal pockets and exposure of cementum on the distal aspect of second molars.[22] Studies have observed that greater periodontal breakdown, such as loss of attachment, higher incidence of plaque, gingivitis and periodontal pocket occurs in the adjacent second molar after surgical removal of the third molars. This is said to occur due to the influence of aging over the healing function.[23] usually healing occurs faster in younger people than in old age. It was said that age decreases the cellular immunity against dental plaque. A low immune response could produce different periodontal responses between younger and older patients and the physiological changes in periodontium increases with age.[24] Thus it is always advisable to remove third molars at an earlier age to produce more beneficial effect on the periodontal health of the adjacent second molar. Besides age, other factors which may influence periodontal healing is preoperative intra-bony defects or probing depths, the size of the contact region between second and third molars and root resorption.[24]

Nerve Injury

The surgical removal of lower third molar endangers both the lingual and inferior alveolar nerves. Patient having an injury to either of these nerves must be managed correctly. Surgical intervention [micro neurosurgical repair]for a damaged inferior alveolar nerve or lingual nerve is not usually indicated but maybe undertaken immediately if the nerve is completely divided and the severed ends are misaligned.[25]

Inferior alveolar nerve

The inferior alveolar nerve travels a significant distance within bone in the mandible. In the mandibular canal it is supported by connective tissues and other structures in the neurovascular bundle. The relationship between inferior alveolar nerve and roots of third molar can be diagnosed radiographically.[10] A higher incidence of inferior alveolar nerve injury has been reported with third molars that are horizontally or mesioangularly impacted and have complete bone cover.[26] Coronectomy is a procedure followed to prevent injury to the inferior alveolar nerve in high risk cases.

Lingual nerve

The lingual nerve is different from the inferior alveolar nerve. The nerve is covered only with a thin layer of soft tissue and mucosa rather than being in a bony canal. In the reported frequency of lingual nerve injury during third molar removal, 0.2-22% patient reported sensory disturbance in the early post-operative period. Several studies have shown that raising and retraction of a lingual mucoperiosteal flap is associated with an increase in frequency of lingual nerve damage.[27] Lingual nerve damage is mostly associated with deeply impacted teeth when the surgery is difficult particularly when distal bone removal is required.[28]

Buccal Nerve

This nerve descends between the two parts of lateral pterygoid muscle, medial to the ramus of the mandible, and then passes laterally across the external oblique ridge distal to the third molar to supply the cheek. As the nerve crosses the external oblique ridge it is made up of between one and five branches, the lowest of which maybe 1cm below the deepest concavity of the ridge. Therefore part of all the nerve is at risk when the distal relieving incision is made during third molar surgery.[29]

Treatment for nerve injury

Most cases of nerve damage during wisdom tooth removal are not identified at the time of removal but in the post-operative period. However, careful monitoring of sensory recovery over three month period should distinguish between these different types of injury and to form a judgment as to whether or not the nerve is likely to recover spontaneously, or if surgical intervention will be required. Sensory deficit in the area innervated by the nerve can manifest as paraesthesia or anesthesia. Surgical intervention is unlikely for paraesthesia. Monitoring sensory recovery is undertaken by application of stimuli to the numb area. Responses of the patients will indicate first the arrival of regenerating nerve ends and then subsequently the level of recovery.[30]

Simple sensory testing

A standard protocol for sensory testing does not exist. Suggested techniques include:

- Light touch sensation

  Mapping out and photographing the area involved. Light touch is most commonly tested by gently applying a wisp of cotton wool to the skin or lining of the cheek or lips. However it is difficult to apply the stimulus in a reproducible manner and the use of a cotton wool wisp on moist oral mucosa is difficult.

- Pin prick sensation

Pin prick sensation is often tested by using a dental probe or needle but reproducibility is poor. Areas of anesthesia can be mapped. If sensation is present within the affected area on the injured side, then the pin prick sensation threshold is determined. The probes are drawn few millimeters across the surface, at a constant pressure and the patient is asked to indicate the point at which the sensation becomes sharper rather than dull.

- Two point discrimination

This test is performed with pairs of blunt with different separation (2-20mm). The probes are mounted around a disc. The probes are applied at a series of fixed sites chosen on the lips or tongue, depending on which has been damaged. The probes are drawn few millimeters across the surface at a constant pressure and the patients are asked whether one or two points are felt. The minimum separation that is consistently reported as two points, is termed as the two point discrimination threshold.

- Taste stimulation

Lingual nerve injury will result in taste loss. Cotton wool pledgets soaked in saline solution, sugar solution, vinegar or quinine solution are drawn 1-2 cm across the side of the tongue and the patient asked to indicate whether they taste salt, sweet, sour, bitter or no taste. Stimuli should be applied in random order, to each side of the tongue and rinsing with tap water between tests.[31]

If there is no evidence of progressive sensory recovery after three months post-injury then surgical intervention may be required.

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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