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## CORONECTOMY: WHAT ARE THE STEPS FOR THE CLINICIAN TO PERFORM THIS TECHNIQUE? – DESCRIPTION OF THE SURGICAL TECHNIQUE

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### **ABSTRACT**

Coronectomy, also described as intentional partial odontectomy, is an alternative surgical technique for the extraction of teeth that present an increased risk of injury to the Inferior Alveolar Nerve (IAN) and/or mandibular fractures. It is essential that the clinician correctly indicates the procedure and observes key intraoperative precautions to ensure success. The objective of this paper is to provide a step-by-step description of this surgical technique and to outline its proper indications and contraindications, enabling clinicians to achieve a high success rate with this procedure. A search was performed in the PubMed/MEDLINE databases using the keywords: “Odontectomy,” “Third Molar,” and “Coronectomy.” The inclusion criteria were English-language articles published between 1984 and 2023 that addressed coronectomy as an alternative to mandibular third molar extraction. In addition, literature review articles evaluating the feasibility and effectiveness of the technique were included. Exclusion criteria included studies that did not address coronectomy or discuss its efficacy and safety, as well as those that focused solely on the extraction of third molars without the use of coronectomy.

**Keywords:** Odontectomy, Third Molar, Coronectomy.

## **INTRODUCTION**

Extraction of third molars and impacted supernumerary teeth is one of the most requested procedures in daily dental practice, and it is frequently accompanied by common signs and symptoms such as pain, bleeding, trismus, or even infections (pericoronitis). To perform this procedure, accurate planning is necessary to minimize the risks of injury to the inferior alveolar nerve (IAN), root fractures, or even mandibular fractures.<sup>1-3</sup> Coronectomy, also termed intentional partial odontectomy in the literature, consists of sectioning the coronal portion of the tooth while allowing the roots to remain intact within the dental socket in situ, in order to minimize damage to the IAN and/or mandibular fractures. This technique was first described by Ecuyer and Debieen in 1984 for molars in proximity to the mandibular canal, providing greater patient safety. Although numerous studies have highlighted the effectiveness of the technique, it still presents negative aspects, such as susceptibility to infections due to the retained roots.<sup>4-7</sup> The object of this paper is to outline the main aspects of coronectomy by describing its indications, precautions, and contraindications, as well as evaluating its effectiveness in avoiding temporary or permanent IAN complications, infections, or bone-related events.

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## **METHODS**

A search was carried out in the PubMed/MEDLINE databases using the keywords “Odontectomy,” “Third Molar,” and “Coronectomy.” The inclusion criteria were English-language articles published from 1984 to 2023 that addressed coronectomy as an alternative to the extraction of mandibular third molars. In addition, literature review articles that evaluated the feasibility and effectiveness of the technique were included. The exclusion criteria included articles that did not address coronectomy, that did not discuss its efficacy and safety, or that addressed only the extraction of third molars without the use of intentional partial odontectomy (Figure 1).

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## **RESULTS**

The database screening summary included PubMed/MEDLINE, yielding 69 articles. Fifty-two potentially eligible studies were found; 42 articles were excluded after analysis, and 22 articles were included.

### **Indications and contraindications of the technique:**

Among the main criteria that must be considered for performing this technique are: the tooth must have pulp vitality, be in intimate proximity to the mandibular canal, and be impacted. Likewise, it must not present any carious lesions, periapical lesions, prior infections, mobility, or pain. The procedure is contraindicated when cysts or tumors are present. Some authors state that the organism can recognize root remnants of teeth with infections or mobility as foreign bodies.<sup>8-12</sup> According to several studies, the technique is not indicated for teeth with caries at risk of pulp involvement, mobility, apical lesions, or the presence of cystic tissue. Moreover, it is not recommended for patients scheduled for esthetic-functional mandibular osteotomies, immunocompromised patients, or those who have previously received radiotherapy. Conversely, it is indicated for teeth with pericoronitis, those causing periodontal disease in adjacent teeth, or those that pose a risk of mandibular fracture.<sup>1-3,10,13,14</sup> Intentional partial odontectomy may also cause postoperative infections, especially when the dental follicle is not completely removed upon crown sectioning. Approximately 10–12% of cases may be prone to infection.<sup>1,15-17</sup>

### **Advantages and disadvantages:**

When evaluating the patient, it is necessary to identify the main risk factors for nerve injury, such as advanced age, mesiodistal angulation of the tooth (distoangular), lingual angulation of the tooth, lack of integrity of the lingual cortical plate, distal bone removal adjacent to the third molar, and long-standing pericoronitis that has resulted in soft tissue fibrosis. Third molar removal surgeries account for the majority of nerve injuries associated with extractions, most frequently involving the Inferior Alveolar Nerve (IAN) and the Lingual Nerve (LN). Among the most commonly cited complications are temporary paresthesia and permanent paresthesia.<sup>8,18,19</sup>

Neurological sequelae should be assessed as hypoesthesia, hyperesthesia, and dysesthesia of the lower lip and the mental region on the operated side when removing sutures. In addition, alterations in lingual sensitivity should be evaluated (Renton et al.). Although coronectomy does not completely eliminate the possibility of neurological damage and, in some instances, may require a secondary surgical stage for the removal of retained roots, it offers greater safety with respect to the IAN.<sup>18</sup>

### **Description of the surgical technique:**

#### *Imaging assessment:*

A thorough imaging exam should be performed by means of cone-beam computed tomography (CBCT) to accurately assess the relationship between the dental roots and the mandibular canal and to support proper surgical planning.

#### *Choice of local anesthetic:*

For local anesthesia, 4% Articaine with 1:100,000 epinephrine or 2% Lidocaine with 1:100,000 epinephrine is preferred to achieve an appropriate regional nerve block and improved hemostasis.

#### *Incision and flap elevation:*

Make an incision with a no.15 (or 15c) blade mounted on a no. 3 or no. 7 handle to design a preferably triangular flap. Begin the incision from the most posterior tooth, along the alveolar crest distally, extending to the mesiobuccal line angle, with a vertical releasing incision to the alveolar mucosa. Elevate a full-thickness flap (mucosa, submucosa, and periosteum) using a periosteal elevator, such as a Molt no. 9 elevator (Figure 2).

#### *Osteotomy:*

Perform osteotomy with a surgical carbide round bur (no. 6 or no. 8) to expose the coronal portion of the tooth down to the cemento-enamel junction, using a rotary instrument under constant and abundant irrigation with sterile 0.9% NaCl solution (Figure 3).

#### *Odontosection:*

Subsequently, using a Zekrya bur or a long shank 702 bur, perform the odontosection/odontectomy with buccolingual strokes, always respecting two-thirds of the buccolingual width of the tooth to avoid damage to the lingual nerve (Figure 4). For easier removal, a crown cut along the long axis of the tooth may be performed (Figure 5).

*Crown removal:*

Finally, using a Straight Seldin no. 2 elevator or an apex elevator no. 303, complete the coronectomy. If necessary, the elevator may be supported on the alveolar crest to gain a fixed fulcrum, avoiding contact with the roots (Figure 6). It is important to remember that the clinician should not mobilize the root portion, but only the coronal portion.

*Bone adjustment:*

Next, using a surgical carbide round bur no. 6, regularize the remaining roots by removing sharp edges, ensuring that they remain 3–4 mm below the alveolar crest (Figure 7).

*Wound closure:*

For wound closure, first place a simple interrupted suture at the flap apex and then along the entire incision line, thus avoiding postoperative exposure of the surgical site and/or dehiscence of the flap (Figure 8).

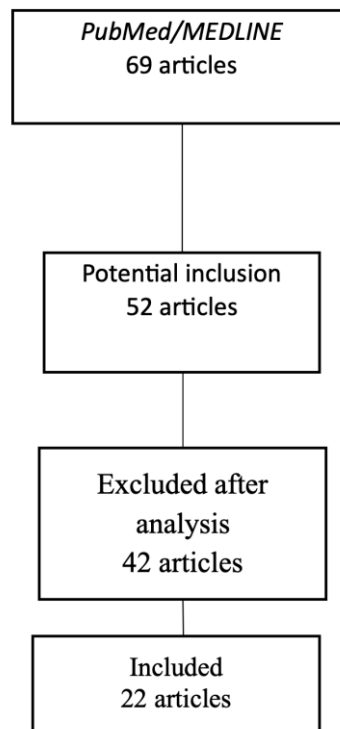


**Figure 1.** Flowchart of the literature review.



**Figure 2.** Creation of a triangular surgical flap to provide complete visualization of the region.

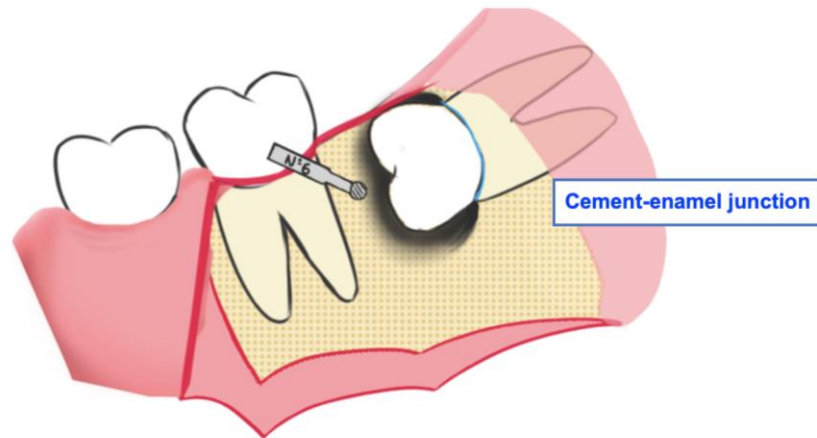


**Figure 3.** Ostectomy using a surgical carbide round bur to properly expose the crown of the impacted tooth.

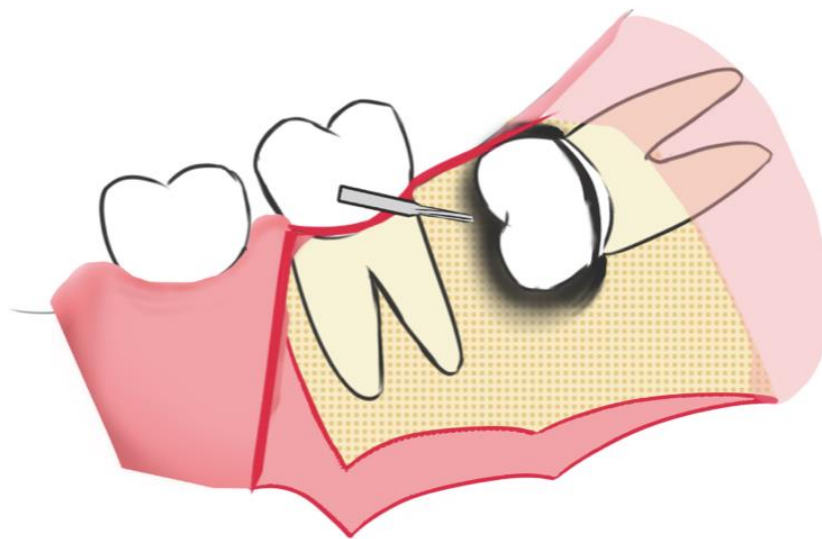


**Figure 4.** Odontosection with a surgical Zekrya bur for a buccolingual section, respecting two-thirds of this distance.

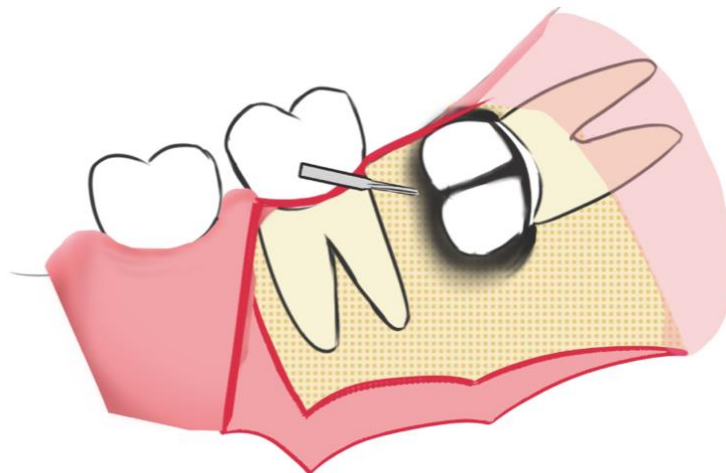


**Figure 5.** Odontosection with a surgical Zekrya bur for a mesiodistal section, respecting two thirds of this distance, facilitating complete crown removal with minimal risk of root movement.

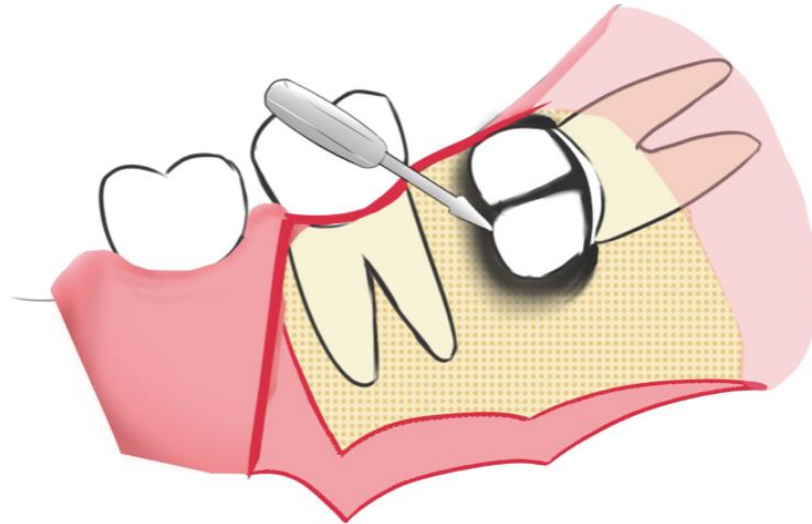


**Figure 6.** Separation and complete removal of coronal fragments using a Straight Seldin number 2 elevator.

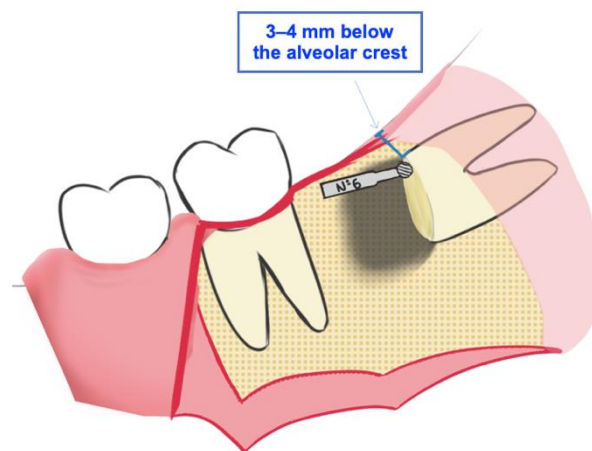


**Figure 7.** Ostectomy with a surgical round bur number 6 to regularize root remnants by removing sharp edges, ensuring 3–4 mm below the bony margin.

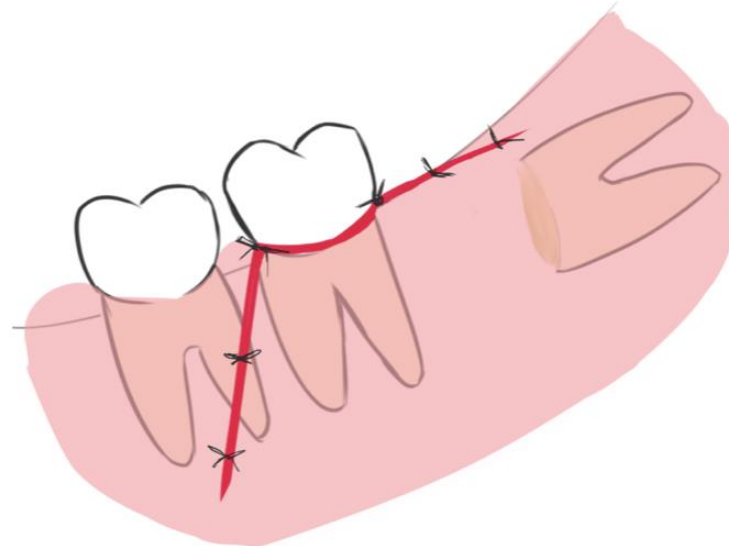


**Figure 8.** Closure of the triangular flap with 3-0 or 4-0 suture.

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## **DISCUSSION**

Third molar surgeries have been the aim of many studies, looking for a better post-operative outcome<sup>20,21</sup> or providing advice about instruments and care.<sup>22,23</sup> Corenectomy was first

described by Ecuyer and Debieen in 1984 as a technique in which the roots are intentionally left within the dental socket after coronal sectioning.<sup>10</sup> According to Williams et al.,<sup>24</sup> panoramic radiography is widely used to assess the degree of proximity between an impacted tooth and the mandibular canal for the extraction of mandibular third molars; however, it may be more challenging to interpret. Therefore, cone-beam computed tomography (CBCT) offers greater visualization and safety for the procedure. Currently, it is indispensable to use CBCT in cases where the panoramic radiograph suggests intimate contact between the roots and the mandibular canal, as it provides greater precision without distortion in a three-dimensional view of the region.

Although coronectomy offers greater safety by avoiding potential IAN injury, the technique itself does not completely eliminate the possibility of neurological damage.<sup>10,18,24</sup> Roots tend to migrate toward the superior border of the mandible during healing, and a further procedure to remove the retained roots may be necessary. There is also concern about the possibility of retained roots developing a radicular cyst, indicating a need for preventive removal. In addition, as noted by Monaco et al.,<sup>10</sup> there is concern regarding pulp complications; therefore, the technique is not indicated for third molars affected by caries, pulp infections, or mobility. Monaco et al.<sup>7</sup> reported that access should be achieved via a full-thickness mucoperiosteal flap, preferably with an anterior vertical incision placed distal to the mandibular second molar and extending along the external oblique ridge. The flap design should be related to the type of impaction. However, a triangular flap with a releasing incision distal to the second molar is more effective for primary-intention healing than an envelope flap. In a case series of 43 coronectomies for impacted third molars, root migration was most likely to occur within the first 3 months and decreased markedly after 6 and 12 months. Patients who exhibited migration within 3 months were younger than those who did not. Subsequently, in 2015,<sup>10</sup> the same authors determined that the retained roots should remain at least 3 mm below the lingual and buccal bony margins. Kim HS et al.<sup>25</sup> and Renton et al.<sup>8</sup> followed the same protocol, setting the cut margin 3 mm below the adjacent bone after crown removal. Mobility of the remaining roots was assessed to minimize secondary trauma to the roots.

For the technique, atraumatic removal of the coronal portion is performed by sectioning in the mesiodistal and buccolingual directions. The alveolar crest can be used as a support wall for elevators, thereby avoiding contact with the roots. Ostectomy may be necessary in some situations; however, it is recommended that it not be extended below the cemento-enamel junction. By observing these details, stress on the roots is significantly reduced, as is the risk of technique failure and root mobilization during the procedure.<sup>26</sup> According to Monaco et al.,<sup>10</sup> the amount of bone to be removed must be compatible with the depth of inclusion and type of impaction observed. For vertical impactions or distoangular inclusions where 50% of the third molar crown is above the cemento-enamel junction (CEJ) of the second molar, odontosection can be performed without ostectomy. However, if the crown is 50% or more below the CEJ of the second molar, ostectomy becomes necessary. For mesial or horizontal inclusions, ostectomy is more often required and should be performed until complete crown visualization is achieved. Regarding suturing, most studies indicate that suturing stabilizes the clot and improves postoperative healing. Suturing should provide tension-free healing, and interrupted simple stitches should be placed until the incision is completely closed, as depicted in Figure 7. Then, coronectomy is a valid surgical option for managing mandibular third molars. With adequate knowledge and attention to technique, the chances of success are high, and the incidence of potential complications is reduced. Proper surgical planning and mastery of the method are essential for the steps to be performed correctly and for success to be achieved.

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