

## SURGERY OF LOWER WISDOM TEETH – CONSEQUENCES FOR THE AMOUNT OF BONE NEAR THE ADJOINING SECOND MOLAR

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**Introduction.** Wisdom teeth or third molars develop in the majority of the adult population and are the last teeth to erupt, normally appearing in the late teens or early twenties. The removal of wisdom teeth is generally considered the most frequent surgical procedure performed in the dental practice. The most common indication for removal is crowding in the dental arch, which can lead to retention of the wisdom teeth. Furthermore, intra- and post-operative complications are observed three times as often in the mandible as in the maxilla. This may be explained by the minimal risk of nerve damage, poorer blood supply, or more frequent damage to amount of bone near the adjoining second molar [4]. Wisdom teeth have high incidence of impaction and have been associated with the pericoronitis, caries of the distal surface of the second molar or of the third molar itself, certain types of cysts or odontogenic tumors, and primary or secondary dental crowding [2,5,10]. Complications in wisdom tooth eruption, particularly of the lower molars, are attributable to their late formation and to the phylogenetic evolution of the mandible, which results in a lack of available space for normal eruption [3,5].

Extraction of third molar is the most common surgical procedure performed in the oral cavity. Kaminishi et al. (2006) noted that between 1997 and 2002 there was an increase in patients over the age of 40 requiring third molar removal [5]. Numerous indications and contraindications for surgical extraction of third molars have been outlined, one of which is the prevention and improvement of periodontal defects in adjacent second molars.

If there are significant changes of attachment level and alveolar bone height distal to lower second molar following removal of impacted adjacent third molar, bone grafts or bone substitutes can be placed in the socket post-operatively to maintain the alveolar bone height.

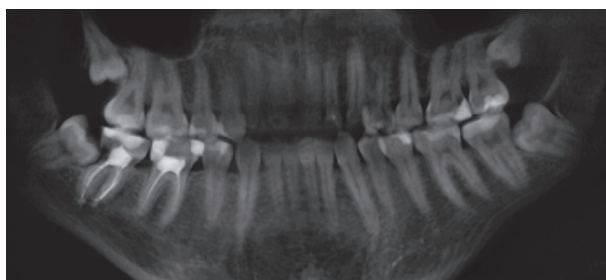
Inflammatory-pericoronaryitis, retro molar abscess, cellulites or abscess and destruction, position change of adjacent teeth, malocclusion. Caries cavity of the distal surface of the second molar or of the wisdom tooth itself (**Figure 1**), definitive types of cysts or odontogenic tumors and primary or secondary dental congestion. Myer (1992) points to the crucial role of impact teeth «wisdom» on the development of clusters teeth [4,5,6]. Multiplex indications and contraindications for wisdom tooth removal have been specified, one of which is the prevention and recovery of periodontal defects in adjacent second molars [1,3].

The time of life when the third molar erupts has often been called the «Age of Wisdom» (**Figure 2**). Removal third molar is a type of minor surgery performed to remove one to multiple teeth when it is deemed to be most beneficial for oral health [1,5,6,7].

Removing delayed and displaced teeth perform generally by the method operation of atypical tooth extraction (open method) and may be accompanied by complications, both general and local nature that arises during and after surgery (**Figure 3**).

After the removal of third molars, may forming large bone defects behind the second molar. In such cases bone grafts can be located in the fosse substitutes to preserve adjoining alveolar ridge altitude [1,2,10].

**Purpose of the Study.** The purposes of this prospective and exploratory study were to assessment the periodontal status distal to the adjoining second molar following the pre and post operation of a partially or fully impacted lower wisdom teeth and to designation the periodontal pocket depth, clinical attachment level and alveolar bone height at the distal side of the lower sec-



**Figure 1.** Caries cavity of the distal surface of the right lowers second molar caused by the wisdom tooth.



**Figure 2.** Impacted upper and lower wisdom teeth.



**Figure 3. Casuistic damage of the second molar after surgical extraction of lower wisdom teeth.**

ond molar and rather purposed to compare the alveolar bone altitude at the distal side of the lower second molar [4, 12].

**Materials and Methods.** The results of a prospective study designed for clinical and radiological examination of patients. Under the supervision were patients who have a the operation of atypical lower wisdom tooth extraction at Surgical Dentistry Department of Poltava Regional Clinical Stomatological Polyclinic from August of 2016 until November of 2016.

This study included 28 patients consist of 15 males (54%) and 13 females (46%). To evaluate the results have been chosen convenient methods.

Patients were clinically examined before and after the removal of lower impacted wisdom teeth. Group research consisted of patients aged between 18 to 32 years, provided good hygiene and good quality radiographs.

Conditions for the exclusion from the study were: pregnancy which was determined during the removal or during the final examination, Periodontal surgery at period of time between the removal and examination, routine surgery that could affect bone growth and/or periodontal when treating patients with chronic periodontal diseases.

Orthophantomogram radiographs (OPGs) were performed twice; first during procedure before removal lower third molar and second was during the 8 weeks review after the removal lower third molar. It was to appraisal the alveolar bone height at the distal of lower second molar using VATECH Pax-P&P (South Korea). To test for reproducibility in measuring alveolar bone height, 10 OPGs were randomly selected with measurements recorded at three separate times, a week apart.

#### **Different of Periodontal Pocket Depth in mm for 3 distal surfaces of adjacent second molar before and after the impacted lower third molar removal with 28 subjects**

Variable	Before extraction Median(IQR)	After extraction Median(IQR)	Z-statistic	p value
Distal-buccal	2.8 (2.8)	2.8 (2.8)	-1.169	0.210
Mid-distal	2.4 (2.1)	1.9 (1.7)	-1.310	0.163
Distal-lingual	2.7 (1.0)	2.2 (2.2)	-1.511	0.086

**Note:** Wilcoxon signed-ranks test.

(p value ≤ 0.05 – Significant; p value > 0.05 – Insignificant).

Forradiological examination, EzDent software was used to measure the alveolar bone heightat distal side of second molar from OPG on the computer pre and post operation.

SPSS version 20 was used to analyze the data including patient *registration* form and survey reports. Periodontal pocket depth (PPD) and clinical attachment level (CAL) of distal-buccal, mid-distal and distal-lingual of the distal side of the adjacent lower second molar were compared before and after the removal of impacted lower third molar using Wilcoxon signed-ranks test.

The non-parametric tests were using to compare bone height difference at the distal surface of the second molar before and after surgery.

We tested the reliability of our measurements on radiographs. Paired student test, we used to compare binary measurements conducted by the study.

Using Pearson correlation coefficient test we found strong revealed ( $R^2 = 0.79$ ) and statistically significant ( $p < 0.0002$ ) connection. In this way, verified the accuracy of measurements on radiographs. Due to the small number of studies for reliable analysis we used Wilcoxon-signed-ranks test. To determine the changes of PPD, CAL and alveolar bone height (ABH) at distal side of second molar before and after the removal of impacted lower adjacent third molar, median and interquartile range (IQR) were calculated in this test.

**Results.** In 28 patients participated in the research were the following types of impaction:

- 3 teeth (11%) were impacted in distoangular position;
- 10 teeth (36%) were impacted horizontally;
- 12 teeth (43%) were impacted mesioangularly;
- 3 teeth (11%) were impacted vertically.

*All patients had a satisfactory condition of oral hygiene. In 16 cases (57%) surgical extraction of lower wisdom teeth were in contact with the adjoining second molars.*

**Discussion.** Recently, delayed eruption and abnormal position of the lower wisdom tooth are very common in adult populations. The ability to accurately predict third molar impaction will allow clinicians to improve third molar treatment strategies especially the periodontal health at the distal side of the adjacent second molar as extraction of third molars have been cited as causing periodontal problem.

The ability to accurately predict third molar impaction will allow clinicians to improve third molar treatment strategies especially the periodontal health at the distal side of the adjacent second molar as extraction of third molars have been cited as causing periodontal problem.

According to our results, we found that, there were no reliable changes of PPD, CAL and ABH at the 3 distal surfaces which consisted of disto-buccal, mid-distal and disto-lingual of the adjacent second molar before and after impacted lower third molar removal.

From **Table 1**, the median for distal-buccal surfaces was the same before and after the extraction of impacted third molar and the different changes was statistically insignificant ( $p > 0.05$ ). While for the mid-distal

and distal-lingual PPD, are reduced about 0.5 mm post operatively; however the *p* value were still insignificant possibly due to small sample sizes.

From **Table 2**, there were no gross changes of CAL before and after the third molar extraction for distal-buccal surface. However, for mid-distal, there were slight reduction of CAL post operatively but the *p* value was still statistically insignificant. The *p* value for disto-lingual was 0.051 which was close to being significant.

While for alveolar bone height (ABH), the result was showed in **Table 3**. There was a difference of ABH pre and post operatively of about 0.3 mm.

However the difference was also statistically not significant. Our findings were agreed with Grøndahl and Lekholm (1973) who demonstrated no significant changes in alveolar bone height distal to the second molar after impacted lower third molar extraction. In their study, the duration was 12 months while in our study the duration was only 4 months. In some studies, they compared the ABH at 2 and 4 years after extraction. Some scientists found that clinical attachment level and periodontal pocket depth on the distal side of second molar 6 months post removal of impacted eights were clinically insignificant. In conclusion, they reported that the second molar periodontal probing depth or attachment level either remained unchanged or had slight improvement after third molar extraction. Kan et al. (2002) had conducted a retrospective study with 158 patients.

They investigated the periodontal conditions distal to mandibular second molars 6-36 months after routine surgical extraction of adjacent impacted third molars. Their results supported Peng et al. (2001) where they suggested that periodontal breakdown was established on the distal surface of a mandibular second molar in the vicinity of impacted third molar. Our study was different from Peng et al. (2001) and Kan et al. (2002) in which their studies were retrospective study that only checked the second molar more than 6 months after the impacted third molar extraction. In their study, they used contralateral teeth as the control group which might not represent the true changes of PPD, CAL and ABH. In our prospective study, we did the measurement pre and post-surgical removal of impacted third molar which would give more reliable results compared to their study [7,9,1].

Krausz et al. (2005) had conducted another retrospective study where the findings did not coincide with the findings of Peng et al. (2001) and Kan et al. (2002). In Krausz et al. (2005) study, only a group of patients was included in the sample and the control were the contralateral second lower molar. Their study also evaluated the long-term changes in periodontal health and alveolar bone 28-58 months post-operatively which was of a longer duration than Kan et al. (2002). and Krausz et al. (2005) noted that there was a significant gain of alveolar bone height on the distal aspect of the adjacent

Table 2.

**Different of Clinical Attachment Level in mm for 3 distal surfaces of adjacent second molar before and after the impacted lower third molar removal with 28 subjects**

Variable	Before extraction Median(IQR)	After extraction Median(IQR)	Z-statistic	<i>p</i> value
Distal-buccal	1.9 (1.9)	1.9 (2.5)	-1.496	0.164
Mid-distal	1.6 (1.9)	0.9 (0.9)	-1.354	0.183
Distal-lingual	1.9 (1.1)	1.0 (1.0)	-1.901	0.051

Note: Wilcoxon signed-ranks test.

(*p* value ≤ 0.05 – Significant; *p* value > 0.05 – Insignificant).

Table 3.

**Different of alveolar bone height in mm distal to the adjacent second molar before and after the impacted lower third molar removal with 28 subjects**

Variable	Before extraction Median(IQR)	After extraction Median(IQR)	Z-statistic	<i>p</i> value
Alveolar bone height	2.9 (2.8)	2.6 (2.1)	-1.315	0.187

Note: Wilcoxon signed-ranks test.

(*p* value ≤ 0.05 – Significant; *p* value > 0.05 – Insignificant).

second molar on the test side, whereas slight bone loss was noted on the control side. However, the sample size by Krausz et al. (2005) was smaller (*n*=25) compared to Peng et al. (2001) (*n*=57) and Kan et al. (2002) (*n*=283). Again we could not compare the results of Krausz et al. (2005) with our findings because their study was a retrospective study and they examined the subjects aged 20-60 years old after the lower third molar had been removed for more than two years compared to our study in which the assessment was done 3 months after the removal of the tooth. The age range of subjects in Krausz et al. (2005) study was wider than in our study (aged 18-32 years old) which may give different outcomes of the study [10,11].

In 2001, Peng et al. compared the periodontal status at distal and mesial sides of mandibular second molars between two groups, where the first group of third molar had been surgically extracted and the second group was the control group. In this study, the samples size was 57 and the subjects were examined after the lower impacted third molar had been extracted more than 5 years. They noted that there were significant probing depth, greater attachment loss and radiographic alveolar bone loss at the distal sides of the experimental group compared to control group [6,7,9].

**Conclusion.** The results of our study showed that in three parts inclusive: clinical attachment level, periodontal pocket depth and alveolar bone height at the distal aspect of the adjoining second molars after surgical extraction of partially or fully impacted lower third molars were no reliable.

**Perspective for Further Research.** Further studies aimed at improvement of tools and operative approach. This will prevent the complications and to conduct an open surgery of wisdom tooth with less traumatization for the bone.



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### **ОПЕРАЦІЯ АТИПОВОГО ВИДАЛЕННЯ НИЖНЬОГО ЗУБА МУДРОСТІ – ВПЛИВ НА РІВЕНЬ КІСТКИ БІЛЯ ПРИЛЕГЛОГО ДРУГОГО МОЛЯРА**

**Панькевич А. І., Масуд Кіані, Колісник І. А., Гоголь А. М.**

**Резюме.** Метою дослідження стала оцінка стану періодонта з дистального боку від другого моляра нижньої щелепи після операції атипичного видалення зуба мудрості, коронкова частина якого повністю або частково розташовувалась у кістковій тканині. Робота виконувалась на базі хірургічного відділення комунальної установи «Полтавський обласний центр стоматології – стоматологічна клінічна поліклініка» Полтавської обласної ради з лютого по травень 2016 року.

У дослідженні були застосовані клінічні та радіологічні методи. На лікуванні перебувало 28 пацієнтів віком від 18 до 32 років. Результати базувались на вимірюванні глибини періодонтальної кишені (борозди), клінічного прикріплення ясен та висоти альвеолярної частини позаду від другого моляра.

Вимірювання проведені з дистальної поверхні (дистально-щічний, медіо-дистальний та дистально-язиковий) позаду від другого моляра до та через 4 місяці після операції атипичного видалення зуба мудрості. Дані проаналізовані за допомогою програмного забезпечення SPSS.

Застосовано непараметричний Т-критерій Вилкоксона для порівняння глибини періодонтальної кишені, клінічного прикріплення ясен та висоти альвеолярної частини до та після операції. Всі зміни, виявлені у ході роботи були недостовірними  $p > 0.05$ .

Для глибини періодонтальної кишені (борозди) медіана становила 2.8 мм до та після операції. Медіана клінічного прикріплення ясен становила 1.9 мм до та після операції, а висота альвеолярної частини до операції була 2.9 мм а після 2.6 мм. Наше дослідження показало, що біля дистальної поверхні другого моляра не відбулося достовірних змін досліджуваних показників через 4 місяці після операції атипичного видалення третього моляра.

**Ключові слова:** прилеглий другий моляр, висота альвеолярної частини, стан періодонта, видалення третього моляра.

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### **ОПЕРАЦИЯ АТИПИЧНОГО УДАЛЕНИЯ НИЖНЕГО ЗУБА МУДРОСТИ – ВЛИЯНИЕ НА УРОВЕНЬ КОСТИ У ПРИЛЕГАЮЩЕГО ВТОРОГО МОЛЯРА**

**Панькевич А. И., Масуд Киани, Колесник И. А., Гоголь А. М.**

**Резюме.** Целью исследования стала оценка состояния периодонта с дистальной стороны от второго моляра нижней челюсти после операции атипичного удаления зуба мудрости, коронковая часть которого полностью или частично располагалась в костной ткани. Работа выполнялась на базе хирургического

отделения коммунального учреждения «Полтавский областной центр стоматологии – стоматологическая клиническая поликлиника» Полтавского областного совета с февраля по май 2016 года.

В исследовании были использованы клинические и радиологические методы. На лечении находилось 28 пациентов в возрасте от 18 до 32 лет. Результаты базировались на измерении глубины периодонтального кармана (борозды), клинического прикрепления десны и высоты альвеолярной части позади второго моляра.

Измерения проведены с дистальной поверхности (дистально-щечной, медио-дистальной и дистально-языковой) позади второго моляра до и через 4 месяца после операции атипичного удаления зуба мудрости.

Данные проанализированы с помощью программного обеспечения SPSS. Использован непараметрический Т-критерий Вилкоксона для сравнения глубины периодонтального кармана, клинического прикрепления десны и высоты альвеолярной части до и после операции. Все изменения, выявленные в ходе работы, были недостоверными  $p > 0.05$ .

Для глубины периодонтального кармана (борозды) медиана составила 2.8 мм до и после операции. Медиана клинического прикрепления десны составляла 1.9 мм до и после операции, а высота альвеолярной части к операции была 2.9 мм, а после 2.6 мм. Наше исследование показало, что у дистальной поверхности второго моляра не произошло достоверных изменений исследуемых показателей через 4 месяца после операции атипичного удаления третьего моляра.

**Ключевые слова:** прилегающий второй моляр, высота альвеолярной части, состояние периодонта, удаление третьего моляра.

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**Pankevych A. I., Masoud Kiani, Kolisnyk I. A., Hohol A. M.**

**Abstract.** Wisdom tooth or third molar develop in the majority of the adult population and is the last tooth to erupt, normally appearing in the late teens or early twenties. The removal of wisdom teeth is generally considered the most frequent surgical procedure performed in the dental practice. The most common indication for removal is crowding in the dental arch, which can lead to retention of the wisdom teeth. Furthermore, intra- and post-operative complications are observed three times as often in the mandible as in the maxilla. This may be explained by the minimal risk of nerve damage, poorer blood supply, or more frequent damage to amount of bone near the adjoining second molar. Third molars have high incidence of impaction and have been associated with the pericoronitis, caries of the distal surface of the second molar or of the third molar itself, certain types of cysts or odontogenic tumors, and primary or secondary dental crowding. Complications in third molar eruption, particularly of the lower molars, are attributable to their late formation and to the phylogenetic evolution of the mandible, which results in a lack of available space for normal eruption.

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If there are significant changes of attachment level and alveolar bone height distal to lower second molar following removal of impacted adjacent third molar, bone grafts or bone substitutes can be placed in the socket post-operatively to maintain the alveolar bone height.

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This study included 28 patients consist of 15 males (54%) and 13 females (46%). To evaluate the results have been chosen convenient methods.

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using Wilcoxon signed-ranks test. The non-parametric tests were using to compare bone height difference at the distal surface of the second molar before and after surgery.

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**Keywords:** adjoining second molar, alveolar bone height, periodontal status, third molar removal.

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**Стаття надійшла 13.12.2016 року**