

Neuropraxia of the Inferior Alveolar Nerve Secondary to Odontogenic Infection: A Case Report

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I. Introduction

The inferior alveolar neurovascular bundle runs in the mandibular canal (inferior alveolar canal) which is covered by dense cortical bone. The mandibular canal is in close vicinity of the roots of the mandibular third molars and this relationship varies according to the depth of impaction of the third molars. The inferior alveolar nerve provides sensory innervation to the mandibular molars before it terminates in the incisive branch and mental branch. The inferior alveolar nerve is more commonly injured following fractures of the mandible, but it may also be involved by neoplastic conditions and odontogenic infections and iatrogenic causes^{1,2,3,4}.

II. Case Report

A 32 year old male presented with the complaint of pain in mandibular right third molar and numbness of the lower lip on right side. Patient had pain in mandibular right third molar since 2 days and then he started experiencing numbness of the lower lip on right side. Patient had no significant past medical and dental history. Clinical examination revealed partially visible carious mandibular right third molar which was tender to palpation and right submandibular lymph nodes which were enlarged and tender to palpation. Patient was also found to be suffering from trismus. Paraesthesia of the region along the distribution of the right mental nerve was demonstrated on clinical examination. It was planned to study the proximity of the roots of the mandibular right third molar to the inferior alveolar canal with the help of Plain Computed tomography scan (CT Scan) of mandible; control the odontogenic infection with medication and then under local anaesthesia, extract the mandibular right third molar surgically by sectioning of the tooth. Anticipating close proximity of the roots of the mandibular right third molar to the inferior alveolar canal, plain CT scan of mandible was done. As anticipated, the CT scan revealed close proximity of the roots of the mandibular right third molar to the inferior alveolar canal and periapical rarefaction in close vicinity of the inferior alveolar canal (See Fig. 1, 2, 3).

Fig.1 Computed tomography scan of patient (Coronal view)

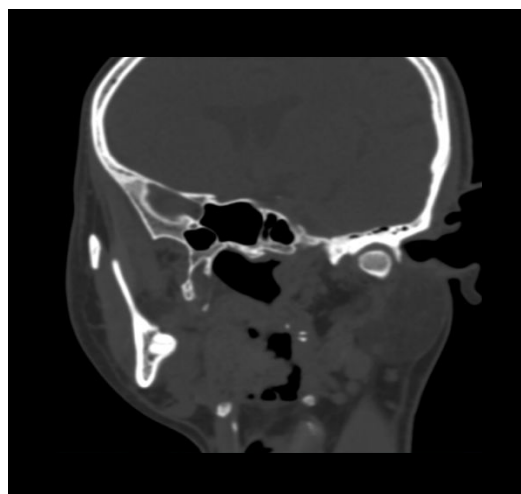


Fig.2 Computed tomography scan of patient (Axial view)

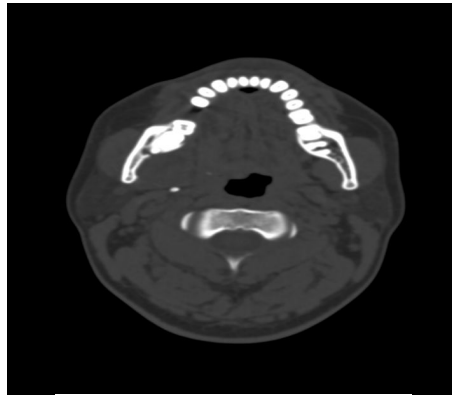
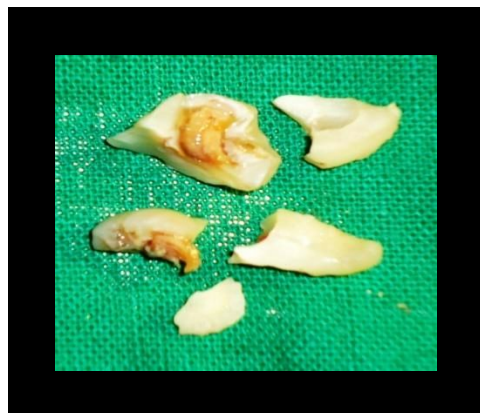


Fig.3 Computed tomography scan of patient (Sagittal view)



Patient was informed about the treatment plan and the possibility of injury to the inferior alveolar nerve and the measures that would be taken during the surgery to prevent the same. With medication, patient's general condition improved a lot and the paraesthesia of the right mental nerve reduced considerably. Under local anaesthesia, transalveolar extraction of the mandibular right third molar was carried out by sectioning of the tooth (Fig.4). Postoperatively, the patient did not experience mental nerve paraesthesia and the surgical wound healed uneventfully.

Fig.4 The impacted mandibular right third molar removed surgically by sectioning of tooth.



III. Discussion

Third molar surgery is one of the most commonly performed minor surgeries by a maxillofacial surgeon. Mandibular third molars are located in the angle region of mandible which marks the junction of the ramus with the body of mandible. The third molars are the last teeth to erupt in the oral cavity, usually erupting at the age of 16 to 25 years⁵. However, owing to the changing dietary habits and evolutionary changes, the jaw size has been found to be showing signs of reduction, one of them being the mandibular third molars getting impacted more frequently. At times, if the third molars erupt completely, they are placed in an unfavourable position i.e. buccally or lingually or at an angle to the adjacent second molars. This unfavourable position of the third molars makes it very difficult to keep them clean and so the third molars are found to be affected by dental caries more frequently^{5, 6, 7}. Infections from the third molars spread to involve the masticator spaces more commonly⁸. However, the periapical infection from the mandibular third molars is also in the close vicinity of the mandibular canal and it may spread around the inferior alveolar nerve and cause paraesthesia. The irritation from the periapical infection around the inferior alveolar nerve may cause neuritis thereby manifesting the cardinal signs of inflammation (rubor, calor, dolor, tumor, functiolaesa). However, as the inferior alveolar nerve is confined within a bony canal, there is not enough room for the inflamed nerve to swell and this may cause compression of the nerve itself thereby causing ischaemic injury and further aggravating the neurological signs (paraesthesia). The irritation from the pus also causes inflammation of the inferior alveolar nerve and the pressure from the pus can cause ischaemic injury to the inferior alveolar nerve.

Surgical management of impacted mandibular third molars is a great challenge to the maxillofacial surgeon. It is important to take into consideration the patients' anatomical factors, patients' viewpoint of the surgery along with his/her past experiences, radiological assessment of the impacted mandibular third molars. Establishing a correct diagnosis demands comprehensive clinico-radiological assessment and the surgeons' experience in handling complicated cases. It is an important aspect of patient management to warn the patient of the possibility of injury to the inferior alveolar nerve in the course of management of deep seated impacted mandibular third molars^{9, 10}. Patients naturally have the "fear of the unknown" which raises their anxiety; but the best and the easiest way to control the patients' anxiety is by providing them with the detailed information about the nature of the disease, the surgical management planned for treating the disease, likely complications associated with the surgical management and the assurance to be competent enough to handle the complications, if any, which may occur during the course of surgical management. Having a healthy and comprehensive conversation with the patient pertaining to the disease they may be suffering from and the proposed surgical management preoperatively is an important step towards prevention of litigation¹¹.

When surgically removing the impacted mandibular third molars, all aseptic precautions should be followed. Copious irrigation should be done when preparing the buccal gutter to prevent thermal injury to the bone. If radiological assessment^{12, 13, 14, 15, 16} is suggestive of unfavourable root configuration, sectioning of the tooth is indicated. Sectioning of tooth offers several advantages like less of bone is removed, postoperative pain, swelling and discomfort are kept to a minimum, the axis of rotation of the tooth (to be removed surgically) becomes favourable following sectioning of tooth¹⁷, sectioning of the roots allows unfavourable roots to be removed individually along their path of withdrawal¹⁵ (*Path of withdrawal is the path along which a tooth or a tooth root can be removed easily by the least application of force*), possibility of damage to the adjacent tooth is also reduced due to the favourable axis of rotation of the third molar following sectioning of the tooth, chances of injury to the inferior alveolar nerve are minimized following the sectioning of the tooth. After the tooth has been delivered, overzealous exploration of the socket should be avoided to prevent likely injury to an exposed nerve. Also, suctioning of the extraction wound to look for the exposed nerve should be avoided to prevent injury to the nerve. The socket can be gently dried with gauze and inspected for any loose bone fragments which may impinge on an exposed nerve, and hence should be removed before closure of the wound. Bleeding from the surgical wound should be controlled prior to closure to prevent compression injury to an exposed inferior alveolar nerve from an impending haematoma. When the surgeon anticipates a fair amount of postoperative swelling due to the handling of the tissues, measures to prevent compression of an exposed nerve may be adopted eg. use of a glove drain for 2-3 days, use of steroids in tapering dosages. Postoperative care of the surgical wound with medication and proper oral hygiene care is equally important for uneventful healing. Many factors determine the outcome of injury to nerve tissue such as the age of the patient, host response, experience of the surgeon, handling of the tissues at the time of surgery.

IV. Conclusion

Surgical skill is dependent on two important aspects: assessment of the case and management. "It is a fundamental principle of medicine that in the clinical setting, assessment and management begin and proceed simultaneously." Complications can arise in a surgical procedure, but the best and the easiest way to manage a complication is "to prevent it." It is important to be well equipped with knowledge, surgical skill and the necessary armamentarium to prevent a complication during a surgical procedure; and to handle one if it occurs during the course of surgery.

References

- [1]. Gintaras Juodzbaly, Hom-Lay Wang, Gintautas Sabalys, Antanas Sidlauskas, Pablo Galindo-Moreno, Inferior alveolar nerve injury associated with implant surgery. *Clin.Oral Impl. Res.* 24,2013, 183–190.
- [2]. Andrew B.G Tay, Inferior alveolar nerve injury in trauma-induced mandible fractures, *Journal of Oral and Maxillofacial Surgery* September 2007 Volume 65, Issue 9, Supplement, Page 40.
- [3]. Tara Renton , Prevention of iatrogenic inferior alveolar nerve injuries in relation to dental procedures, *Dent Update* 2010; 37: 350–363.
- [4]. Hanlie Engelbrecht ,Shabnum Meera, Jeff F. Kourie, Perineural infiltration of the inferior alveolar nerve in mandibular ameloblastomas, *Br. J. Oral Maxillofac Surg*(2013),<http://dx.doi.org/10.1016/j.bjoms.2013.02.002>
- [5]. GökseilŞimşek Kaya, Muzaffer Aslan, Mehmet MelihÖmezli, ErtunçDayr, Some morphological features related to mandibular third molar impaction ,*J Clin Exp Dent.* 2010;2(1):e12-7
- [6]. Nazir A, Akhtar MU, Ali S. Assessment of different patterns of impacted mandibular third molars and their associated pathologies. *J Adv Med Dent Scie* 2014;2(2):14-22.
- [7]. Dr Ajay Kumar Pillai, Dr Parimala Kulkarni, Dr Swapnil Moghe, Dr Vineesh Vishnu, Dr Saurabh Dhanraj Yadav, Dr Syed Saquib Dastagir, Infra - temporal & temporal abscess – Retrograde infection from mandibular molars, *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*Volume 13, Issue 11 Ver. VI (Nov. 2014), PP 96-99.
- [8]. Dr G.V Thakur, ,Dr V.T Kandakure, , DrA.Thote, , Dr Ayesha .K,Masticator Space Abscess: A Case Report, *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, Volume 7, Issue 2 (May.- Jun. 2013), PP 64-67.
- [9]. JózsefSzalma, Inferior alveolar nerve injuries and impacted lower third molars: The importance of third dimension, *Edorium J Surg* 2015;2:12–15.
- [10]. Pitekova L, Satko I, Novotnakova D, Complications after third molar surgery, *Bratisl Lek Listy* 2010, 111 (5), 296-298.
- [11]. Hesham F. Marei, Medical litigation in oral surgery practice:Lessons learned from 20 lawsuits, *Journal of Forensic and Legal Medicine*, 20 (2013): 223-225.
- [12]. Hemamalini Balaji ,Dr.K.Laliytha, Evaluation of impacted mandibular third molar using panoramic radiographs, *J. Pharm. Sci. & Res.* Vol. 7(11), 2015, 940-945.
- [13]. FábioWildsonGurgel Costa, Erick Helton Lima Fontenele, TácioPinheiroBezerra, Thyciana Rodrigues Ribeiro, BárbaraGressy Duarte Souza Carneiro, Eduardo Costa Studart Soares, Correlation between radiographic signs of third molar proximity with inferior alveolar nerve and postoperative occurrence of neurosensory disorders. A prospective, double-blind study, *Acta CirúrgicaBrasileira - Vol. 28 (3) 2013*, 221-227.
- [14]. Hang-Gul Kim, Jae-Hoon Lee, Analysis and evaluation of relative positions of mandibular third molar and mandibular canal impacts, *J Korean Assoc Oral Maxillofac Surg* 2014;40:278-284.
- [15]. T. Renton, N. Smeeton, and M. McGurk, Factors predictive of difficulty of mandibular third molar surgery, *British Dental Journal* volume 190 no. 11 June 9 2001; 607-610.
- [16]. Pallavi Sinha, Anuradha Pai, Assessment of proximity of impacted mandibular third molar roots to the mandibular canal using intraoral periapical radiography and cone-beam computerized tomography: A comparative study, *International Dental & Medical Journal of Advanced Research* (2015), 1, 1–5.
- [17]. Sam E. Farish, DMD,Gary F. Bouloux, General Technique of Third Molar Removal, *Oral Maxillofacial Surg Clin N Am* 19 (2007) 23–43.