

ORTHODONTIC EXTRUSION FOLLOWED BY A SURGICAL EXTRACTION OF HIGH-RISK LOWER THIRD MOLAR: CASE REPORT

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ABSTRACT

AIM: The aim of this article is to present a clinical case of alternative method of surgical treatment of lower third molar with signs that indicate high risk of postoperative complications.

MATERIALS AND METHODS: We present an orthodontic extrusion followed by surgical extraction of lower third molar. For precise diagnostics and suitable method of treatment we used standard panoramic radiograph and CBCT. As a method of surgical treatment we chose assisted orthodontic extraction with individually manufactured ring with soldered bar, fixed to tooth 47.

RESULTS: In our clinical case we achieved traction of the impacted lower third molar to safe distance from the mandibular canal. On the second stage of the treatment we performed a classic odontectomy without affect or damaging the IAN.

CONCLUSION: The classic odontectomy is a surgical method with a high risk of damaging the IAN when the impacted tooth is very close to the mandibular canal. The orthodontic extraction like an alternative surgical method of high-risk lower third molars is preventive method, by which there is minimal risk of damaging the nerve during the surgery. The orthodontic extrusion makes the following surgical extraction a safe and secure method for the patient.

Keywords: retention, impacted lower third molar, alternative method, orthodontic extrusion, CBCT

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INTRODUCTION

The retention of lower third molars is a widely spread problem in the daily practice. In different populations the frequency is between 9.5 (1) and 25% (2). According to data shown by other authors the retention of lower third molars is highly different between populations – 9.5% to 68.6% (3,4).

The main method of treatment is surgical extraction - odontectomy. The odontectomy is a rou-

tine procedure in daily practice. Like with every surgical procedure there is a risk of different intra- and postoperative complications. According to Liedholm (5) possible complications are :

- ◆ postoperative alveolitis – 0.5 – 32.5%
- ◆ postoperative infection – 0.9 – 4.2%
- ◆ postoperative bleeding – 0.2 – 1.5%
- ◆ temporary dysfunction of *n. alveolaris inferior* – 0.6 – 5.5%
- ◆ permanent dysfunction of *n. alveolaris inferior* – 0.1 – 0.9%
- ◆ temporary dysfunction of *n. lingualis* – 0.004 – 11.5%
- ◆ permanent dysfunction of *n. lingualis* – 0.2 – 0.6%

With high-risk teeth this value can go up to 20% (6). To evaluate a lower third molar as high-risk x-ray marks with the following frequency are used: diversion of the mandibular canal – 30%, darkening of the roots in the apical area – 11.6%, deflection of the roots from the mandibular canal – 4.6% (7, 8).

There are alternative surgical methods for treatment of impacted third molars with strict indications and different local and general factors from the side of the patient.

Such kind of innovative and alternative surgical method of treatment is the **orthodontic extraction/extrusion of the tooth** with orthodontic forces and followed by surgical extraction.

AIM

The aim of this article is to present a clinical case of an alternative method of surgical treatment of a lower third molar with signs that indicate a high risk of postoperative complications.

MATERIALS AND METHODS

We present an orthodontic extrusion followed by surgical extraction of a lower third molar with root apices which penetrate into the mandibular canal.

For precise diagnostics and suitable methods of treatment we used standard panoramic radiograph and CBCT.

As a method of surgical treatment we chose assisted orthodontic extraction with individually manufactured ring with soldered bar, fixed to tooth 47.

The thickness of the soldered bar is 1.2 mm with a special V-shape dimpling for better retention of the extruding element.

Clinical Case:

A 20-year-old man, II skeletal class and II malocclusion came to our clinic with a desire for consult and orthodontic treatment. The patient came to us without any subjective present complaints. In the medical history there is no information about undergone orthodontic treatment in the past or traumas in the maxillofacial region.

After an orthodontic diagnostics we determined these deviations: compression of the upper and lower jaw, insufficient space and distal occlusion. Because of the insufficient space and the unfavorable position of the third molars to the second molars the patient was guided for extraction of the lower third molars.

After a treatment plan was made, the patient was directed to the Department of Oral and Maxillofacial Surgery at the University Medical and Dental Centre for odontectomy of teeth 38 and 48.

On the panoramic radiograph it was found that the roots of tooth 48 penetrate in the mandibular canal. For more precise and a better visualization of the correlation of the roots to the mandibular canal a CBCT was made. The CBCT image showed the direct communication and penetration of the roots. (Fig. 1, Fig. 2). There were no signs on the panoramic radiograph of a high risk of postoperative complications followed by the classical extraction of tooth 38.

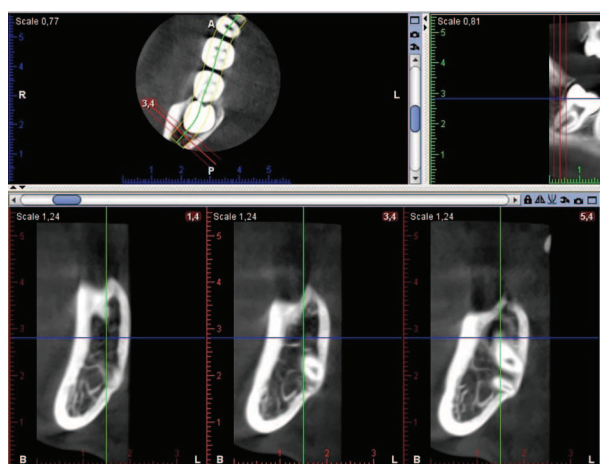


Fig. 1. Communication of the distal root of tooth 48 with the mandibular canal

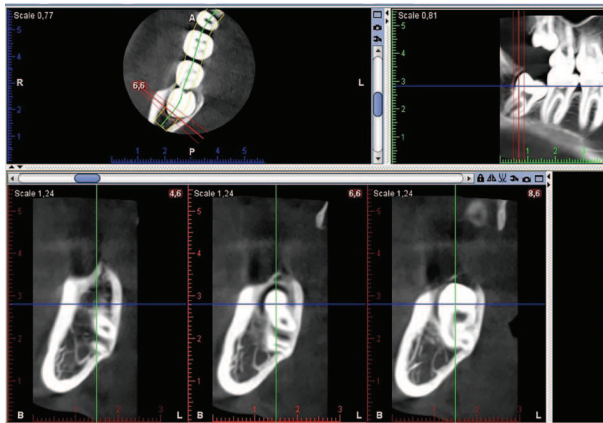


Fig. 2. Communication of the medial root of tooth 48 with the mandibular canal

For the surgical treatment of tooth 48 we chose assisted orthodontic extrusion followed by an extraction of the tooth. Tooth 38 would be extracted by the methods of classical odontectomy.

Under local anesthesia a horizontal cut was made on the alveolar ridge, distal from tooth 47, and a vertical one, vestibular in the area of tooth 47. A triangular muco-periosteal flap was made. Under continuous flow of sterile saline the bone around tooth

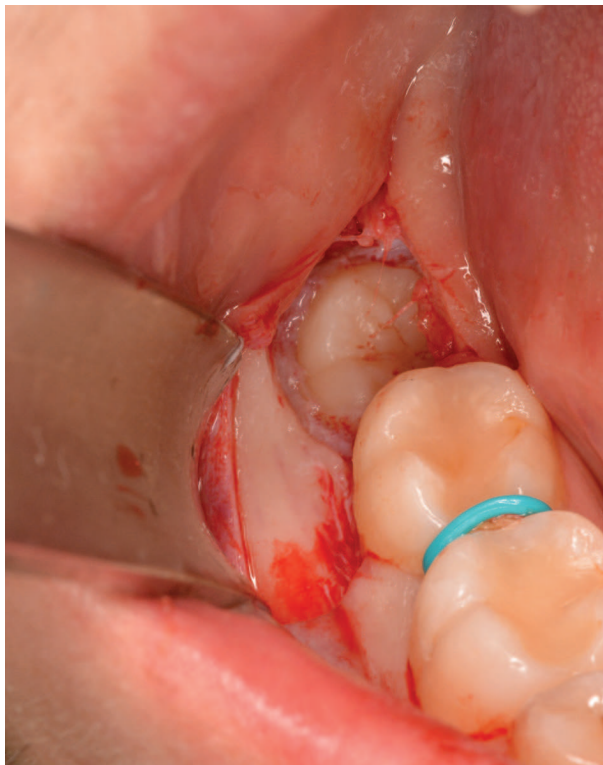


Fig. 3. Dissection of the triangular muco-periosteal flap; visualization of the crown of tooth 48

48 was cut to the level of the cervical part of the tooth (Fig. 3). The growth follicle was removed carefully and hemostasis was made. A previously made orthodontic hook from triple twisted orthodontic wire with thickness of 0.1 mm was fixed with composite on the occlusal surface of tooth 48 (Fig. 4).

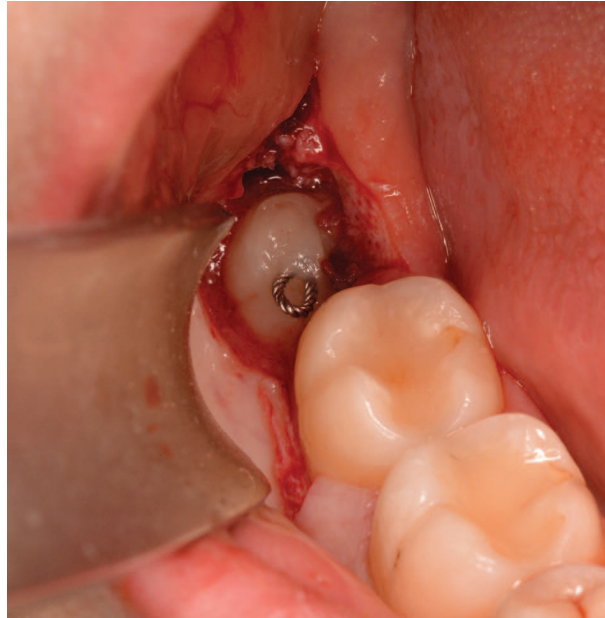


Fig. 4. Fixed orthodontic hook from triple twisted orthodontic wire on the occlusal surface of tooth 48

At the same stage an orthodontic ring with soldered individually produced bar was positioned on tooth 47. With a wire ligature the hook on the wis-



Fig. 5. The orthodontic ring with soldered individually produced bar placed on tooth 47; ligation of tooth 48 to the bar

dom tooth was fixed to the bar on the ring of tooth 47 (Fig. 5).

The flap was adapted and sutured with 3/0 silk. The sutures were removed after 7 days.

The activation started right after the surgical exposure of tooth 48. On the second visit an elastic chain was put between the wire ligature and the bar to increase the power of the wisdom tooth extrusion. The direction is up and backwards. The activation was done every 10 days and in 45 days the tooth was extruded at a safe distance from the mandibular canal. This way the odontectomy can be performed with a low risk of damaging the IAN.

To prove the extrusion of the tooth we made a standard segment x-ray and CBCT. The CBCT image shows the movement of the tooth and a distance of 1.28 mm from the mandibular canal in the area of the medial root and 1 mm in the area of the distal root (Fig. 6, Fig. 7).

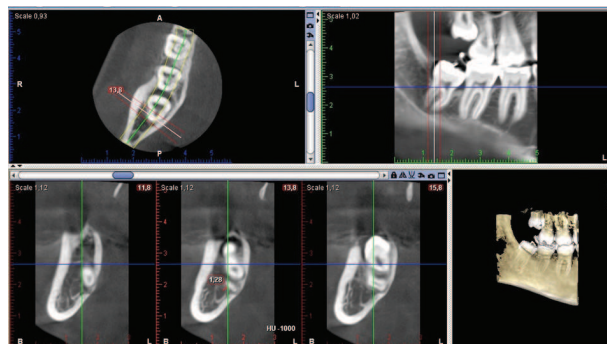


Fig. 6. A distance of 1.28 mm of the medial root from the mandibular canal

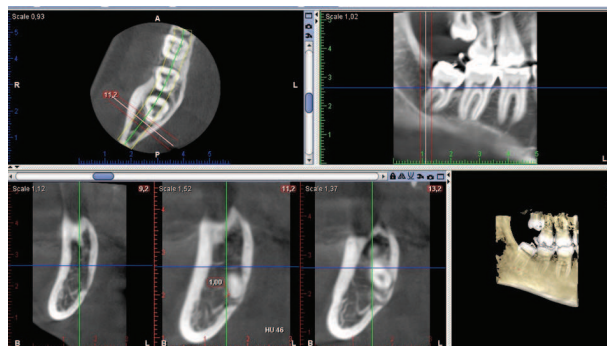


Fig. 7. A distance of 1.00 mm of the distal root from the mandibular canal

After the extrusion of the wisdom tooth at safe distance from the IAN we performed the sec-

ond stage of the treatment – the classic odontectomy. After a removal of the ligature and the ring, an identically triangular muco-periosteal flap was made. The bone on the vestibular side was removed and the tooth was carefully extracted. After the curettage of the post-extraction socket we didn't find any communication to the mandibular canal. A haemostatic material was placed and the flap was repositioned and sutured with 3/0 silk.

During the postoperative period there were no subjective complaints from the patient associated with neurologic deficit of the inferior alveolar nerve. There was no sensory interference (Fig. 8, Fig. 9).



Fig. 8. Second stage: removed ring and ligature from tooth 47 and uncovering tooth 48 for extraction

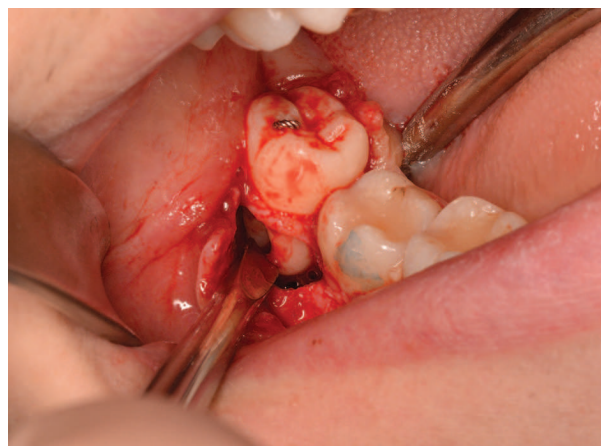


Fig. 9. Extraction of tooth 48

DISCUSSION

Performing the method of classic odontectomy of high-risk wisdom teeth carries postoperative complications, linked with impaired function of the IAN. Even temporary sensory interference like reduced or missing sensitivity in the areas which are innervated by the IAN is related to great discomfort for the

patients. This period can last more than 6 months. In other cases there is irreversible damage of the IAN linked with permanent sensory deficit. So the use of alternative methods of surgical treatment and preventing complications is very important. Such a method can be the orthodontic extrusion.

An alternative method of surgical treatment of high-risk impacted third molars is the so-called orthodontic extraction/extrusion of the tooth (9-17). In the literature there are not enough researches and data about this method. The first attempts for extrusion and the imposed techniques were connected with complicated and extended surgical-orthodontic treatment. To avoid damaging of the IAN Alessandri Bonetti et al., (18-20) present a method of orthodontic extraction. According to his clinical research he treated over 80 patients without complications connected with sensory deficit. The results are encouraging, but the technique is complex and the treatment period is long - 6 to 12 months, especially when we have impacted tooth with mesioangulated or horizontal position.

The period of the extrusion depends of the angulation and inclination of the wisdom tooth to the second molar.

In our case we modified the Bonetti et al. technique, using standard orthodontic ring placed on tooth 47 with soldered bar and a wire ligature. Due to the deep retention and penetration of the roots into the mandibular canal, but the small angulation, it was possible to apply segment anchor and greater force during the extrusion. With an almost vertical position, without inclination to tooth 47, the result was achieved in 45 days.

Despite the disadvantages of the technique, consisting in the increased time of the treatment and a two-stage surgery, the advantages are undisputable.

The advantages of the used technique are:

- ◆ Traction of the third molar roots from the mandibular canal at a safe range needed for classic odontectomy
- ◆ Minimal risk of damaging *n. alveolaris inferior*
- ◆ Working under local anesthesia without pain caused by the compression of the IAN during the surgical intervention.
- ◆ Without neurological postoperative interference, connected with damage of the IAN

◆ Safe surgery for the patient.

In our clinical case the extrusion of the lower third molar from the mandibular canal and IAN was followed by a safe extraction with a small bone defect and less inflicted injury to the hard and soft tissues. The procedure was done without damaging the periodontal tissues of tooth 47 and preserving the bone in the distal area of this tooth. The orthodontic extraction prevented serious neurological problems caused by damaging IAN.

CONCLUSION

The classic odontectomy is a surgical method with high risk of damaging the IAN when the impacted tooth is very close to the mandibular canal. Damaging the nerve causes temporary or permanent sensory interferences in the area innervated by the IAN. The orthodontic extraction as an alternative surgical method of high-risk lower third molars is a preventive method, by which there is minimal risk of damaging the nerve during the surgery. The orthodontic extrusion makes the following surgical extraction a safe and secure method for the patient.

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