

# APPLICATION OF CORONECTOMY AS AN ALTERNATIVE SURGICAL METHOD FOR THE TREATMENT OF IMPACTED MANDIBULAR THIRD MOLARS – CASE REPORT

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## Abstract

The extraction of mandibular third molar is a difficult surgical approach, because of the close relation of the tooth to the inferior alveolar nerve. Coronectomy can be applied as an alternative technique instead, in order to avoid inferior alveolar nerve damage and its sensitivity changes. Removing the crown of mandibular third molar and leaving the roots intact, reduces the risk of nerve injury and postoperative neurosensory deficits. Specific radiographic signs have been identified to enable appropriate surgical approach; however, CBCT is considered as a more effective imaging technique, allowing better decisions to be made with regards to the removal technique. This case report demonstrates the complex surgical approach to managing the impacted third mandibular molar of a 24 years old female patient, where the roots of the tooth are in a close proximity to the inferior alveolar nerve. The patient was followed up for a 12-month period, where a clinical, CBCT and radiographic evaluation was made. No discomfort of the patient was registered after the surgery, neither deficit in sensitive nerve function for the anticipated follow-up period.

Coronectomy reduces the incidence of complications related to the inferior alveolar nerve, although it does not completely exclude the possibility of complications of another nature related to the subsequent migration of the roots.

*Keywords:* coronectomy, CBCT, mandibular third molar, impaction, inferior alveolar nerve

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## 1. Introduction

Impacted teeth are fully formed teeth in the jawbone, but have not erupted in their supposed place, or anywhere else on the dental arch, due to disruption of the eruptive process.

Impaction, as a developmental anomaly, has a multi causal etiology and is caused by several local and general factors. It can affect any morphological group of teeth, both deciduous and permanent dentition, but it most often involves the teeth that are the last to erupt in the oral cavity, such as mandibular third molars, maxillary canines, maxillary third molars, etc. The impaction of these teeth is followed by the appearance of pathological conditions, with varying degrees of severity, there's why the need for a radical therapeutic approach is imposed, i.e. their surgical extraction.

The operative extraction of an impacted mandibular third molar is a complicated surgical operation, because of the association of the intervention with intraoperative and postoperative complications, also it is one of the most frequently applied procedures in oral surgery practice.

These complications are due to the position of the impacted tooth, as well as the proximity of important anatomical-morphological structures, such as the mandibular canal with its neuro-vascular content (alveolar inferior nerve, alveolar inferior artery and vein) (Kim et al.,2017).

Intraoperative injury to the inferior alveolar nerve leads to the appearance of a certain postoperative neurosensory deficit, which is clinically manifested by the appearance of neurosensory aberrations. (L. K. Cheung,2010)

Certain neurosensory aberrations (absent complete physiological and functional recovery of the nerve) represent a serious medical problem, and they impose the need to apply an adequate surgical technique in order to reduce or minimize the risk of nerve injury.

The prevention of injury to the inferior alveolar nerve is extremely important, when planning the operative procedure for the extraction of the impacted third mandibular molar, therefore certain alternative techniques are described:

- Coronectomy, (Ecuyer J. et al.,1984)
- Staged (phase) extraction, (Landi L. et al.,2010)
- Pericoronar osteotomy, (Tolstunov L. et al.,2011)
- Orthodontic – assisted extraction, (Checchi L. et al.,1996)
- Modified and grafted coronectomy, (Leizerovitz M. et al.,2013)

This paper is focused in the technique of coronectomy, its appliance and benefits. Coronectomy is presented in the literature as a surgical technique that reduces the risk of injury to the alveolar inferior nerve. The method is based on the removal of the crown of the impacted lower third molar, whose roots are left in situ, this way avoiding direct or indirect injury to alveolar inferior nerve. The remaining roots should be at least 3 mm below the crestal bone segment of the alveolar ridge, from the lingual and buccal side. In the period that follows, the newly created bone tissue covers the remaining roots. The pulp tissue present in the root canals is not subject to additional treatment. The preservation of the stability and fixation of the remaining roots in the alveolar bone i.e. absence of their mobility, is a crucial moment regarding the success of the applied surgical procedure, (Pogrel MA et al.,2009)

## 2. Material and methods

*2.1. The aim of the study:* The application of the most adequate method for the extraction of impacted mandibular third molars, where their roots are in close proximity with the mandibular canal, is the main motive of this paper. The aim of our study is:

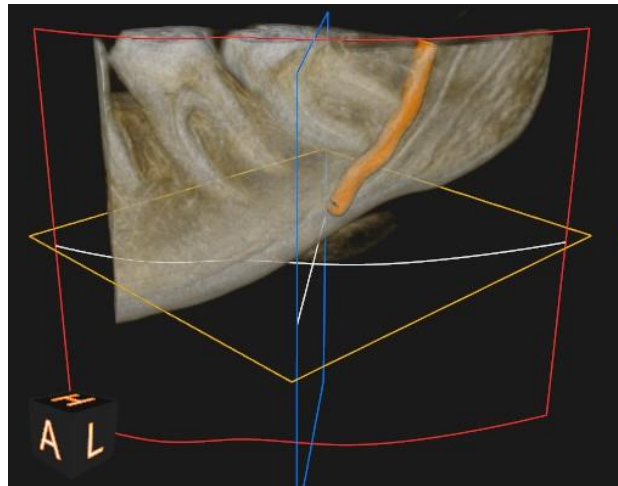
- to analyze and determine the position of the impacted mandibular third molar;
- to determine the proximity of the roots of the impacted mandibular third molar with the mandibular canal i.e. alveolar inferior nerve;
- to define a treatment plan in relation to the surgical extraction of the impacted mandibular third molar;
- to make a clinical and radiographic assessment and to identify the indications for performing a coronectomy on the impacted mandibular third molar;
- to monitor the root migration of the impacted mandibular third molar for a period of 12 months after the performance of coronectomy;
- to analyze the complications associated with performing coronectomy as a method for extraction of impacted mandibular third molars.

*2.2. Classification of the impacted molars by their position:* Before performing the extraction, a very important moment is the determination of the exact position (localization, depth in the jaw bone, inclination of the tooth and the relation to the adjacent anatomical and morphological structures) of the impacted mandibular third molar. For that purpose, generally accepted and confirmed classification systems are used, according to George Winter and Pell and Gregory.

The classification according to Winter defines deviation of the eruption path of the impacted third molar from the normal position of the tooth in the tooth row, that is, the angle formed between the average normal axis of the second and third mandibular molar. (Christian K. et al, 2022)

Classification according to Pell and Gregory, is based on the size of the space between the distal side of the lower second molar and the mandibular ramus. (Leila K. et al, 2019)

The following classification according to Pell and Gregory determines the depth of the impaction of the lower third molar and the level of the crown of the lower third molar in relation to the lower second molar (the amount of bone tissue that covers the impacted tooth). (Leila K. et al, 2019)



**Figure 1.** CBCT of the left mandibular quadrant

*2.3. Case report:* The selection of patients in the research sample was limited by certain criteria. The examination and the surgical treatment of the patients of our study was performed in The Department of Oral Surgery, University Clinical Center "St. Panteleimon", Skopje.

A 24-year-old female patient, in good general health, was repeatedly referred for extractions of her impacted mandibular third molar, due to severe localized periodic disruptions of intermittent pain and paresthesia on the left side of the lower jaw. She also reported pressure associated with the lower left third molar.

At the appointment, a CBCT of the left quadrant of the jawbones was taken to the patient, and a dental plan was made, which included extraction of the third mandibular molar by applying the method of coronectomy.

In the presented case, according to the CBCT of the left side of the patient the lower third impacted mandibular molar responds to mesioangular inclination, 2B position. (Figure 1)

The patient was explained the risks of extraction the tooth and options of applying the method of coronectomy. The patient chose to have coronectomy performed, the treatment plan was reviewed and her consent was obtained.



**Figure 2.** Tooth crown separation/coronectomy and osteotomy

When performing the coronectomy technique (Figure 2 ) we applied the principles recommended by Pogrel M.A. 2009 et al, Renton T. et al, 2012 as follows:

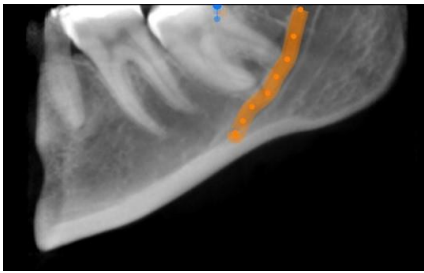
- Applying and elevation of a triangular mucoperiosteal flap
- Buccal, occlusal and distal osteotomy
- Separation of the crown from the root of the tooth, immediately below the enamel - cement border
- Complete cutting of the crown at an angle of 45°
- Removal of the crown with a suitable instrument

- Reduction of the root fragment 2-3 mm. below the crestal bone ridge, buccal and lingual
- Suturing the wound primarily with vertical mattress sutures

The patient came for a dental visit at seven days postoperatively. The surgical sites appeared to be healing normal. The patient subjectively reported absence of paresthesia in the IAN and lingual nerve distribution.

Coronectomy, like any other surgical procedure, carries with it the risk of complications. The complications and consequences of applying this method are related to the roots left in the bone, where it should be observed:

- the condition of the pulp tissue
- migration of roots
- the eruption of the roots
- root mobility



**Figure 3.** First day of surgery



**Figure 4.** 6 months after surgery



**Figure 5.** 12 months after surgery

### 3. Results

The patient was followed up for a 12-month period, where a clinical and radiographic evaluation was made. No discomfort of the patient was registered after the surgery, neither deficit in sensitive nerve function for the anticipated follow-up period. The patient stated the area felt fine with no pain or paresthesia. The migration of the remaining roots was evident after 6 months of surgery, while the difference between 6 and 12 months was insignificant. The distance of root migration from the mandibular canal from the initial position and after 12 months follow up was measured to be 1.7mm. (Figure 3, Figure 4 and Figure 5) this situation offered efficient conditions for root extraction with no longer presence danger of IAN damage.

### 4. Discussion and conclusion

Regarding the clinical results obtained from the researches of different authors, Leung YY, et al, 2012, presents 155 coronectomies in 108 patients. In the first week after the operation, infection occurred in 6 cases, postoperative pain was recorded in 58 patients (43%) with exposed pulp. In 4 patients, an eruption of the roots occurred and a reoperation was performed for the extraction of the same. No IAN lesion or other pathology was recorded. Root migration appeared in the first 12 months postoperatively and stopped in 75.2% of cases, and after 24 months the unerupted roots no longer migrated. The results show a relatively small number of IAN injuries so that the coronectomy technique is preferred in these cases.

In the study of Giuseppe Monaco et al., 2015, 94 patients were included and 116 coronectomies were performed. During three years of observation, no case of IAN injury was registered. Alveolitis

appeared in 5 cases (4%), 10 cases (9%) with postoperative edema, 10 cases (9%) with postoperative pain

T. Renton, 2012 in his research examined 128 patients diagnosed with a close relationship of the impacted mandibular third molar with the IAN, who were divided into two groups. The observation was carried out during 25 months, so that in 19 patients (19%) where extraction was carried out, IAN injury was recorded, while in the coronectomy procedure, which was unsuccessfully carried out, only in 3 cases (8%). During a successfully performed coronectomy, no case of IAN or lingual nerve injury was registered. Alveolitis occurred with the same incidence in both groups. Soft tissue infection occurred in one patient in the extraction group and 3 patients in the coronectomy group postoperatively.

For 231 mandibular third molar coronectomies performed in 191 patients with an observation period of 5.7 years, M. H. Pedersen et al., 2018 recorded a prevalence of IAN injury of 1.3%, while in 3.5% of cases the remaining roots were extracted. Infection occurred in 11.7% of cases and all were treated with antibiotics. 97% of the left roots showed a sign of migration and 65% a sign of rotation.

Regarding references and our case we can conclude that:

Coronectomy is in advantage as a safer technique, compared to the traditional extraction of impacted mandibular third molars, due to the management of the risk of injury of IAN and the reduction of postoperative complications

Coronectomy appears to be safe and an alternative technique that could be considered for nearly all cases of vertical, mesioangular, or distoangular impactions of mandibular third molars.

## 5. Nomenclature

CBCT – Cone Beam Computed Tomography

IAN – Inferior Alveolar Nerve

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