

CORONECTOMY TO AVOID NERVE INJURIES:AN EXCEPTIONAL CASE REPORT AND REVIEW OF LITERATURE

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ABSTRACT

Perforation of the third mandibular molar (TMM) roots by the inferior alveolar nerve (IAN) is rare and can be very difficult to determine by conventional radiographic method. It can be the cause of large defect while removing the TMM. This work reports the unusual case of a 34 year old woman whose chief complaint was pain associated to the 48. Clinical examination showed gingival inflammation of the site. Radiological imaging reveals a wisdom tooth partially impacted with converging roots performed by the NAI. Treatment consisted in a coronectomy. The purpose of this case report is to show that coronectomy is the most appropriate and safer option to avoid the IAN injuries risk in such exceptional cases.

Keywords: Coronectomy, Inferior alveolar nerve (IAN).

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INTRODUCTION

The inferior alveolar nerve injuries related to the removal of erupted, partially impacted, or totally impacted third molars are the most feared complications by practitioners and the most disabling complications for patients. They are often due to the intimate relationship between the nerve and the roots of the tooth furthermore when it comes to perforation and which incidence is estimated to 0.12% [1]. These injuries are reported to occur in up to 3.6% of cases permanently and 8% of cases temporarily.[2, 3] The injury can be caused by compression of the roots while removing the tooth or with the surgical instruments especially the rotary ones [4].

Coronectomy, also called intentional partial odontectomy is a relatively new procedure. It was first introduced in 1984 as a conservative treatment option for mandibular third molars. The introduction of Cone Beam CT scanning was an evolution in the practice and a great help in the decision making process. Despite the positive

results shown by studies and reported by several articles as a safe technique with fewer complications and more promising results, this procedure is still widely considered as controversial[5].

CASE REPORT

A 34-year-old female, in good general health, was repeatedly referred for extraction of her MTM due to pain. She stated that over the last four months she had consulted several dentists who each suggested third molar extraction.

At her consultation appointment, she reported that the right molars area had been symptomatic for about 4 months with progressive discomfort, occasional pressure and intermittent pain along with intolerable electric discharges associated with the lower right third molar.

Accurate clinical examination showed an inflammation of the gingival mucosa, we evocated a pericoronitis (**Fig.1**).



Fig.1: Intra oral picture showing an inflammation of the gingival mucosa of the partially impacted third molar.

The panoramic radiograph showed a reaction in the distal of the crown which confirmed the diagnosis of pericoronitis and also assessed the intimate relationship between the mandibular third molar and the IAN. There was a darkening of the roots and radiolucency of the apices (**Fig. 2**).



Fig. 2: Panoramicrodiograph : a reaction in the distal of the crown and a darkening of the roots associated to radiolucency of the apices.

We performed a corn beam computed tomography (CBCT).The IDC appears to be inter-radicular with no loss of cortication and snaking through tooth roots (**Fig. 3**).

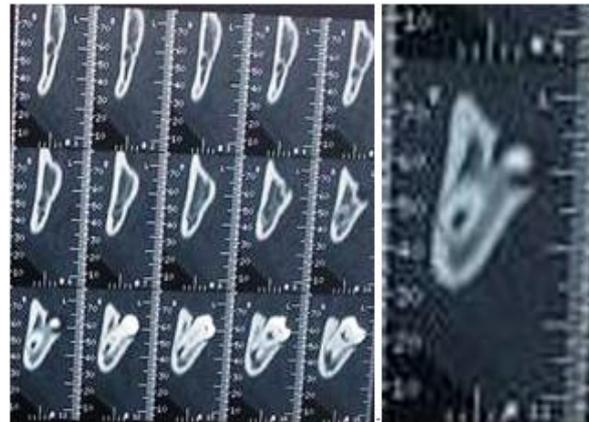


Fig. 3: In CBCT, the IDC appears to be inter-radicular with no loss of cortication and snaking through tooth roots.

The patient was warned about the risks of observation extraction and advised to have a coronectomy. She consented to have coronectomy performed.

Patient has been operated with loco regional anesthesia. We raised a conventional bucca mucoperiosteal flap with a releasing incision to expose the third molar tooth and we retained it with actor (**Fig. 4a**). We then created a narrow buccal gutter of bone adjacent to the buccal aspect of the tooth down to the amelo-cemental junction (ACJ) by using a fissure bur which was then used and drilled directly into the pulp at the mid centre of the buccal groove intersection with the ACJ (**Fig. 4b**).This cut is lateralized to create a narrow horizontal groove in the tooth just below the ACJ.A small fine instrument is used to softly fracture of the crown from the roots (**Fig. 4c**).A large diameter bur is then used to remove the enamel spurs and to lower the level of the remaining root two or three millimeters below the alveolar crest bone level(**Fig. 4d**).It's important to note that the patient felt some electric discharge during the intervention. The socket was irrigated with physiological serum(**Fig. 4e**), and the area was then closed primarily with resorbable sutures. Antibiotic, corticosteroid, analgesic and mouthwash were prescribed postoperatively.

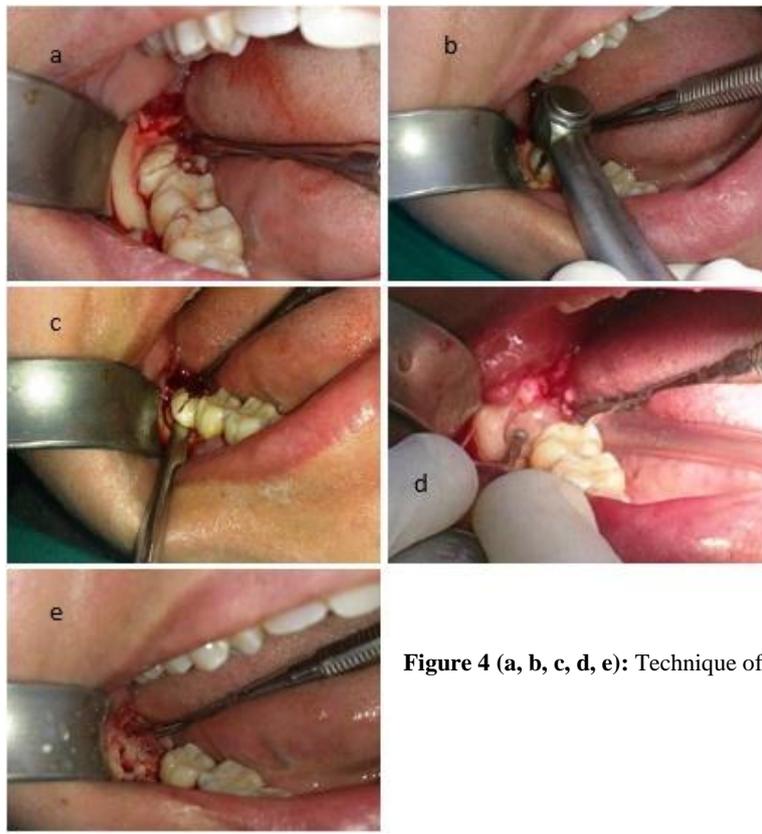


Figure 4 (a, b, c, d, e): Technique of coronectomy

At the follow-up consultation eight days later, The surgical sites appeared to be healing within normal limits but the patient complained about some post-operative pain, the presence of paresthesia in the IAN and lingual nerve distribution in the right lower lip and chin. Two weeks later, the patient affirmed that the pain was over and expressed her satisfaction of both the treatment and the follow up (Fig. 5).



Figure 5: Control after 2 weeks :the surgical site heals perfectly.

Instructions were given for the patient to return for reassessment and radiographs control every six months for the first two years, and once more after the third year(Fig. 6).



Figure 6: Control after one month: Lower right MTM after amputation of the crown.

DISCUSSION

Coronectomy was developed in order to reduce the incidence of iatrogenic injury to the inferior dental nerve, for nearly all mesioangular, horizontal impactions and especially in the cases which are expected to have large postsurgical defects. It was first reported by Knutsson et al. in 1989 [6]. Iatrogenic injuries to the third division of the trigeminal nerve remain a big, common and complex clinical problem with a significant effect

on the patient's self-image. Seddon summarises these injuries in three categories:

1. Neuropraxia i.e. an interruption in conduction of the impulse down the nerve fiber.
2. Axonotmesis i.e. loss of the relative continuity of the axon and its covering of myelin, but preservation of the connective tissue framework of the nerve.
3. Neurotmesis i.e. loss of continuity of not only the axon, but also the encapsulating connective tissue.

Sunderland grading is more often used by surgeons to decide when and how to intervene [7]. Usually these injuries interfere with major functions and alter every act of routine or every social interaction we take for granted, thus deteriorating the quality of life. This leads to significant psychological effects in relation to dental, facial, and even overall body image and may even be the cause of an extreme nervous breakdown. In our case when the roots are perforated by the nerve, the risk for all these complications was extreme.

The surgeon's experience, the surgical procedures, the patient's age, and preexisting disease are known to be risk factors for IAN injury but the major one is still the radiographic evidence of proximity[8].

Although it's important to know that the risk of nerve injury can never be absolutely avoided but only reduced if the surgeon takes all the safety precautions including making the right choice regarding the treatment options.

IDC being inter-radicular with no loss of cortication is a rare anatomical location that requires identification prior to planning of any surgical procedure in the mandible to avoid the difficulty in providing adequate anaesthesia with an inferior alveolar nerve block and direct damage to the nerve during the removal.

To achieve that it's necessary to determine the correct relationship between the root apices and the inferior alveolar canal. At this point, different radiological imaging techniques can be used.

Radiographic plain film signs indicative of possible IAN risk include: Diversion or deviation of the canal; narrowing or darkening of the root; Interruption of the canal lamina dura, curving of root, narrowing of the canal; peri-apical radiolucent area, but the major ones are the first three enumerated signs. Those signs have a relatively low specificity and nerve damage can often occurs in their absence however most authors consider that all roots that vertically overlap the outline of the canal or lie in prolonged contact with it are at risk[2, 9].Therefore, there is increasing evidence that three dimensional (3-D) radiographic modalities such as computed tomography and

CBCT scanning of high risk teeth give much more accurate prediction of the likelihood of the nerve injury by providing cross-sectional, axial, sagittal, coronal and panoramic views. This will further establish and give very precise information about the anatomic relationship between the IAN and the roots and will be used to assess in detail how the IAN canal position influenced the class and position of impaction, angulation of impaction, and bone contact in the presence of the earlier described high-risk findings on panoramic radiographs. However, some IANs are found to be distant from the roots using 3-D imaging (approximately 30–50%) even if they were judged at high risk on plain films because the major problem in panoramic radiography is superimposition which can be very misleading.

The 3-D imaging would allow for removal of the tooth rather than planned coronectomy. The disadvantage of CT is the relatively high radiation dose and cost[10].

With the combination of these two radiological techniques, our case was ascertained to represent a greater risk to the nerve. Panoramic radiographic signs of proximity indicated a CBCT which assessed the perforation of the MTM by the IAN. This suitable case supports the indication and the appropriate choice of coronectomy.

Guidelines for coronectomy include: Leaving the retained root fragment at least 2 or 3 mm inferior to the crest of bone; not performing this procedure in infected teeth or if there's any association with cystic tissue and any other apical disease, especially when the root portion is involved; not operating on mobile teeth because they can become a nidus for infection or migration; not performing treatment of the exposed pulp and root and if the patient is medically compromised (immuno-compromised or with tumour) because root remnants of those teeth may act like foreign bodies.

Practicing coronectomy in teeth that are horizontally impacted along the course of the alveolar canal is unsuitable[11, 12].

Luckily our patient was in good health. Nevertheless, we took all the possible precautions to extremely avoid and minimize any damage to the nerve. The challenge was to control the depth of the decoronating cut and the sectioning in order not to endanger the nerve.

When correctly applied to an appropriate case, a successful coronectomy aims to minimize the risks of IAN by leaving the roots of vital teeth with non-inflamed pulpal tissue untouched which generally heal without complications. Kohora & al conclude that the retained roots after coronectomy in the lower third molars led to no complications in terms of infection or the development of pathologies

within the first 3 years postoperatively, and show surrounding bone formation over the retained root fragment alongside good healing[13]. However some side effects might occur, similar to those after normal extraction in comparable circumstances. They can include bleeding; poor or delayed healing or unhealed socket; enamel lipping; deep periodontal pockets on the distal of the second molars; alveolar osteitis; dry sockets; local postoperative infections; postoperative pain and inadvertent root removal, or root walk-out during surgery which may increase the risk of IAN and are considered as a failed coronectomy[14, 15].

All the studies that have evaluated the root migration suggested that most migratory component would be present in the first year postoperatively, with an average migration of 2–4 mm then the healing bone over roots will progressively stop this migration [13, 16, 17]. But in our case where the roots were retained by the nerve, we just encountered temporarily paresthesia and post operative pain which were completely resolved in 2 weeks.

Leung and Cheung studies have compared the lesions nerve occurring after coronectomy (171 coronectomies) versus conventional extraction (178 surgical extractions) in cases of third molar and IAN promiscuity on 231 patients. Nine patients in the conventional group presented with IAN sensory deficit versus 1 patient in the coronectomy group. Leung YY, Cheung similar results were reported by Renton & al. 2005 studies which found a rate of 19% of lesions after conventional extraction against 3% after coronectomy which demonstrates a statistically significant decrease in IAN damage using coronectomy for high-risk patients[15]. Renton T, Monaco & al. study reported 1 on 37 cases of nerve injury (intermittent pain) which was resolved after 10 months by the extraction of the left roots, once they had migrated far enough from the nerve. It was the only study using antibiotic prophylaxis before coronectomy and prolonged therapy postoperatively with a very low incidence of infection[18], but the use of antibiotic is still controversial and some authors judge it unnecessary[19].

Pogrel & al. reported no postoperative cases of inferior alveolar nerve injury after performing 50 coronectomies on 41 patients who were at significantly increased risk of IAN damage from plain radiographic assessment[15].

Chkoura & al in their systematic review concluded that the technique of coronectomy can be proposed to minimize the risk of IAN injuries. However, in order to consider coronectomy based on scientific evidence, more randomized studies with the same

surgical technique and long enough follow up should be done [20].

In conclusion, nerve damage during the removal of lower third molars is a rare and serious risk associated with clinical and medico legal consequences. Coronectomy can be suggested as a valuable option in selected cases for the management of mandibular wisdom teeth deemed at high risk of IAN injury.

Clinicians should therefore routinely consider coronectomy as an oral surgery's answer to modern day conservative dentistry worthy of exploration and a valid treatment option for patients who are at high risk of iatrogenic nerve injury, and offer them the procedure when third molar operations are planned. Unfortunately there is a lot of resistance to the acceptance of coronectomy which is still considered highly controversial by many oral surgeons.

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