

# SURGICAL EXTRACTION OF MANDIBULAR IMPACTED THIRD MOLAR USING PIEZO SURGERY – CASE REPORT

## ХИРУРШКА ЕКСТРАКЦИЈА НА ИМПАКТИРАН МАНДИБУЛАРЕН ТРЕТ МОЛАР СО КОРИСТЕЊЕ НА ПИЕЗОХИРУРГИЈА – ПРИКАЗ НА СЛУЧАЈ

Saveski M.<sup>1</sup>, Najdevski Z.<sup>1</sup>, Babacic A.<sup>1</sup>, Limani V.<sup>1</sup>, Murtezani J.<sup>1</sup>, Apostolova G.<sup>2</sup>

<sup>1</sup>Oral surgery residents, Clinic for Oral Surgery and Implantology, University Dental Clinical Centre "St. Pantelejmon", Skopje, Republic of North Macedonia, <sup>2</sup>Department of Oral Surgery, Faculty of Dentistry, Ss. Cyril and Methodius University in Skopje

### Abstract

**Aim:** The aim of this study is to present the application of piezosurgery in the extraction of an impacted mandibular third molar in a patient with Parkinson's disease. The goal is to preserve insufficient bone tissue and maintain the integrity of the mandibular canal contents in a limited surgical field. **Material and Method:** A 67-year-old male patient with total toothlessness and Parkinson's disease visited the University Clinic for Oral Surgery and Implantology with signs of acute odontogenic infection in the lower left quadrant. A CBCT scan revealed the presence of an impacted left mandibular third molar, with close proximity to the apex of the tooth and the roof of the mandibular canal, which were separated from each other by a 1 mm bone wall. **Results:** The use of piezosurgery in the treatment of an impacted third molar in a patient with Parkinson's disease proved to be the most effective and predictable method, minimizing trauma to soft tissue and bone structures. **Keywords:** impacted mandibular third molar, piezosurgery, Parkinson's disease, surgical extraction.

### Апстракт

**Цел:** Целта на оваа студија е да се прикаже примената на пиезохирургијата при екстракција на импактиран мандибуларен трет молар кај пациент со Паркинсонова болест, со цел штедење на инсуфициентно коскено ткиво и зачувување на виталитетот на содржината од мандибуларниот канал, во услови на непрегледно работно поле. **Материјал и метод:** 67-годишен пациент, со тотална беззубост и Паркинсонова болест, ја посети Универзитетската клиника за орална хирургија и имплантологија со знаци на акутна одонтогена инфекција во долниот лев квадрант. На СВСТ-скенот се детектираше импактиран мандибуларен трет молар кај кој апексот беше во непосредна близина со крвотот на мандибуларниот канал одвоени меѓу себе со 1 мм коскен сид. Индицирана беше екстракција на забот со помош на пиезохируршки апарат. **Резултати:** Употребата на пиезохирургијата во третман на импактиран трет молар, кај пациент со Паркинсонова болест, се покажа како најефикасен и најпредвидлив метод, со минимизирање на траумата на меко-ткивните и коскени структури.

**Клучни зборови:** импактиран мандибуларен трет молар, пиезохирургија, Паркинсонова болест, хируршка екстракција.

### Introduction

Tooth impaction is a pathological condition in which a tooth fails to reach its normal, physiological position within the dental arch. The incidence of impaction is significantly higher in third molars compared to other teeth. Impacted mandibular third molars most commonly occur due to insufficient space between the distal surface of the second mandibular molar and the anterior border of the ascending ramus of the mandible<sup>1,2,3</sup>.

Third molars are the most frequently associated teeth with various pathological conditions, making them one of

the most studied cases in oral surgery. According to the literature, the prevalence of impacted teeth ranges between 15.2% and 35%<sup>4,5,6,7</sup>.

The surgical extraction of impacted mandibular third molars is one of the most common procedures in oral surgery. This intervention can prevent the occurrence of pericoronitis and painful conditions. However, it can also negatively impact the patient's quality of life due to post-operative complications such as pain, bleeding, swelling, trismus, alveolitis, and mastication difficulties<sup>8,9</sup>.

As a recent innovation in dental technology, piezosurgery offers a novel approach to working with bone tis-

sue. Developed in the early 2000s, piezosurgery utilizes precisely controlled ultrasonic vibrations to minimize damage to surrounding soft tissues such as the mucosa, blood vessels, and nerves while precisely cutting hard structures like bone. The precision of piezosurgery allows for a more targeted and atraumatic surgical intervention compared to conventional burs and drills, which can cause trauma to both soft and hard tissues. Due to these advantages, piezosurgery is increasingly being applied in oral surgery, including sinus membrane elevation, implant site preparation, and, more recently, surgical extractions with a risk of injury to adjacent anatomical structures.

Certain studies suggest that piezosurgery significantly reduces intraoperative bleeding, postoperative pain and swelling, as well as the risk of complications such as loss of periodontal tissue of adjacent teeth and alveolar bone<sup>10</sup>.

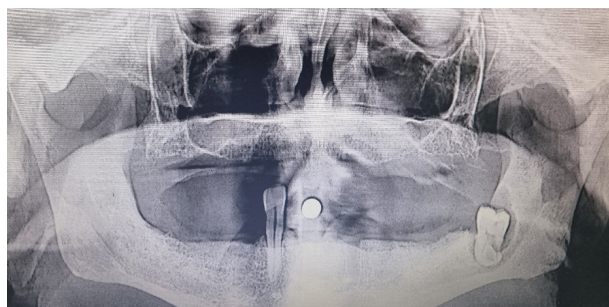
## Aim

The aim of this case report is to present a piezosurgery-assisted extraction of an impacted mandibular third molar in a patient with Parkinson's disease to preserve the insufficient bone tissue and maintain the integrity of the mandibular canal contents while working in a limited surgical field.

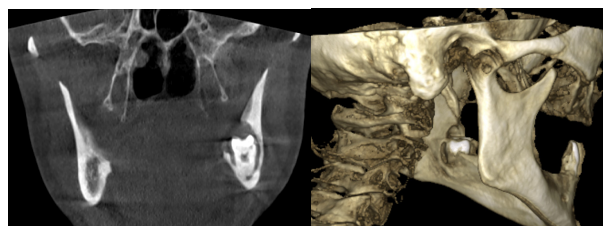
## Case Report

A 67-year-old patient was admitted to the University Clinic for Oral Surgery and Implantology with signs of an acute odontogenic infection in the lower left quadrant. The patient's medical history indicated Parkinson's disease and controlled hypertension, both managed by a specialist internist and neurologist. The patient was classified as ASA III.

A2D panoramic radiograph revealed the presence of an impacted left mandibular third molar with a diffuse chronic lesion surrounding it (Figure 1). Due to the close proximity of the impacted tooth to the mandibular canal



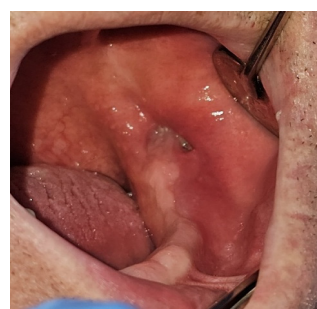
**Figure 1.** Position of the impacted left mandibular third molar on 2D Panoramic.



**Figure 2.** Position of the impacted left mandibular third molar on CBCT



**Figure 3.** Position of the impacted left mandibular third molar (buccal view)



**Figure 4.** Intraoral view of impacted left mandibular third molar

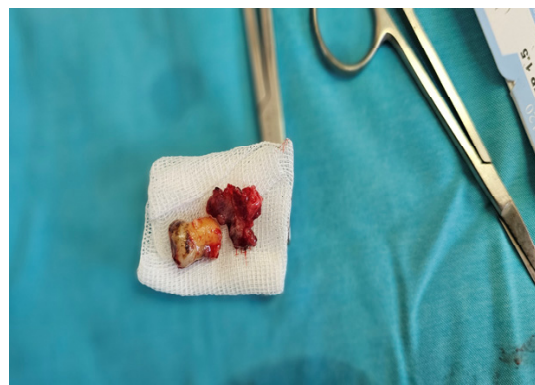
and the limited vertical bone dimension from the tooth apex to the lower border of the mandible, a CBCT scan was performed to further plan the intervention. The scan confirmed a 1 mm bony separation between the tooth apex and the roof of the mandibular canal (Figures 2, 3).

The initial management of the acute odontogenic infection included incision and drainage of the abscess content, along with a five-day course of intramuscular antibiotic therapy (Amp. Neloren 600 mg and Amp. Dexamethasone 4 mg, for 2 days). Significant clinical improvement was noted at the first follow-up visit, and oral antibiotic therapy (Caps. Clindamycin 300 mg, 3x1) was prescribed for five days. Once the acute infection subsided, the patient was scheduled for surgical extraction of the causative tooth (Figure 4).

A mandibular nerve block was administered using a local anesthetic (Amp. Scandonest + epinephrine 2%), and



**Figure 5.** Piezo-surgical device



**Figure 8.** Extracted third molar and extirpated distal pathological tissue



**Figure 6.** Extraction of the impacted left third mandibular molar with piezo-surgical device

a mucoperiosteal triangular flap was elevated. After exposing the alveolar bone, an osteotomy was performed around the impacted third molar using a piezo-surgical device (Woodpecker Surgic Touch LED, Guilin Woodpecker Medical Instruments Co. Ltd., Guilin, Guangxi, P.R. China) (Figure 5,6). The tooth was extracted using lower root elevators and molar forceps. Following extraction, the chronic pathological lesion was excised from the post-extraction socket and



**Figure 7.** Post extraction wound

<p>МЕДИЦИНСКИ ФАКУЛТЕТ, ИНСТИТУТ ЗА ПАТОЛОГИЈА ул.50-та Дивизија бр.6, 1000 Скопје тел. 02/3-112-166</p>		<p>НАОД:</p>
<p>Име: _____ Пол: Мажко</p> <p>Презиме: _____</p> <p>Роден: 05.08.1958</p> <p>Адреса: УЖНОМОГОВСКА БРИГАДА 2 Б</p> <p>Град: СКОПЈЕ - ГАЗИ БАБА</p>	<p>Установа: Стоматолошки клиника - ОРАЛНА ХИРУРГИЈА</p> <p>Адреса: _____</p> <p>Град: СКОПЈЕ</p> <p>Лекар: Гордана Апостолова</p> <p>Амб.број: _____</p> <p>Прим./Зат.: 06.2.2025 - 20.3.2025</p>	
<p>Клиничка дијагноза: 200 K05.9 Отстранета патолошка формација при екстракција на импактиран</p> <p>Вид на испратен материјал: Operative Material</p> <p>Материјал опис:</p>		
<p><b>ХИСТОПАТОЛОШКИ НАОД</b></p> <p><b>INFLAMMATIO CHRONICA GINGIVAE</b></p> <p>K05.1 - K05.1</p>		
<p><b>Макроскопски наод:</b></p> <p>Доставен е неправилен некоткивен фрагмент со светло розова пребоеност и средна конзистенција со димензии 2,6x2,0x0,3cm. Фрагментот во дел е хеморагично имобиран. Материјалот е земен целосно во три попречни пресека, вклучени во 1 парафински блок и сечени полусекции во три нивоа.</p>		
<p><b>Микроскопски наод:</b></p> <p>Микроскопски видлив е површен истенчен, на места палиларно пролифериран многослоен плоскост епител со правилна стратификација на слоевите, а субепително во едната страна има богат хроничен инфламаторен инфилтрат, доминантно сочинет од плазма клетки, а поретко лимфоцити и еднечни неутрофили. Направена е имунохистохемиска анализа за диференцираност и одредување на клоналност на плазма-клеточната популација при што се доби следниот имунопрофил: CD138 (+ дифузен), Kappa (+), Lambda (+), CK AE1/AE3 (-/+ епител). Ki-67 покажа низок пролиферативен индекс на плазма клеточната популација кој на места достигнува до 10%.</p> <p>Според опишаната морфологија и направена имунохистохемиска анализа, се работи за хроничен гингивитис со доминација на плазма-клеточна популација со поликлоналност на клетките и бенигни карактеристики.</p>		
<p>Раководител: Проф. д-р Костидинова-Кункова Славица 738379</p>	<p>Консултант: Прим. д-р Иллевски Боро 738336</p>	<p>Левар: д-р Ристовска Алексиса Викторија</p>
<p>Наодот е електронски авторизиран од Прим. д-р Иллевски Боро 738336</p> <p>НАПОМЕНА: Подготвено со помош на програмата за авторизација БР. БТ/4001 - Објавено на 04/04/2025. www.kom.gov.mk</p> <p>стр: 1/2</p>		

**Figure 9:** Histopathological findings

sent for histopathological examination (Figure 7, 8). The histopathological examination revealed chronic inflammation conformed with the immunohistochemical findings of plasma cell populations with specific immunoprofiles: CD138, Kappa (+), Lambda (+), and CK AE1/AE3 (-/+ epithelium) (Figure 9). The mucoperiosteal flap was repositioned and sutured using 3-0 silk non-resorbable sutures.

Postoperative care instructions were given to the patient, and antibiotic therapy continued for an additional five days, supplemented with anti-inflammatory and antiox-





**Figure 10:** Extracted third molar on 2D

ident medicine (Chymoral 3x2). The sutures were removed after 14 days, and follow-up visits confirmed adequate bone and soft tissue healing without pain, swelling, infection, or damage to adjacent nerve structures. (Figure 10).

## Discussion

The extraction of mandibular third molars is frequently associated with temporary or permanent damage to the inferior alveolar and lingual nerve. The incidence of this complication is relatively low but increases when the nerve is in close proximity to the third molar roots.

Although osteotomy performed with conventional rotary instruments is faster, the risk of injury to surrounding soft tissues is higher, as is the occurrence of osteonecrosis due to thermal damage (overheating of the bone), which can impair tissue regeneration. Piezosurgery is widely used in oral surgery to minimize the risk of thermal damage, as it operates with lower pressure and continuous water cooling, creating a micro-protective effect.

Piezoelectric devices are also used in complex surgical procedures in anatomically challenging areas, such as the molar region of the mandible, where osteotomy lines are close to vital structures like nerves and blood vessels. Ultrasonic vibrations enable selective and precise cutting, offering greater accuracy and safety while reducing tissue trauma compared to conventional rotary instruments<sup>11,12,13</sup>.

A study by Demirci A. et al. demonstrated that piezosurgery significantly improves patient quality of life by reducing postoperative swelling and trismus compared to conventional rotary methods. However, it is important to note that the overall operative time was longer with piezosurgery<sup>14</sup>.

Similar findings were reported in the study by Tanaskovic N. and Lucic M., where significant differences were observed between conventional and piezosurgical techniques in the postoperative period regarding complica-

tions such as paresthesia, pain, and swelling. These complications were more pronounced in cases treated with conventional techniques. Although the duration of the intervention was longer with piezosurgery, postoperative complications were less severe. This is a crucial fact opposite the existing belief that prolonged surgical procedures are directly correlated with postoperative pain intensity<sup>15</sup>.

Parkinson's disease primarily affects elderly patients and is characterized by involuntary body movements and muscle rigidity. The tremors associated with this condition pose a significant challenge for dentists, as patients struggle to keep their mouths open for extended periods, and anxiety during treatment can further exacerbate symptoms. Thus, managing these patients requires a calm, relaxed environment to maximize their comfort<sup>16</sup>.

Performing a complex oral surgical procedure that demands high precision with rotary instruments is particularly challenging in patients who cannot maintain a stable and visible surgical field during the procedure. In such cases, the preferred method is using a piezosurgical device.

## Conclusions

In our case, surgical extraction of the mandibular left third molar proceeded without intraoral and extraoral complications. The use of piezo surgery in the treatment of impacted third molar in a patient with Parkinson's disease has proven to be the most effective and predictable method, minimizing trauma to soft tissue and bone structures.

## Reference

1. Santosh P. Impacted mandibular third molars: Review of literature and a proposal of a combined clinical and radiological classification. *Ann Med Health Sci Res* 2015;5(4): 229–234. DOI: 10.4103/2141-9248.160177
2. Matsuyama J, Kinoshita Kawano S, Hayashi Sakai S, Mitomi T, Sano Asahito T. Severe impaction of the primary mandibular second molar accompanied by displacement of the permanent second premolar. *Case Rep Dent* 2015;5(8):62-64.
3. Bouloux GF, Steed MB, Perciaccante VJ. Complications of third molar surgery. *Oral Maxillofac Surg Clin North Am* 2007;19:117-28.
4. Schersten E, Lysell L, Rohlin M. Prevalence of third molars in dental students. *SWED DENT J* 1989;13:7-13.
5. Ylipaavalniemi P, Turtola L, Murtomaa H, Rytomaa I. Evaluation of the need for third molar removals among 20- to 21- years old Finnish university students. *PROC FINN DENT SOC* 1985;81:222-5.
6. Hman M. Our third molar teeth: their eruption, presence and absence. *Dental Cosmos* 1936; 78:750-62.
7. Kramer RM, Williams, AC. The incidence of impacted teeth. *ORAL SURG ORAL MED ORAL PATHOL* 1970; 29:237-41
8. Dias.B.L.; Tonzar.T.T.;Santos.R.D. Salivary biomarkers of cellular damage and oxidative stress following of lower third molar surgical removalArch Health Invest (2020)9(1):11-17 <http://dx.doi.org/10.21270/archi.v9i1.4865>
9. Majid OW, Mahmood WK. Effect of submucosal and intramuscular

- 
- dexamethasone on postoperative sequelae after third molar surgery: Comparative study. *Br J Oral Maxillofac Surg.* 2011;49(8):647-52
10. Mancini, A.; Inchingolo, A.M.; Chirico, F.; Colella, G.; Piras, F.; Colonna, V.; Marotti, P.; Carone, C.; Inchingolo, A.D.; Inchingolo, F. et al. Piezosurgery in Third Molar Extractions: A Systematic Review. *J. Pers. Med.* 2024, 14, 1158. <https://doi.org/10.3390/jpm14121158>
  11. Rullo R, Addabbo F, Papaccio G, D'Aquino R, Festa VM. Piezoelectric device vs. conventional rotative instruments in impacted third molar surgery: Relationships between surgical difficulty and postoperative pain with histological evaluations. *J Craniomaxillofac Surg.* 2013;41:e33–8. DOI: 10.1016/j.jcms.2012.07.007.
  12. Barone A, Marconcini S, Giacomelli L, Rispoli L, Calvo JL, Covani U. A randomized clinical evaluation of ultrasound bone surgery versus traditional rotary instruments in lower third molar extraction. *J Oral Maxillofac Surg.* 2010;68:330–6. DOI: 10.1016/j.joms.2009.03.053.
  13. Bhati B, Kukreja P, Kumar S, Rath VC, Singh K, Bansal S. Piezosurgery versus Rotatory Osteotomy in Mandibular Impacted Third Molar Extraction. *Ann Maxillofac Surg.* 2017 Jan-Jun;7(1):5-10. DOI: 10.4103/ams.ams\_38\_16. PMID: 28713729; PMCID: PMC5502515.
  14. Demirci A, Bayram F, Dergin G. Piezosurgery versus conventional rotary surgery for impacted third molars: A randomised, split-mouth, clinical pilot trial. *Med Oral Patol Oral Cir Bucal.* 2024 Jan 1;29(1):e1-e8. DOI: 10.4317/medoral.25929. PMID: 37992138; PMCID: PMC10765334.
  15. Tanasković N. et Lučić M. The Use of Piezosurgery for Mandibular Third Molar Extraction, *Serbian Dental Journal*, Vol.61,N.4, 2014.
  16. Fouad A. Al-Omari, MohammedM. AlMoaleem, Sulaiman S. Al-Qahtani, Abdullah S. Al Garni, Syed Sadatullah, andMaster Luqman. Oral Rehabilitation of Parkinson's Disease Patient:A Review and Case Report.Hindawi Publishing Corporation. Volume 2014, Article ID 432475, 4 pages. <http://dx.doi.org/10.1155/2014/432475>.