

# Prevention of Complications of Removal of the Mandibular Third Molars

## Zapobieganie powikłaniom związanym z usuwaniem zębów mądrości z żuchwy

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### SUMMARY

**Aim:** Study of the causes that may contribute to complications during and after tooth extraction to justify treatment and prevention measures.

**Materials and Methods:** A retrospective analysis of the content of ambulatory cards and protocols of operations of 168 patients for the period from 2016 to 2018 and evaluation of the results of personal work for 2018–2020 related to surgical interventions in 134 patients which removed the third lower molars.

**Results:** According to the retrospective material, damage to the inferior alveolar nerve was found in 5.9% of cases, lingual nerve – in 3.3% of cases, the prevalence of alveolitis with simple removal was 16.3% of cases, at difficult and surgical removal – 3.9% of cases. The application of our proposed treatment and prevention complex allowed to reduce their rates to 3.1%, 2.3%, 8.0% and 3.8% of cases, respectively. Risk factors for complications have been identified.

**Conclusions:** when planning the method of surgical removal of third lower molars it is necessary to take into account the probability of its intimate location in relation to inferior alveolar nerve and lingual nerve. The presence of focus of destruction with signs of acute or exacerbation of chronic inflammation in the periodontal bone tissue of the causative tooth is a risk factor for alveolitis and an indication for the appointment of treatment and prevention in the preoperative period, even with simple removal.

**Key words:** teeth, removal, complications, treatment, prevention, inferior alveolar nerve, lingual nerve

**Słowa kluczowe:** zęby, usuwanie, powikłania, leczenie, profilaktyka, nerw żębobólowy dolny, nerw językowy

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### INTRODUCTION

Removal of the mandibular third molars occupies a significant percentage in the structure of daily medical practice of the dentist-surgeon and remains an urgent task today, as it requires an individual approach to the choice of surgery technology, taking into account possible postoperative complications. The complexity of the task is due to a number of objective circumstances and requires the doctor to understand the measures of dental rehabilitation of each patient after surgery. Statistics on sensory disorders of the third branch of the trigeminal nerve in the operation of atypical removal of mandibular third molars presented in modern publications confirm the fact that this problem is of great socio-economic importance, as it mainly affects patients of working age [1].

In our previous publication, it was noted that recently the method of choice is increasingly becoming a surgical procedure such as coronectomy of the tooth, which is considered the most rational way to remove the retinated and dystopian mandibular third molars. Its use is primarily shown in cases of their intimate

location directly to the mandibular canal, when there is a high probability of injury to the vascular-nervous bundle with damage to n. inferior alveoli. In this aspect, coronectomy is the operation of choice for the doctor, which prevents its damage [2].

However, during surgery in the area of mandibular third molars there is a risk of damage and the lingual nerve which can lead to prolonged sensory deficit and deterioration of the patient's quality of life in the postoperative period. There is little information in the available literature on the anatomical preconditions and features of surgical techniques that would help prevent injury to the lingual nerve.

Given the above circumstances, we studied this issue regarding the completeness of its coverage in periodicals according to the publications to compare them with their own observations, summarize the results of clinical cases of complications of tooth extraction, starting with preoperative examination, protocol of operation, the postoperative period. This is the basis for the development of precautions in the provision of surgical care.

## AIM

The aim study of the causes that may contribute to complications during and after tooth extraction to justify treatment and prevention measures.

## MATERIALS AND METHODS

To achieve this goal, a retrospective analysis of the content of ambulatory records (f.№069 / 0) and ambulatory cards of 168 dental patients (f. 3 043 / O) for the period from 2016 to 2018 inclusive, which was removed 3NM and evaluated results of surgical interventions in 134 patients performed by employees of the Department of Propaedeutics of Surgical Dentistry during 2018-2020 on the basis of Poltava Regional Clinical Dental Clinic (KM «Poltava Regional Center of Dentistry - Dental Clinic»).

Examination of patients was performed according to the generally accepted method with X-ray examination (intraoral contact radiography, orthopantomography (OPTG) or cone-beam computed tomography (CCT)) [3]. Statistical processing of the received data is carried out.

## RESULTS

In total, a retrospective study of materials related to dystopia, retention, difficult eruption and the presence of complicated forms of caries over a period of time removed 213 mandibular third molars in 168 patients. Of these, 45 patients (26.7%) had both mandibular third molars removed at different time intervals. In 71.4% of cases (152 teeth) the intervention was performed by the method of complex or surgical removal, and in other 28.6% of cases (61 teeth) - by the method of simple removal (Table 1).

Analysis of ambulatory maps of all 302 patients by measuring the retromolar distance on OPTG by the method of Olive-Basford (1981) in 64.2% of cases (253 teeth) revealed a lack of sufficient space for eruption of mandibular third molars, and in other 35.8% (141 teeth) - sufficiency of space for eruption. In 34.8% of cases (137 teeth) they were partially covered with bone tissue, and in another 65.2% (257 teeth) - in a state of

eruption or covered only with the mucous membrane of the gums. According to the classification of G. Pell, B. Gregory (1933), the position of mandibular third molars is shown in (Figure1), and the greatest difficulty of their surgical removal is characteristic of the position of the teeth C2-C3.

According to the classification of G. Winter (1926) according to radiological and clinical data, in 41.2% of cases the mesioangular inclination of mandibular third molars was determined, in 25.5% - horizontal position, 18.6% - vertical, in 9.8% the buccal lingual inclination, and 4.9% accounted for dystoangular inclination. According to these features, retrospective material and data from own observations have identical values.

Archival data on temporary loss of sensitivity in the area of innervation of the inferior alveolar nerve in 9 cases (5.9%) are evidenced by consulting a patient with a neurologist with the appointment of pathogenetic neurotropic treatment. However, they do not contain complete information about the time of treatment after tooth extraction, its duration and effectiveness, but indicate the restoration of tissue sensitivity in the area of innervation within 6-8 months.

During the period of personal research at removal of 131 mandibular third molars in 4 cases (3.1%) in the postoperative period sensory disturbances of temporary character in a zone of innervation of the lower alveolar nerve were noted. Timely consultation with a neurologist immediately after the

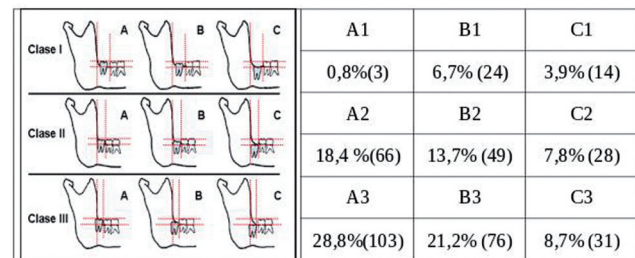
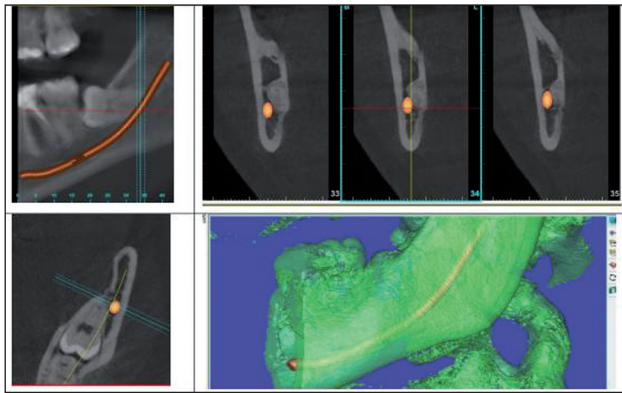


Figure 1. The nature of the position of mandibular third molars as a percentage of the total number of removed teeth

Table 1. Structure and frequency of complications after 3-d LM removal

The structure of complications and periodontal destructive changes (abs.%)		Number of examined patients			
		The data are retrospective		Data from own research	
		168		134	
		Number of teeth removed			
		Easy removal	Complex or surgical	Easy removal	Complex or surgical
		61	152	50	131
nerve damage	mandibular alveolar	-	9 (5.9)	-	4 (3.1)
	tongue	-	5 (3.3)	-	3 (2.3)
alveolitis	serous	4 (6.5)	6 (3.9)	3 (6.0)	5 (3.8)
	purulent	6 (9.8)	-	1 (2.0)	-
periodontal destructive changes	periapical	12 (19.7)	3 (2.0)	9 (18.0)	3 (2.3)
	pocket of Wuzhheim	23 (37.7)	15 (9.9)	21 (42.0)	14 (10.7)



**Figure 2.** Sections of the OPTG fragment of the mandible at the intimate location of mandibular third molars to the mandibular canal

detection of damage and the appointment of pathogenetic treatment helped to restore sensitivity for 2-4 months.

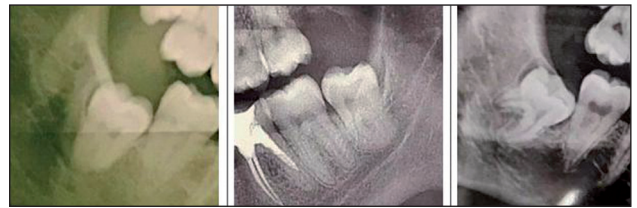
With the intimate location of the mandibular third molars in relation to the mandibular canal, which is confirmed by the results of cone-beam computed tomography (Figure 2), we chose the technique of coronectomy of the tooth to avoid injury to the inferior alveolar nerve during surgery. Its introduction made it possible to reduce the frequency of nerve damage by almost 2 times, from 5.9% to 3.1% of cases.

According to archival data, in 5 cases (3.3%) of trauma of the lingual nerve there was a loss of tactile, pain and temperature sensitivity of the tongue, the mucosa of the alveolar process from the lingual surface and the soft tissues of the bottom of the oral cavity on the side of the injury. In 4 patients, sensory deficits were observed for 4-8 weeks after with a gradual recovery of sensitivity on the background of treatment prescribed by a neurologist. In one of 5 cases of traumatic neuropathy of the lingual nerve to restore tissue sensitivity took 10 months with long-term use of pathogenic therapy.

Despite the seemingly low prevalence of injury, its occurrence leads to functional disorders, accompanied by damage to the tongue when closing the dentition, especially chewing. This causes the patient psycho-emotional concern, especially since in this case it is not possible to predict the timing of the restoration of lost sensitivity.

According to the results of own observations, injuries of the lingual nerve are documented 3 times (2.3%). Analysis of surgical protocols shows that in 2 cases there is an osteotomy of tissues adjacent to the distal contact privacy, from the retromolar fossa, as well as in the case of prolonged visual sensitivity, which separates the crown, requiring its lingual tilt (Figure 3).

The most common complication of mandibular third molars removal in the postoperative period according to archival data was alveolitis (alveoloneuritis). Thus, with simple removal of 61 mandibular third molars alveolitis was found in 10 cases (16.3%), of which in 4 cases (6.5%) – serous form, in 6 cases (9.8%) – purulent form. With complex and surgical removal of 152 mandibular third molars serous alveolitis was diagnosed in 6 cases (3.9%). It has been found



**Figure 3.** Fragments of the mandible on OPTG of patients with postoperative traumatic neuropathy of the lingual nerve

that in cases of alveolitis with simple removal, patients were preceded by acute inflammatory phenomena in the area of the causative tooth with radiological signs of Vuzhheim's pocket or destruction in the periapical tissues.

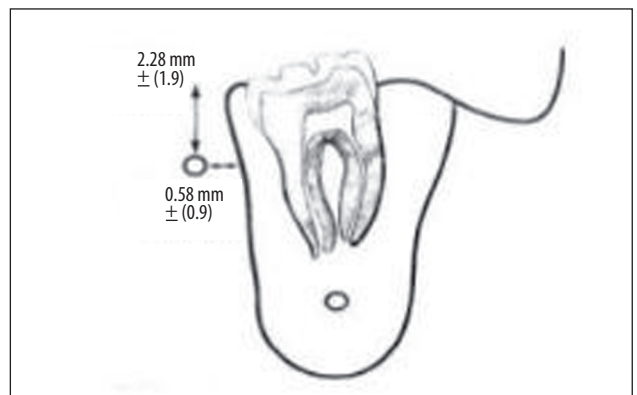
Such statistical differences can also be explained by the fact that after complex or surgical removal of mandibular third molars, prophylactic antibacterial therapy was prescribed.

## DISCUSSION

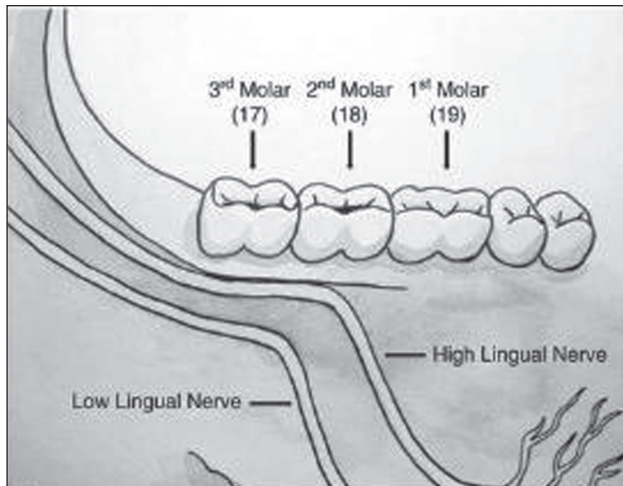
The available data on the features of the topographic location of the lingual nerve, obtained in the study of cadaveric material by different researchers [4, 5], have significant statistical differences. This is due to a number of subjective and objective factors – different research methods without regard to race, age, sex, bone atrophy and timing of tooth loss. Figure 4 shows the average results of measurements of the location of the lingual nerve in the horizontal plane (distance to the lingual cortical plate) and vertically from the lingual edge of the alveolar ridge at the level of mandibular third molars, obtained by Kiesselbach and Chamberlian (1984).

According to their data, up to 17% of cases the nerve is located at or above the apex of the alveolar crest, and direct contact with the bone occurred in 62% of cases, which causes a high probability of injury during surgical removal of mandibular third molars.

To determine the role of anatomical preconditions in damage to the lingual nerve, the analysis of the literature indicated the difficulty of visualizing the nerve trunk at the stage of preoperative examination. Data on certain successes in the application of ultrasound diagnostics in determining its horizontal level of the lingual nerve in the area of the



**Figure 4.** Schematic representation of the location of the lingual nerve in relation to mandibular third molars in the frontal plane



**Figure 5.** Schematic representation of variants of the topographic location of the lingual nerve in relation to mandibular third molars in the sagittal plane

third molar are given [6]. In particular, the authors propose to distinguish between the upper or lower lingual nerve on the basis of ultrasound (Figure 5).

Therefore, determining the features of the anatomical and topographic location of the lingual nerve is a necessary condition for choosing the method of surgical intervention, which should have minimal risks of intra- and postoperative complications. This is greatly facilitated by the use of magnetic resonance imaging and X-ray examination with visualization of landmarks along the lingual nerve.

In the case of separation crown with lingual inclination significantly hampered visual inspection the rotating instrument and with a thin lingual wall of the alveoli, its perforation is possible with direct mechanical damage to the nerve by burr. Foreign authors in these cases recommend the use of lingual flap retractor, which, although it leads to a temporary loss of sensitivity of the lingual nerve, but prevents its severe injury with rupture of the tissues [8].

The buccal access to the tooth and adjacent bone tissue is generally accepted. Therefore, under such conditions, we constantly perform: separation of the tooth crown (complete or partial), separation of the tooth by bifurcation of the roots, osteoectomy along the perimeter of the tooth crown. Other techniques, such as lingual flap retraction with lingual split technique, are rarely used in our practice due to the possibility of injury to the lingual nerve. R. Pippi, A. Spota and M. Santoro note that osteoectomy are statistically significantly associated with the likelihood of permanent damage to the lingual nerve. Recognized situations of possible trauma to the lingual nerve should also include cases where the buccal inclination of the tooth, there is a thinning of the lingual wall of the alveoli mandibular third molars, and during the dislocation of the tooth may break. Bone fragments should be removed during revision of the surgical wound. It is at this stage that iatrogenic nerve injury is possible [7].

The analysis of statistical data of scientific publications on the prevalence of lingual nerve injury shows its significant variation. Temporary loss of sensitivity in buccal access without

“lingual flap retraction” and “lingual split technique” in most cases did not exceed 5%. With detachment of the lingual flap with osteoectomy, the risks increased to 10% or more [9, 10]. Therefore, in our practice in the case of detachment of the lingual flap and osteoectomy on the lingual side, we must use a tongue retractor to prevent injury to the nerve of the same name.

According to our own observations, the retention of the flap by the tongue retractor allowed to reduce the frequency of injuries of the lingual nerve from 3.3% to 2.3% of cases.

Given the statistics on the frequency of alveolitis presented by other authors [11], we can assume that the prerequisite for the occurrence of alveolitis is acute odontogenic inflammation or exacerbation of a chronic process (periodontitis, pericoronitis, etc.). That is, alveolitis occurs against the background of an existing source of infection in the periodontal tissues. Unfortunately, the primary documentation did not always provide objective data that could lead to complications and negative consequences.

Therefore, we took into account certain shortcomings in the management of such patients in the pre- and postoperative periods and further in their practice in the presence of acute inflammation or exacerbation of chronic odontogenic lesions to prevent alveolitis prescribed treatment and prevention 1-2 days before surgery to remove mandibular third molars, and absence of inflammatory phenomena in the periodontal tissues, this course was performed immediately after surgery, only under conditions of complex or surgical removal:

1. Antibacterial drugs (amoxicillin - 500 mg 2 times, or azithromycin - 500 mg 1 time per day for 7 days).
2. Nonsteroidal anti-inflammatory drugs (nimesulide - 100 mg, or ketorolac - 10 mg 2 times a day) in the presence of intense pain.
3. Antihistamines (levocetirizine 5 mg or loratadine 10 mg once a day for 7 days).
4. Locally recommended antiseptic (chlorhexidine bigluconate 0.05% solution or “Angilex-Health” solution for the oral cavity) in the form of mouth baths before and after eating.

According to the results of our own observations, the appointment of treatment and prevention complex allowed to reduce the frequency of damage to the inferior alveolar nerve by almost 2 times, from 5.9% to 3.1% of cases, the frequency of lingual nerve injury from 3.3% to 2.3% of cases, the frequency development of alveolitis from 16.3% to 8.0% of cases with simple removal of mandibular third molars and avoid the development of purulent forms of the disease in general.

## CONCLUSIONS

1. At an intimate arrangement of mandibular third molars to inferior alveolar nerve for the prevention of its damage the method of choice is a coronectomy (partial odontectomy). When planning technological approaches to perform flap detachment surgery and osteoectomy in the area of the alveolar ridge on the lingual side, it is desirable to pre-perform radiological examination or ultrasound to visualize the lingual nerve, which greatly helps prevent its damage.

2. At separation of a crown of mandibular third molars in case of its lingual inclination there is a high probability of perforation of a lingual wall of an alveolus with simultaneous damage of a nerve of the same name. Therefore, it is expedient and reasonable to keep the detached tongue flap with a lingual flap retractor.
3. In case of manifestations of post-traumatic neuropathy of the inferior alveolar or lingual nerves, we recommend an early examination by a neurologist in order to prescribe pathogenetic neurotropic treatment. This allows to reduce by 2 times the recovery time of sensory disturbances in the area of innervation.
4. The presence of foci of destruction with signs of acute or exacerbation of chronic inflammation in the periodontal bone tissues of the causative tooth is a risk factor for alveolitis and an indication for the appointment of therapeutic and prophylactic drug complex in the preoperative period, even with simple removal of mandibular third molars times.

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The Authors declare no conflict of interest

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article