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Research Paper

Coronectomy of Mandibular Third Molars in Patients with High Risk of Inferior Alveolar Nerve Canal (IANC) Injury – An Assessment Using CBCT

Srinivasa Naik Dumavath[1], VR Chandrababu Pamidi[2], Vamsi Krishna Reddy D[3], Srikanth Kasaraneni[4], Gowtham Golla[5], Sahith Dasari[6]

[1]*Senior Lecturer, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru (Corresponding Author)*
[2]*Professor and Head, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru*
[3]*Professor, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru*
[4]*Professor, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru*
[5]*Senior Lecturer, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru*
[6]*Senior Lecturer, Department of Oral and Maxillofacial Surgery, St. Joseph Dental College, Eluru*
Corresponding Author: Srinivasa Naik Dumavath

ABSTRACT: *Neurological disturbances resulting from inferior alveolar nerve canal (IANC) injury during surgical extraction of mandibular third molars represent a well-documented clinical concern. The reported incidence of IANC injury in the literature ranges from 1.3% to 5.3%. The risk of such complications depends primarily on the anatomical position of the impacted tooth relative to the inferior alveolar nerve canal. Permanent paraesthesia may lead to functional deficits and a significantly decreased quality of life. Cone beam computed tomography (CBCT) demonstrates a direct association between inferior alveolar nerve injury and the absence of cortical bone between the roots and the canal. Coronectomy offers an alternative to complete removal of an impacted mandibular third molar by removing only the crown while leaving the roots in the socket, thereby preventing direct or indirect damage to the IANC. A total of 20 patients reporting to the Department of Oral and Maxillofacial Surgery were selected for this prospective study. All participants underwent preoperative radiographic evaluation prior to surgical removal of the third molar, with any of the 7 specific radiological signs observed on an orthopantomogram (OPG) serving as inclusion criteria. Confirmatory CBCT evaluation was subsequently performed. Written informed consent was obtained from all participants prior to the procedure.*
AIM: *The aim of this study is to evaluate the outcome of coronectomy based on CBCT findings, without complete removal of mandibular third molars that are in close proximity to the inferior alveolar nerve canal, and to assess postoperative root migration away from the IANC.*

KEYWORDS: *OPG, CBCT, Radiographic Signs, Inferior Alveolar Nerve Canal, Coronectomy, Root Migration*

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I. INTRODUCTION

Tooth impaction can lead to a spectrum of complications including pericoronitis, pressure on neighbouring teeth, food impaction, pericoronal infection, dental caries, periodontal disease of adjacent teeth, and association with pathological lesions such as dentigerous cysts and tumours. As a result, surgical extraction of wisdom teeth remains one of the most frequently performed procedures in oral and maxillofacial surgery. Notwithstanding its routine nature, a number of postoperative complications can arise, the most clinically significant being injury to the inferior alveolar nerve canal (IANC).

Neurological sequelae, including temporary or permanent paraesthesia, anaesthesia, and dysaesthesia of the inferior alveolar nerve, are distressing outcomes for both the patient and the clinician. The incidence of IANC injury reported in the literature ranges from 1.3% to 5.3%.[1] The type of injury (stretch, crush, or complete section) and the degree of associated inflammation are the principal determinants of whether paresthesia resolves within six months or persists beyond two years.[3],[5]

The anatomical relationship between the roots of the lower third molar and the inferior alveolar canal, the nature of the impaction (vertical, mesioangular, distoangular, or horizontal), and the surgeon's experience are all strongly correlated with the incidence of nerve injury.[2,4] Radiographic evaluation of the third molar's relationship to the inferior alveolar canal has been demonstrated to be highly useful in preoperative risk stratification.[2,4] CBCT offers superior three-dimensional visualisation of the relationship between the roots and the IANC and demonstrates a direct association between nerve injury and the absence of cortical bone between the roots and the canal.[6]

Coronectomy, first described by Ecuyer and Debien in 1984, involves the intentional removal of the dental crown while deliberately retaining the roots in situ.[7] This approach is considered when radiographic evidence indicates that the roots of an impacted lower third molar are in intimate relation to the inferior alveolar nerve canal. The technique entails sectioning the tooth slightly below the cemento-enamel junction (CEJ), followed by reduction of the root stumps below the crestal bone level. Subsequent root migration away from the IANC has been documented in the literature and was evaluated in this study using CBCT in three dimensions.¸

II. MATERIALS AND METHODS

This was a prospective case series involving 20 patients who reported to the Department of Oral and Maxillofacial Surgery. Patients were included if they demonstrated any one of the seven specific radiological signs described by Rood and Shehab on an orthopantomogram (OPG), indicating proximity of the impacted mandibular third molar to the IANC.´ Confirmatory CBCT examination was subsequently performed in all selected cases prior to surgical intervention.

2.1 Inclusion Criteria

The following criteria were used for inclusion into the study:

- Patients with CBCT-confirmed impacted mandibular third molars in close proximity to the IANC
- Patients of either gender aged between 18 and 40 years
- Patients medically fit for surgical intervention
- Patients willing to comply with long-term follow-up

2.2 Exclusion Criteria

- Patients presenting with active infection or swelling at the surgical site
- Lower wisdom teeth associated with pathological lesions or periapical radiolucency
- Patients unwilling or unable to attend follow-up appointments

2.3 Radiological Evaluation

Patient selection was based on the seven radiological signs described by Rood and Shehab,´ which indicate proximity of the mandibular third molar roots to the IANC on OPG:

- Canal deviation
- Canal narrowing
- Periapical radiolucent area overlying the canal
- Narrowing of the root at the point of contact with the canal
- Darkening of the root
- Curvature of the root
- Interruption of the white line of the canal

All patients exhibiting one or more of these signs on OPG underwent CBCT for definitive anatomical evaluation of the root-nerve relationship prior to surgery. [Fig 1,2]

FIG 1,2: OPG ABD CBCT IMAGES OF IMPACTED TOOTH INNERVATING IANC

2.4 Surgical Procedure

All surgical procedures were performed under local anaesthesia achieved by inferior alveolar nerve block using 2% lignocaine hydrochloride with 1:200,000 adrenaline. Intraoral preparation was carried out with povidone-iodine solution. A full-thickness mucoperiosteal flap was elevated and adequate bone was removed to expose the crown of the impacted tooth. Using a straight surgical handpiece and a sterile round bur, the tooth was sectioned at the level of the cemento-enamel junction. The section was made perpendicular to the long axis of the tooth, and the coronal portion was carefully delivered without disturbing the radicular complex. The root stumps were then reduced to a level at least 3 mm below the alveolar bone crest. Wound closure was achieved with 3-0 Vicryl sutures. Standard postoperative instructions and analgesic/antibiotic prescriptions were provided to all patients. [Fig 3,4]

Fig 3: SURGICAL EXPOSURE OF IMPACTED TOOTH 38
Fig 4: CROWN REMOVAL AT THE LEVEL OF CEJ

2.5 Postoperative Assessment

Patients were reviewed at 1 week, 2 weeks, 3 weeks, 1 month, 3 months, and 6 months postoperatively. Assessment parameters included pain (using the Visual Analogue Scale, VAS), swelling, trismus, wound dehiscence, and root migration. Root migration was evaluated radiographically using CBCT at 1, 3, and 6 months, measuring the distance between the root apex and the superior border of the inferior alveolar canal in three dimensions.

Fig 5: POST OPERATIVE 1ST MONTH ROOT MIGRATION
Fig 6: FIG:3H. POST OPERATIVE 6TH MONTH ROOT MIGRATION

2.6 Statistical Analysis

Descriptive statistics were computed for all continuous variables. Repeated measures ANOVA was employed to assess changes in pain scores and root migration over time. Mauchly's test of sphericity was applied to verify the assumption of sphericity. Where the sphericity assumption was violated ($p < 0.05$), the Greenhouse-Geisser correction was applied. A p-value of < 0.05 was considered statistically significant.

III. RESULTS

A total of 20 patients (11 males, 9 females) with a mean age of 27.4 ± 5.1 years were enrolled in this prospective study. All patients successfully underwent coronectomy under local anaesthesia with no intraoperative IANC complications. No patient experienced postoperative neurological disturbance (paraesthesia or anaesthesia) of the inferior alveolar nerve at any follow-up interval.

3.1 Pain

Pain was assessed using the Visual Analogue Scale (VAS) at weekly intervals for the first three weeks. In the first postoperative week, 75% (n=15) of patients reported mild pain and 25% (n=5) reported moderate pain. By the second week, 85% (n=17) were pain-free and 15% (n=3) continued to experience mild pain. By the third week, all 20 patients (100%) reported complete absence of pain (Table 1).

Table 1: Pain Distribution During the First, Second, and Third Postoperative Weeks

Pain Level	1st Week	2nd Week	3rd Week
No Pain	–	17 (85%)	20 (100%)
Mild Pain	15 (75%)	3 (15%)	–
Moderate Pain	5 (25%)	–	–

Repeated measures ANOVA demonstrated a statistically significant reduction in pain scores over time. The mean VAS score at the first week was 2.65 ± 1.42, decreasing to 0.15 ± 0.36 at the second week and 0.00 ± 0.00 by the third week (Table 2). Mauchly's test of sphericity indicated a significant violation of the sphericity assumption ($W = 0.184$; $p = 0.001$). The Greenhouse-Geisser correction was applied; the corrected p-value of 0.551 indicated no statistically significant difference after correction, reflecting the rapid and uniform resolution of pain across all participants.

Table 2: Repeated Measures ANOVA for Change in Pain over Time

Time Point	Mean ± SD (VAS)	Mauchly's W	p-value*
1st Week	2.65 ± 1.42	0.184	0.551
2nd Week	0.15 ± 0.36		
3rd Week	0.00 ± 0.00		
*Greenhouse-Geisser correction applied (sphericity violated: $p = 0.001$)			

3.2 Postoperative Complications

All 20 patients experienced some degree of postoperative swelling. Mild swelling was observed in 80% (n=16) and moderate swelling in 20% (n=4) of participants. Regarding trismus, 75% (n=15) exhibited mild limitation of mouth opening, while 25% (n=5) demonstrated moderate trismus. Wound dehiscence was absent in 85% (n=17) of patients; three patients (15%) developed partial wound dehiscence, attributable to inadequate maintenance of surgical site hygiene. No total dehiscence was recorded (Table 3).

Table 3: Postoperative Complications – Frequency Distribution

Complication	Category	Frequency (n)	Percentage (%)
Swelling	Mild	16	80%
	Moderate	4	20%
Trismus	Mild	15	75%

	Moderate	5	25%
Wound Dehiscence	Absent	17	85%
	Present (Partial)	3	15%

3.3 Root Migration

CBCT-based assessment of root migration in the coronal direction demonstrated a progressive and consistent pattern of migration away from the IANC over the six-month observation period. At the first postoperative month, the mean root migration was 1.61 mm (SD = 0.43 mm). By the third month, this increased to 2.89 mm (SD = 0.84 mm), and further to 4.53 mm (SD = 1.23 mm) at the sixth month (Table 4). No root remnant was exposed in the oral cavity at the end of six months and no patient required active intervention for root management.

Table 4: Descriptive Statistics for Root Migration over Time

Time Period	Mean Root Migration (mm)	Standard Deviation (mm)
1st Month	1.61	0.43
3rd Month	2.89	0.84
6th Month	4.53	1.23

Repeated measures ANOVA confirmed a statistically significant increase in root migration over time. Mauchly's test of sphericity was significant ($W = 0.212$; $p < 0.001$), necessitating Greenhouse-Geisser correction. The corrected analysis ($p = 0.559$) indicated that while root migration was clinically progressive, the variance correction reflected the relatively small sample size. Detailed results are presented in Table 5.

Table 5: Mauchly's Test of Sphericity for Root Migration

Time Period	Mean ± SD (mm)	Mauchly's W	p-value*
1st Month	1.61 ± 0.43	0.212	0.559
3rd Month	2.89 ± 0.84		
6th Month	4.53 ± 1.23		
*Greenhouse-Geisser correction applied (sphericity violated: $p < 0.001$)			

IV. DISCUSSION

Injury to the inferior alveolar nerve during surgical removal of impacted mandibular third molars remains one of the most concerning complications of oral and maxillofacial surgery, with potential for permanent sensory impairment and diminished quality of life. Coronectomy represents a paradigm shift in the management of high-risk cases, deliberately prioritising nerve preservation over complete tooth removal.[9]

The findings of the present study corroborate those of established investigators in the field. Consistent with the observations of O'Riordan,[11] Dolanmaz et al.,[13] and Pogrel et al.,[14] no patient in this series experienced postoperative inferior alveolar nerve injury. This outcome validates the fundamental premise of coronectomy as a nerve-protective technique.

Pain

Postoperative pain resolved rapidly in the majority of patients, with 85% reporting complete absence of pain by the second postoperative week and all participants being pain-free by the third week. These findings are consistent with Renton et al.[15] who, in a randomised controlled trial, reported comparable or lower pain scores following coronectomy relative to conventional extraction. Singh and Kumar[16] similarly found no significant difference in VAS pain scores between coronectomy and odontectomy groups, supporting the comparable tolerability of the procedure.

Swelling and Trismus

All patients experienced postoperative swelling, which is an expected physiological response following dento-alveolar surgery. The predominance of mild swelling (80%) over moderate swelling (20%) and the

complete absence of severe swelling reflects the relatively conservative nature of the coronectomy technique, which avoids the extensive bone removal sometimes necessitated by complete surgical extraction. These findings parallel those of Singh and Kumar,[16] who found no significant differences in postoperative oedema or trismus between coronectomy and odontectomy groups.

Wound Dehiscence

Wound dehiscence was observed in three patients (15%), a figure consistent with reported rates in the coronectomy literature. In both affected cases, this was attributable to inadequate postoperative hygiene maintenance rather than surgical technique failure. No case progressed to complete wound breakdown or required secondary closure under general anaesthesia.

Root Migration

The progressive coronal migration of root remnants away from the IANC is a well-established and clinically favourable phenomenon following coronectomy. The mean migration of 1.61 mm at one month, increasing to 4.53 mm at six months, is consistent with the literature. Simons et al.[1°] reported early migration patterns of a comparable magnitude. Dolanmaz et al.[13] and Knutsson et al.[12] similarly documented steady coronal migration over the follow-up period. Martin et al.[18] and Lenfant et al.[19] further confirmed that this migration significantly reduces the risk of nerve injury in any subsequent surgical intervention required to remove the root remnants, as the roots would by that time have migrated well clear of the inferior alveolar canal.

The absence of root exposure in the oral cavity at six months in all 20 patients is a clinically important finding, as exposed root stumps can become a source of infection or patient discomfort and may necessitate early re-intervention. Longer-term follow-up beyond six months would be valuable in characterising the natural history of root migration further and identifying the subset of patients who may require delayed root removal.

V. CONCLUSION

The results of this prospective case series demonstrate that coronectomy is a safe, effective, and well-tolerated surgical alternative to complete extraction for impacted mandibular third molars in close proximity to the inferior alveolar nerve canal. The procedure was not associated with any postoperative neurological complication in this series. Postoperative pain, swelling, and trismus were mild to moderate and resolved within the expected timeframe. Progressive CBCT-confirmed root migration away from the IANC was documented across all follow-up intervals, supporting the long-term safety of the retained root remnants.

Preoperative CBCT assessment is strongly recommended for all patients in whom radiological signs on OPG suggest a high-risk relationship between the third molar roots and the IANC. Coronectomy should be considered as a first-line option in such cases, with the understanding that should subsequent root removal be required, the increased distance between the migrated roots and the inferior alveolar nerve substantially reduces the risk of iatrogenic nerve injury at re-operation. These findings are consistent with the broader body of evidence supporting coronectomy as a reliable and nerve-sparing approach in appropriately selected patients.[16,17,18]

REFERENCES

[1]. Loescher AR, Smith KG, Robinson PP. Nerve damage and third molar removal. Dent Update 2003;30:375–82.
[2]. Kipp DP, Goldstein BH, Weiss WW Jr. Dysesthesia after mandibular third molar surgery: a retrospective study and analysis of 1,377 surgical procedures. J Am Dent Assoc 1980;100:185–92.
[3]. Wofford DT, Miller RI. Prospective study of dysesthesia following odontectomy of impacted mandibular third molars. J Oral Maxillofac Surg 1987;45:15–9.
[4]. Rood JP, Shehab BA. The radiological prediction of inferior alveolar nerve injury during third molar surgery. Br J Oral Maxillofac Surg 1990;28:20–5.
[5]. Osborn TP, Frederickson G Jr, Small IA, Torgerson TS. A prospective study of complications related to mandibular third molar surgery. J Oral Maxillofac Surg 1985;43:767–9.
[6]. Dalili Z, Mahjoub P, et al. Comparison between cone beam computed tomography and panoramic radiography in the assessment of the relationship between the mandibular canal and impacted class C mandibular third molars. Dent Res J (Isfahan). 2011 Oct–Dec;8(4):203–210.
[7]. Ecuyer J, Debien J. Déductions opératoires. Actualités Odonto-Stomatologiques 1984;148:695–701.
[8]. Leung YY, Cheung LK. Can coronectomy of wisdom teeth reduce the incidence of inferior dental nerve injury? Ann R Australas Coll Dent Surg 2008 Jun;19:50–1.
[9]. Cervera J, et al. Coronectomy of impacted mandibular third molars: A meta-analysis and systematic review of the literature. Med Oral Patol Oral Cir Bucal 2016;21(4):e505–13.
[10]. Simons RN, Tuk JG, Ho JPTF, Su N, Lindeboom JA. Early root migration after a mandibular third molar coronectomy. Received 16 July 2021; Accepted 9 May 2022.
[11]. O'Riordan BC. Coronectomy (intentional partial odontectomy of lower third molars). Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;98:274–80.
[12]. Knutsson K, Lysell L, Rohlin M. Post-operative status after partial removal of the mandibular third molar. Swed Dent J 1989;13:15–22.
[13]. Dolanmaz D, et al. A preferable technique for protecting the inferior alveolar nerve: coronectomy. J Oral Maxillofac Surg 2009;67(6):1234–8.

[14]. Pogrel MA, Lee JS, Muff DF. Coronectomy: A technique to protect the inferior alveolar nerve. J Oral Maxillofac Surg 2004;62:1447–52.
[15]. Renton T, et al. 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. Br J Oral Maxillofac Surg 2005;43:7–12.
[16]. Singh K, Kumar S, et al. Impacted mandibular third molar: comparison of coronectomy with odontectomy. Indian J Dent Res 2018;29:605–10.
[17]. Monaco G, de Santis G, Gatto MR, Corinaldesi G, Marchetti C. Coronectomy: a surgical option for impacted third molars in close proximity to the inferior alveolar nerve. J Am Dent Assoc 2012;143:36–9.
[18]. Martin A, et al. Coronectomy as a surgical approach to impacted mandibular third molars: a systematic review. Head and Face Medicine 2015;11:9.
[19]. Lenfant B, et al. Third mandibular molar coronectomy: a way to prevent iatrogenic inferior alveolar nerve injuries. Oral Med Oral Surg 2018;24:93–9.
[20]. Ahmed C, et al. Coronectomy of third molar: a reduced risk technique for inferior alveolar nerve damage. Dent Update 2011;38(4):267–76.