

Partial Odontectomy- To Shield The Inferior Alveolar Nerve ?

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ABSTRACT

Purpose : Iatrogenic inferior alveolar nerve injury is highly probable during third molar surgeries especially in cases where the roots are in close approximation with the inferior alveolar canal. It presents as a difficult clinical situation with the patient having altered sensations for a varied period of time. The aim of the study was to evaluate the efficiency of partial odontectomy in preventing injury to inferior alveolar nerve without causing any other complications.

Patients and methods: A study design with a sample size of twenty patients, all of whom had impacted mandibular third molars in close approximation with IAN evaluated by IOPAR's and panoramic radiographs was considered. Ten patients were included in group I who underwent partial odontectomy and ten

patients in group II underwent complete surgical removal of impacted mandibular molars.

Results: The mean follow up time for both the groups was six months. One case of Inferior alveolar nerve injury was found in the surgical removal group ,who developed signs of neuropraxia which resolved within a week. One case in complete surgical removal group developed a dry socket while none of the cases in coronectomy group developed a dry socket. Post operative infection was seen in none of the cases in both the groups.

Conclusion: Partial odontectomy/coronectomy is an alternative technique to preserve the vitality of inferior alveolar nerve in selected cases. A long term followup period is required to assess the fate of the embedded root after coronectomy.

Key words: Odontectomy, Mandibular Third Molar, Impacted Tooth

INTRODUCTION

Inferior alveolar nerve injury during removal of lower third molar is a notorious clinical and more often an undesirable medico-legal issue. The results of damage to inferior alveolar nerve are unpredictable, with many cases showing recovery, while some other cases show no recovery¹.

Nerve injury could occur as a result of direct trauma to the nerve during injection of local anaesthetic, surgical incision, removal of bone, sectioning the third molar or manipulation of tooth with an elevator. It usually presents with paresthesia or anesthesia of lower lip, chin and buccogingival area of affected side. Certain indirect causes like post surgical oedema, hematoma formation and infection have also been implicated as the causes of dysesthesia.

Meticulous Preoperative examination can help avoid surgical complications. Various investigations like intraoral periapical radiograph, digital orthopantomograph have been used widely with varied incidence of accuracy in prediction of post operative neurosensory deficit. Currently advanced imaging modalities like low dose Cone beam CT scan, is being used for preoperative assessment of close proximity of inferior alveolar nerve with the lower third molar which allows accurate imaging of the relationship between the inferior alveolar canal and the lower third molars.

Certain approaches used to minimize the risk of nerve injury during surgical removal of mandibular third molars are, the staged removal of third molars, orthodontic assisted removal and coronectomy (intentional partial odontectomy).

Coronectomy as defined by Pogrel Lee and Muff is a technique to remove the crown of a tooth while leaving the roots (which maybe closely related to inferior alveolar nerve) untouched, so that the possibility of nerve damage is reduced.²

This study is aimed at evaluating the efficacy of partial odontectomy of impacted third molars in preserving the vitality of inferior alveolar nerve, and also to assess the possible

complications of the same.

PATIENTS AND METHODS

This study was conducted with a sample size of 20 cases with impacted mandibular third molars in close approximation with IAN. Partial Odontectomy was performed in GROUP I (10 patients) and GROUP II (10 patients) underwent complete surgical removal.

Inclusion Criteria

1. Patient willing to take part in the study and oblige with post operative follow up regimen.
2. Patients in the age group between 19 yrs and 40 yrs.
3. Patients under ASA I category.
4. Patients with impacted mandibular third molars in close approximation to inferior alveolar nerve.
5. Radiographic criteria for selection is based on HOWE AND POYTON³ criteria:

Category I-radiolucent band across the root

Category II-loss or discontinuity of one or both white lines of inferior dental canal

Category III-Narrowing of inferior alveolar canal

Exclusion Criteria:

1. Patients below 19 yrs and above 40 yrs of age.
2. Patient suffering from any systemic disease.
3. Patients with horizontally impacted mandibular third molars along the course of inferior alveolar nerve
4. Patients with impacted mandibular third molars with peripical pathology.
5. Patients with pre existing defects of inferior alveolar nerve.

METHODOLOGY

Twenty patients who fulfilled the above criteria were selected for

the study. Preoperative assessment with detailed history, clinical examination, investigations as needed like Intraoral periapical radiograph, Orthopantomogram, routine blood investigations were obtained. Informed consent was taken from those who agreed to participate in the study.

Ten patients included in Group I category underwent partial odontectomy and ten patients in Group II underwent complete surgical removal of the impacted mandibular third molars under local anaesthesia (inferior alveolar, lingual and long buccal nerve block with 2% lignocaine hydrochloride with 1:80,000 epinephrine).

Facial skin preparation was done using savlon & betadine and standard draping procedure was carried out. Intra oral irrigation was done using normal saline with chlorhexidine solution.

- 1) Local anesthesia was secured with 2% lignocaine hydrochloride and 1:80,000 epinephrine.
- 2) A standard Terrance Ward's incision was placed and mucoperiosteal flap was reflected.
- 3) A lingual flap was raised and the lingual tissues retracted.
- 4) In Group I patients decrowning i.e, crown of the tooth was transected at an angle of 45° using 702 fissure bur. Crown was totally transected so that it could be removed with the tissue forceps alone and need not be fractured off the roots. Following removal of the crown of the tooth, fissure bur was used to reduce the remaining root fragments such that remaining roots were at least 2 - 3 mm below the crest of lingual and buccal cortical plates (Case 1).

CASE 1

PREOPERATIVE PICTURES



ORTHOPANTOMOGRAM

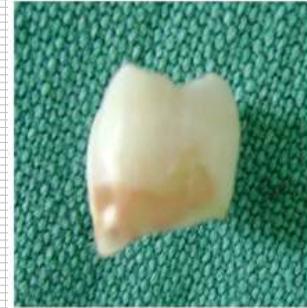


INTRAORAL PERIAPICAL RADIOGRAPH

INTRAOPERATIVE PICTURES



PROCEDURE



TRANSECTED CROWN

POST OPERATIVE PICTURES



SIX MONTHS ORTHOPANTOMOGRAM



IMMEDIATE INTRAORAL PERIAPICAL RADIOGRAPH

- 5) In Group II patients, Distobuccal bone cutting was done and tooth was sectioned if it was indicated, and was completely removed.
- 6) After the wound was thoroughly debrided and irrigated in both the groups, wound was closed primarily using 3-0 Black Braided Silk (BBS) suture. Post surgical instructions were advised and medications were prescribed.

FOLLOW UP DESIGN:

- 1) Patients under both the groups were followed up for six months with radiographs at two intervals; immediate and after six months post operatively.

2) Twelve hours post operatively, patients of either group were assessed for intensity of pain experienced using a numerically rating scale with anchor points as 0-no pain to 10- worse pain possible. The numerically rating scale was graded as (0) no pain, (1-3) mild pain (4-6) moderate pain & (7-10) severe pain.(figure 1) Based on the rate of healing, the sutures were removed between seventh and tenth postoperative days.

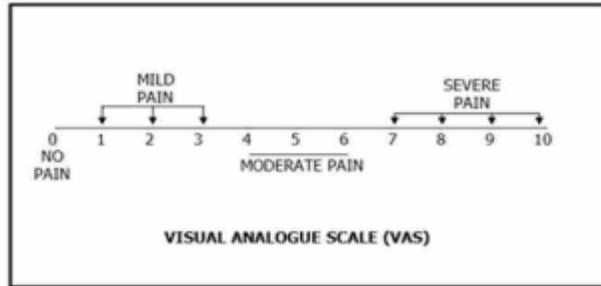


FIGURE 1
VISUAL ANALOG SCALE FOR ASSESSMENT OF INTENSITY OF PAIN

3) The function of inferior alveolar nerve was initially assessed for 24 hrs and also on the fifth day post operatively. Those who reported with numbness in the lower lip and/ or in gums, of skin between the commissure of the mouth and the chin on the operated side, were further assessed objectively for the same by mapping and numerically rating the various zones of altered sensation as per the visual analogue scale.(Table 1)

Table 1 - Visual analog scale for assessment of altered sensation

Right	Left
1. Complete absence of sensation	1. Complete absence of sensation
2. Almost no sensation	2. Almost no sensation
3. Reduced sensation	3. Reduced sensation
4. Almost normal sensation	4. Almost normal sensation
5. Fully normal sensation	5. Fully normal sensation

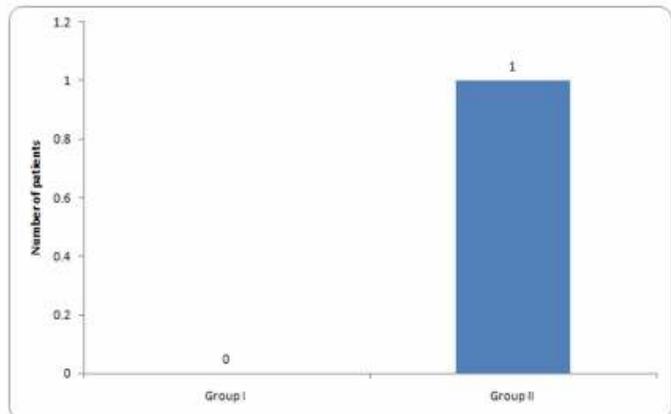
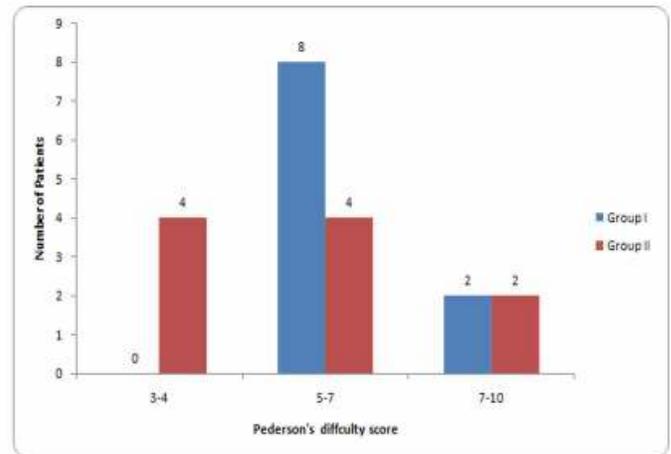
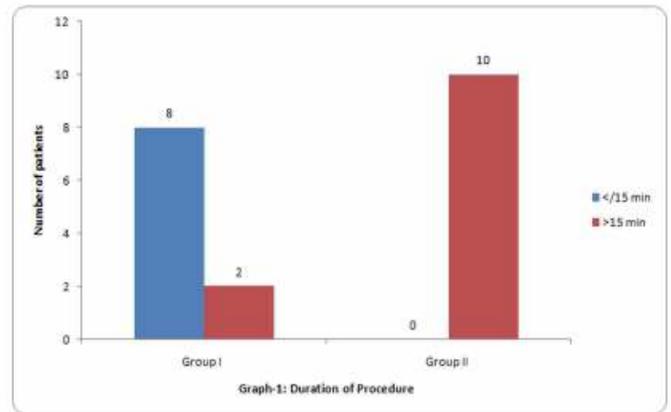
Please indicate with an "X" on any of the number corresponding to your current level of sensation.

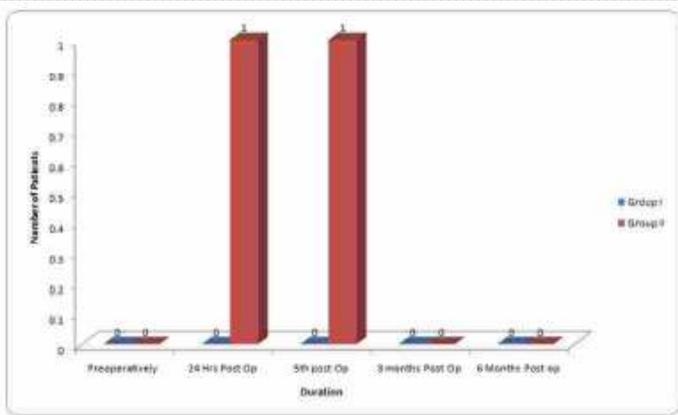
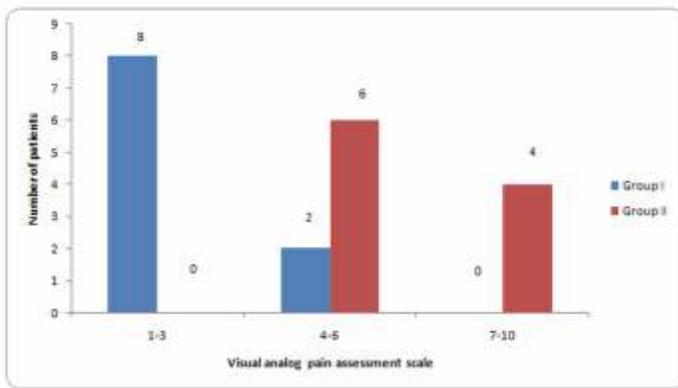
4) Patients of either group were also evaluated for the presence of signs of infection or any other post operative problems at the recall visits

RESULTS

There was a female predominance in the patients involved in the study with 60% (6/10) of females in group I and 90% (9/10) in group II. In both the groups, majority of the patients were in the age group of 19-25. The time taken for the completion of procedure was comparatively higher for group II patients (>15mins) while in 8/10 of group I patients, the procedure took lesser time (<15mins)(Graph 1). The time taken in the remaining 2 patients in group I is attributed to the relative difficulty of the procedure as per Pedersons difficulty index. [graph 2]. One of the ten patients in group II showed signs of nerve injury in the form of temporary sensory disturbance in the region of the lip on the operated

side(left) which resolved within one week postoperatively (graph 3,5). No cases reported of lingual anaesthesia. Majority of patients in group I (80%) experienced nil to mild pain while all of the patients in group II experienced moderate to severe pain in the 12 hour postoperative period (graph 4). None of the patients in group I showed development of infection of retained roots during the follow up period of six months. All of the cases showed migration of the roots to a safer position in relation to the nerve. The incidence of dry socket in the study is 5% with one patient included in group II developing a dry socket that was treated with antiseptic sedative dressings which healed without further complications.





DISCUSSION

Neurological complications after removal of impacted mandibular third molars have been documented throughout the history of dentistry. Various authors have reported the varied incidence of inferior alveolar nerve injury in literature. In the year 2010, reported incidence of inferior alveolar nerve injury was 0.6% by Waseem Jerjes et al⁴. The clinical presentation may be: numbness in the lower teeth, chin, and lower lip with biting injuries, problems with speech, problems with mastication, an inability to control food and liquid with unnoticed drooling of fluids and occasionally allodynia.⁵ Inferior alveolar nerve injury may have serious repercussions for those who earn a living with speech like the professional actors, musicians, teachers and trial lawyers.

The incidence of temporary inferior alveolar nerve injury encountered in our study was 10% owing to the small sample size. Howe and Poyton³ observed that darkening of roots on x ray was the most reliable indicator of true relationship between third molar and inferior alveolar canal. Incidentally the case that encountered inferior alveolar nerve injury in our study had darkening of the roots in the preoperative radiographic assessment. Iatrogenic injury to inferior alveolar nerve is perhaps the most distressing complication following third molar surgery. Any technique that would reduce the possibility of nerve damage is worthy of exploration.

The first published description of Intentional Partial Odontectomy was by Ecuyer and Debien in 1984.⁶ Intentional Partial

Odontectomy was reported in 1992 by Gary L Freedmann⁷. Rood and Shehab in 1990, by comparing the radiological signs to the actual incidence of damage to the IAN found that three radiological signs, being diversion of the canal, darkening of the root and interruption of white line were statistically significant as predictors of trauma to the IAN. They found that when the most severe sign was present the nerve was affected in 30 % of the cases⁸.

Brian O' Riordan(1997) presented a paper of 100 cases of coronectomy of the impacted wisdom tooth as a means of avoiding nerve injury and discussed the technique and complications of the treatment at British Association of oral and maxillofacial surgeons' annual meeting. Subsequently this technique has been reported by M Anthony Pogrel and T.Renton in 2004 and 2005 respectively⁹.

Renton T has observed a root migration of about 8 % of the teeth in coronectomy group with the migration distance of less than 2mm¹⁰. Pogrel MA in 2007 has shown that in approximately 30% of the cases there is genuine coronal migration of the root fragments away from the inferior alveolar nerve.¹

As mentioned earlier a proper selection criteria is mandatory to perform partial odontectomy. If partial odontectomy is performed on teeth with active infection around them, particularly around the root, necrotic residual root canal becomes an attractive site for hematogenous infection. During Partial Odontectomy, atraumatic sectioning of the tooth below the cemento-enamel junction and avoiding bodily movement is necessary to protect apical vessels from severing and thus preserving the vitality of the tooth. Technique of leaving the retained root fragments atleast 3 mm inferior to the crest of bone seems appropriate to enable bone to form over the retained roots as part of the normal healing process and does appear to encourage bone formation over the retained root fragment¹. The Late migration of the root fragments does appear to occur in all cases but is unpredictable. In this study most of the root fragments moved to a much safer position with regard to the nerve.

Provided a proper selection criteria is followed, Partial Odontectomy is a promising procedure that successfully cures the symptoms due to the impacted mandibular third molars without posing any threat to the inferior alveolar nerve.

Conclusion

This study confirms that partial odontectomy can reduce the incidence of Inferior alveolar nerve deficit as against to complete surgical removal of impacted mandibular third molar teeth. There are also fewer complications in terms of pain and dry socket in the healing process of partial odontectomy. The embedded roots tend to migrate away from the inferior alveolar canal postoperatively. Partial odontectomy appears to be a safe procedure at least in the short term. Prolonged follow up is required to determine the fate of the root in the long term.

BIBLIOGRAPHY

1. Pogrel MA. Partial Odontectomy. Oral Maxillofacial Surg Clin

- N Am 2007; 19:85-91.
2. Pogrel MA, Lee JS, Muff DF. Coronectomy: a technique to protect inferior alveolar nerve. *J Oral Maxillofac Surg* 2004;62:1447-1452.
 3. Howe GL, Poyton HG. Prevention of damage to inferior dental nerve during the extraction of mandibular third molars. *Br Dent J* 1960;109:355-63
 4. Jerjes W, Nhembe F, Mc Carthy E, Hamdoon Z, Kalkani M, Banu B et al. Risk factors associated with injury to the inferior alveolar nerve and lingual nerves following third molar surgery-revisited. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2010;109:335-345.
 5. Libersa P, Savignat M, Tonnel A. Neurosensory disturbances of the inferior alveolar nerve: a retrospective study of complaints in a 10 year period. *J Oral Maxillofac Surg* 2007;65:1486-1489.
 6. J. Ecuyer and J. Debien, "Surgical deductions," *Actualites Odonto-Stomatologiques*, vol. 38, no. 148, pp. 695-702, 1984.
 7. Freedman GL. Intentional Partial Odontectomy: Report of case. *J Oral Maxillofac Surg* 1992;50:419-421.
 8. Rood JP, Sheehab BA. The radiological prediction of inferior alveolar nerve injury during third molar surgery. *British Journal of Oral and Maxillofacial Surgery* 1990;28:20-25.
 9. Brain. C, O' Riordan C. Coronectomy (intentional partial odontectomy of lower third molars). *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;98:274-80.
 10. Renton T, Hankins M, Sproate C, McGurk M. A randomised controlled clinical trial to compare the incidence of injury to the inferior alveolar nerve as a result of coronectomy and removal of mandibular third molars. *British Journal of Oral and Maxillofacial Surgery* 2005;43:7-12.

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