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Research Article

Coronectomy vs Surgical Extraction of the Third Molar: A Systematic Review

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Abstract

Introduction: Avulsion of the lower wisdom tooth is the most common procedure performed in oral surgery. The close anatomical relationship between the roots and the mandibular canal increases the incidence of damage to the inferior alveolar nerve during extraction. These lesions can have serious consequences on oral function as well as psychological repercussions on the well-being of the patient.

Materiel and Method: This is a systematic review of the literature carried out according to the criteria published by the international PRISMA recommendations: A systematic literature search was performed from database PubMed and Cochrane Library during a period from 2015 to 2021

Discussion and Conclusion: Coronectomy of wisdom teeth is a surgical technique that minimizes the risk of nerve damage by removing the crown of the tooth, leaving the roots intact in situ. This technique is mainly indicated when the roots are closely linked to the nerve and the extraction of the tooth could result in damage or severing of the inferior alveolar nerve.

This work aims to develop the latest news regarding the extraction of wisdom teeth as well as to compare the results of each technique allowing the practitioner to make prudent decisions.

Keywords: Coronectomy; Surgical Extraction; Third Molar

Introduction

Surgical removal of the mandibular third molars is one of the most frequently performed oral surgery procedures. However, like any surgical procedure, it comes with risks. Among these, damage of the inferior alveolar nerve can occur, leading to ipsilateral lip-chin paresthesia. Although mostly temporary, this postoperative result can be very badly experienced by patients.

The inferior alveolar nerve (formerly called the inferior dental nerve) is a sensory nerve originating from the mandibular nerve (V3), itself originating from the trigeminal nerve (V). This nerve travels on each side of the mandible in a channel near the roots of the lower molars and especially the lower wisdom teeth [1].

To avoid this nerve damage, the surgical technique of coronectomy has demonstrated its effectiveness according to numerous studies of very high level of proof. A technique involves performing a coronal-radicular separation in order to remove only the crown of the tooth and can be considered an approach that fits into the current principle of minimally invasive surgery [2]. It makes it possible to stay away from the inferior alveolar nerve and thus avoid its nerve damage.

The indication for coronectomy is essentially based on the risk of injury to the inferior alveolar nerve during the extraction of the lower wisdom teeth [3], this risk can be reflected in three radiological signs [4]

- Blackening of the tips of the wisdom tooth
- Interruption of the roof of the mandibular canal
- Deviation of trajectory

The radiological views used in first intention to study the relationship of the third molar with the mandibular canal are retro-alveolar radiographs and orthopantomogram. These standard techniques assess anatomical structures and their relationships only in the vertical plane; they ignore the vestibulo-lingual component.

The orthopantomogram is the imaging technique of choice.

So-called "second-line" radiographic techniques are prescribed in the event of doubt or suspicion of anatomical contact between the third molar and the mandibular canal on first-line examinations, mainly dental panoramic [5].

The most common second-line exam is a CT scan. The acquisition is made in axial sections and the frontal and radiar sections are reconstructed. The sections are 1 to 2 mm thick for a representation close to anatomical reality in all planes [5].

Material and Method

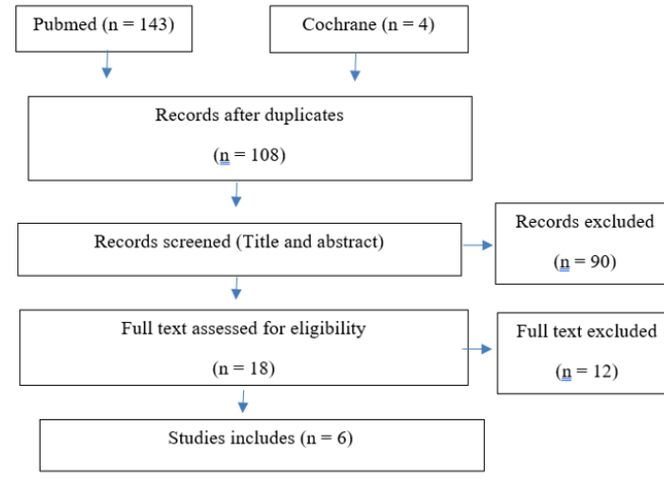
This is a systematic review of the literature carried out according to the criteria published by the international PRISMA recommendations (Preffered Reporting Items for Systematic reviews and Meta-Analysis). The objective of this work is to compare between coronectomy and conventional extraction of the third molar in relation to the risks associated with the two techniques.

To identify the studies included for this review, an electronic approach based essentially on the two bibliographic, medical and scientific databases PubMed and Cochrane Library during a period from 2015 to 2021:The search was performed using search equations based on keywords used separately or combined using the logical operator "AND" ("AND") which allows to find references containing 2 words at a time in the same field or in different fields.

The inclusion criteria were as follows: The publication date from 2015 to 2021. The language restriction has been set for English language studies. Studies involving adult patients who underwent coronectomy and a control group of those who underwent high-risk third molar extraction surgery were included. In each study, the intimate tooth/nerve relationship was confirmed by conventional radiography and/or cone beam computed tomography (CBCT)

Results

A database search found 147 articles, which became 108 when the duplicates were removed. Titles and abstracts were reviewed and eighteen full-lengths assessed. Nine of these were excluded and nine studies met the criteria and were included.



Title	Authors	Revue	Release date
Coronectomy of Mandibular Third Molar: Four Years of Follow-Up of 130 Cases	Saverio Cosola., *et al.*	Medicina 2020	2020
Somatosensory changes in Chinese patients after coronectomy vs. total extraction of mandibular third molar: a prospective study	Zi-Yu Yan., *et al.*	Clinical Oral Investigations (2020)	2020
Identification of Specific Panoramic High-Risk Signs in Impacted Third Molar Cases in Which Cone Beam Computed Tomography Changes the Treatment Decision	Jozsef Szalma., *et al.*	Journal of Oral Maxillofacial Surgery	2020
Risk of inferior alveolar nerve injury with coronectomy vs surgical extraction of mandibular third molars—A comparison of two techniques and review of the literature	A. S. Ali., *et al.*	Journal of Oral Réhabilitations	2017
Coronectomy; Good or Bad?	Humera Sarwar., *et al.*	Dental Update. 2015	2015
Long-term morbidities of coronectomy on lower third molar	Yiu Yan Leung., *et al.*	Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology 2016	2016

Table a

Nerve damage

Sarwar., *et al*. reported two cases of moderate damage to the inferior alveolar nerve in patients who underwent conventional extraction [6]. In this study, 128 patients, with radiological evidence showing proximity to the inferior alveolar nerve, were randomized to receive extraction or coronectomy for removal of the mandibular third molars; they reported lesions of the inferior alveolar nerve in 19 patients. (19%) that were removed by extraction and no damage occurred after a successful coronectomy. In addition, there was no lesion of the lingual nerve [6].

In the study by Renton., *et al*, no inferior alveolar nerve injury was observed in the coronectomy group, while one developed in almost a fifth (18.6%) of the procedures. surgical extraction [7].

Leung., *et al*. [8] performed 612 coronectomies of the lower third molar performed in 458 patients (286 women and 172 men) and reported a single case of a patient (0.16%) who presented with an alveolar nerve deficit postoperative lower lip in the form of moderate hypoaesthesia of the lower lip but recovered at 12 months follow-up. There was no lingual nerve deficit after coronectomy in all cases [8]. These results illustrate coronectomy as a preferable alternative to extraction, with a low incidence of complications. It is a technique suggested in case of high risk of injury to the inferior alveolar nerve.

Infection

Sarwar., *et al*. [6] reported that the incidence of dry socket was equal in all groups. However, one patient in the extraction group and three patients in the coronectomy group developed soft tissue infections. The higher incidence of these soft tissue infections in people undergoing coronectomy is likely due to retention of the remaining root [6]. Although the study reported a similar incidence of dry socket in all groups, this may not be truly representative, as a number of people in this study had deeply affected teeth with pericoronitis.

According to Renton., *et al*, the risk of infection, dry socket, reoperation or other adverse outcomes was not influenced by the type of treatment [7].

As for Leung., *et al*, the infection rate at week 1 after coronectomy was 2.9% (18/612). All infected patients who presented during this follow-up period were treated with antibiotics and local measures, including debridement with or without incision and drainage, and infections resolved without incident. None of these cases presented with subsequent chronic infection or required removal of the retained root. There was no incidence of postoperative infection at 6 months, 36 months and 60 months [8].

Post operative pain

There were 31.2% (191/612) of patients in the Leung., *et al*. study who reported pain in the postoperative week (8). For those who complained of pain, the VAS pain intensity score was 3.2 out of 10 in the coronectomy group while it was 3.7 out of 10 in the extraction group [8].

Discussion

Coronectomy has many advantages over extraction with regard to damage related to the inferior alveolar nerve; coronectomy can be considered a safer option, as reported by many of the discussed studies. The current criteria used to decide the fate of the mandibular third molars are applicable when imaging via panoramic radiographs and computed tomography offers a three-dimensional view, making this form of imaging more suitable.

A CBCT image can provide new and improved information by allowing more precise examination of root morphology, caries lesions, external root resorption and contact with ACI, which could ultimately influence decisions [9].

The studies presented highlight the benefits as well as some complications of coronectomy. Overall, studies encourage coronectomies in patients where there is a high risk of inferior alveolar nerve injury, particularly as a useful alternative for removal of mandibular third molars. A common conclusion found in all of the studies was that the long-term complications of this procedure are unknown due to insufficient follow-up time. Therefore, a longer study period is needed, with a follow-up of approximately 10 years, to be able to fully assess the long-term benefits of coronectomy.

Consistent with previous results, coronectomy appears to be a safe surgical procedure in most cases, with reduced complications compared to complete extraction of wisdom teeth [11]. It is therefore considered a treatment option with long-term safety for the management of impacted lower third molars with a high risk of injury to the inferior alveolar nerve [10].

Conclusion

Coronectomy can be considered a well-documented technique for the treatment of lower wisdom teeth when in close proximity to the inferior alveolar nerve, and this procedure is characterized by a lower incidence of nerve damage, long-term follow-up of these cases has revealed that coronectomy is probably a safe procedure and that removal of any remaining roots is necessary. A longer evaluation of these cases should be performed, and further clinical studies to assess patient comfort and the safety of the surgery should be conducted.

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