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EFFECTS OF SURGICAL REMOVAL OF MANDIBULAR THIRD MOLAR ON PERIODONTAL TISSUES OF ADJACENT SECOND MOLAR: EFFECT OF SURGICAL EXTRACTION DIFFICULTY

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ABSTRACT:

Objective: To study the effect of surgical removal of mandibular third molar on periodontal tissues of adjacent second molar and to study the effect of difficulty of surgical removal on the results.

Materials and Methods: The sample size was thirty-one patients who underwent third molar surgery in Oral and Maxillofacial Surgery Department at Faculty of Dentistry-Tishreen University. The cases have been classified according to the difficulty of the surgical removal according to Pederson in three groups: easy, moderate and hard. The periodontal health of the second molars was evaluated before the surgery and 3 months postoperatively. Clinical measures included probing depth and clinical attachment level distal and buccal of second molar. Radiographic measures included the distance from the alveolar bone crest to the cementoenamel junction distal of second molar.

Results: There were statistically significant differences between the distance from the alveolar bone crest to the cementoenamel junction, clinical attachment level and probing depth distal of second molar before and after three months of the surgery ($p < 0.05$); there were improvement in these parameters in the three groups. There were statistically significant differences between the three groups in the alveolar bone height and the probing depth after three months. The upper mean of the probing depth and the distance from the alveolar bone crest to the cementoenamel junction was in cases classified as hard in difficulty of surgical extraction, afterwards come the moderate cases and lastly come the easy cases. There were no statistically significant differences in probing depth and clinical attachment level buccal of second molar in the three groups ($p > 0.05$).

Conclusion: According to this study the extraction itself improves the clinical attachment level, probing depth distal of second molar and the distance from the alveolar bone crest to the cementoenamel junction. The difficulty of the third molar extraction is a risk factor that affects the periodontal tissues of adjacent second molar.

Keywords: third molar, surgical extraction, adjacent second molar, periodontal tissues, probing depth, attachment level.

INTRODUCTION:

Mandibular third molars are found in 90% of the general population; 33% of them have at least one impacted third molar [1] . Therefore, extraction of the third molar is one of the most common surgical procedures carried out by oral surgeons [2-6]. In The United states about ten million third molar surgeries are done every year [7-8].

Third molars have high incidence of impaction, and are associated with the

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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. [9]

The problems that are associated with the eruption of the third lower molars are attributed to their late formation and to the lack of the available space for natural eruption [10], and it is considered as the last tooth to erupt in the dental arch. [11]

The complications associated with the surgical extraction of the third molar such as pain, swelling, trismus, neurological damage [12-14] and damage to the periodontal tissues of the adjacent second molar still a major problem and challenge for surgeons and patients.[15,16] Complications of periodontal tissues distal to the second molar may occur [17-21]. The patient's age and the third molar pattern have been identified as primary risk factors that may affect the healing of periodontal tissue on the distal side of the second molar postoperatively. [22]

There is a debate about the incidence of periodontal defect at the distal side of the second molars after surgical extraction of the third molars, where many conflicting findings have been published in the previous dental literature regarding the effect of third molar surgery on the periodontal tissues of the adjacent second molar. [23 ,24]

Some authors have found an improvement in the status of periodontal tissues around the lower second molars [25-28]

While others described a periodontal defect around the second molar after extraction [11 ,30]

Furthermore, other authors did not find significant changes in the periodontal tissues and the height of the alveolar bone distal of the second molar.[2 ,9 ,25 ,26]

Some authors studied the effect of the flap design on the reduction of periodontal defects after the surgical extraction of the third mandibular molar [3 ,15]. Some researchers have studied the effect of the suturing technique on the periodontal status of the second molar.[1]

Some studies used platelet-rich plasma and collagen absorbable membrane to prevent periodontal defect after third molar surgery [31]. Some of them used bone grafts [32], and some used *manual and ultrasonic scaling*. [33]

Some authors have suggested that further studies focusing on the third molar extraction with strict standards are necessary and may prove the risk factors for periodontal healing distal to the adjacent second molar. [11] The first three months are considered as the cutoff for periodontal healing. [22]

MATERIALS AND METHODS:

A total of 34 surgical procedures were performed to extract third mandibular molar in 21 patients. 19 patients aged 17-24 years (12 females (36.84%) and 7

males (63.15%)) completed the study, all of them were from patients who were referred to the Department of Oral and Maxillofacial Surgery at the Faculty of Dentistry at Tishreen University between January and November 2016.

Inclusion criteria for the study group were: age less than 25 Years, no systemic diseases, patients who do not smoke or drink alcohol, the third molar with no connect to oral cavity. The criteria for exclusion were: pregnancy, systemic conditions that might have an effect on bone growth or periodontal healing such as diabetes mellitus or on immunosuppressive medications, and patients with chronic periodontal diseases.

Cases were distributed according to difficulty of extraction as it described by Pederson to easy, moderate, and hard [34]. Table 1

Panoramic Radiography was performed before the surgery and after 3 months of surgery using digital panoramic radiography apparatus. Clinical examinations were carried out before surgery and after 3 months of surgery. The periodontal parameters were probing depth (PD) and clinical attachment level (CAL) on distal and buccal sides of second molar, Figure 1 and 2. Acrylic stents were constructed to be used as a guide to determine CAL preoperatively and postoperatively, Figure 3 and 4. The PD is the distance from the gingival margin to the bottom of the gingival pocket. CAL is the distance from certain point on acrylic stent to the bottom of the pocket.

Radiographs were viewed on a computer using the Digora Program version 2.7, where we are able to manipulate the images, changing the brightness, contrast and determination points. Automatically, after calibration of the image, the program provided the measurement in millimeters and tenths of millimeters. We measure the distance from the cementoenamel junction (CEJ) to the alveolar crest bone level.

All surgeries were done by the same surgeon under local anesthesia (Lidocaine 2% with 1:100,000 epinephrine) in the same surgery room and under similar conditions, Figure 5. A buccal sulcular incision was made starting near the mesiobuccal edge of the second molar and extending to its distal surface then to the anterior border of ramus. A vertical incision was made and a full-thickness flap was released and reflected. Minimum ostectomy and tooth sectioning were done then the mucoperiosteal flap was closed with suturing.

First and second cases: a 22-year-old male with a bilateral third mandibular molars impactions underwent a bilateral surgical third molar extraction and was included in the study. The left side was classified as hard, meanwhile, the right side was classified as easy according to Pederson classification. Figures from 6 to 8.

RESULTS:

A one-way ANOVA test was used to compare differences between more than two independent variables. The mean of the distance from the alveolar bone crest to the CEJ before the surgery was 3.924 ± 2.207 mm; 1.793 ± 0.683 mm for the easy cases, 3.693 ± 1.762 mm for the moderate cases, and 5.967 ± 1.925 mm for the hard cases. After 3 months of surgery, the mean of the distance from the alveolar bone crest to the CEJ was 2.034 ± 1.243 mm; 0.921 ± 0.227 mm for the easy cases, 1.940 ± 1.091 mm for the moderate cases and 3.056 ± 1.184 mm for the hard cases. The mean of the probing depth in the distal side of the second molar before the surgery was 4.645 ± 1.135 mm; 4.000 ± 1.414 mm for the easy cases 4.333 ± 0.816 mm for the moderate cases, and 5.667 ± 1.000 mm for the hard cases. After 3 months of the surgery, the mean of the probing depth in the distal side was 2.742 ± 1.182 mm; 1.714 ± 0.756 mm for the easy cases, 2.667 ± 0.976 mm for the moderate cases, and 3.667 ± 1.118 mm for the hard cases. The mean of the probing depth in the buccal side of the second molar before the surgery was 1.129 ± 0.341 mm; 1.143 ± 0.378 mm for the easy cases, 1.200 ± 0.414 mm for the moderate cases, and 1.000 mm for the hard cases. After 3 months of the surgery, the mean of the probing depth in the buccal side was 1.032 ± 0.180 mm; 1.143 ± 0.378 mm for the easy cases, 1.000 mm for the moderate cases, and 1.000 mm for the hard cases. The rate of change in clinical attachment level in three months in the distal aspect of the second molar was -1.387 ± 1.022 mm; -1.571 ± 0.787 mm for the easy cases, -1.267 ± 1.100 mm for the moderate cases, and -1.444 ± 1.130 mm for the hard cases. There was no difference in the rate of change in CAL after three months in the buccal side of the second molar for all cases.

DISCUSSION:

This study evaluated the periodontal parameters of the mandibular second molar after three months of adjacent third molar surgery and compared the results according to the difficulty of the surgical removal.

Because of the problems in the assessment of CAL which caused by the sub-gingival location of CEJ, the non-visibility and tactile error in identifying true CEJ levels, an acrylic stent was made to determine a fixed reference point to provide accurate information relating to gain or loss of attachment.

For the whole sample, the differences were studied using Paired Samples Test for the correlated samples and it was recognized that there were significant differences in the means in the distance from the alveolar bone crest to the CEJ, PD, and CAL in the distal side of the second molar after 3 months compared to the means before the surgery, but There was no significant difference in PD, and CAL in the buccal side. the average distance, PD, and CAL decreased after the surgery which means that the periodontal status has improved.

To recognize if there were differences among averages of variables after three months according to difficulty of surgical removal, one-way ANOVA test was used.

It was found that there were significant differences in distance and PD after three months. The highest mean values were in hard cases according to Pederson classification. Afterwards, come moderate cases, and the lowest values were in easy cases. We may attribute these differences to the surgical trauma which is higher in hard cases. There was no significant difference in the rate of change of CAL after three months.

CONCLUSION

In conclusion, the periodontal status of the second molar improves after the surgical removal of the adjacent third molar. The difficulty of surgical removal is a risk factor for periodontal status distal of the second molar after extraction.

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TABLES AND FIGURES:

Classification	Value
Spatial relationship	
Mesioangular	1
Horizontal/transverse	2
Vertical	3
Distoangular	4
Depth	
Level A: high occlusal level	1
Level B: medium occlusal level	2
Level C: deep occlusal level	3
Ramus relationship/space available	
Class 1: sufficient space	1
Class 2: reduced space	2
Class 3: no space	3
Difficulty index	
Very difficult	7–10
Moderately difficult	5–6
Slightly difficult	3-4

Table 1 Difficulty index for removal of impacted third molars, as described by Pederson [46]

Figure 1 Probing in the distal side of the second molar

Figure 2 CAL measuring

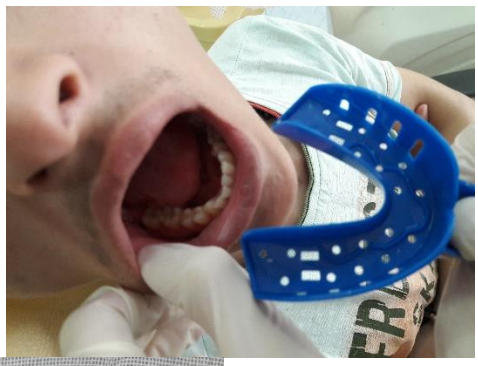

Figure 3 impression of mandible

Figure 4 Making acrylic stent

Figure 5 The surgical instruments

Figure 6 Panoramic radiography of the patient before the surgery

A

B

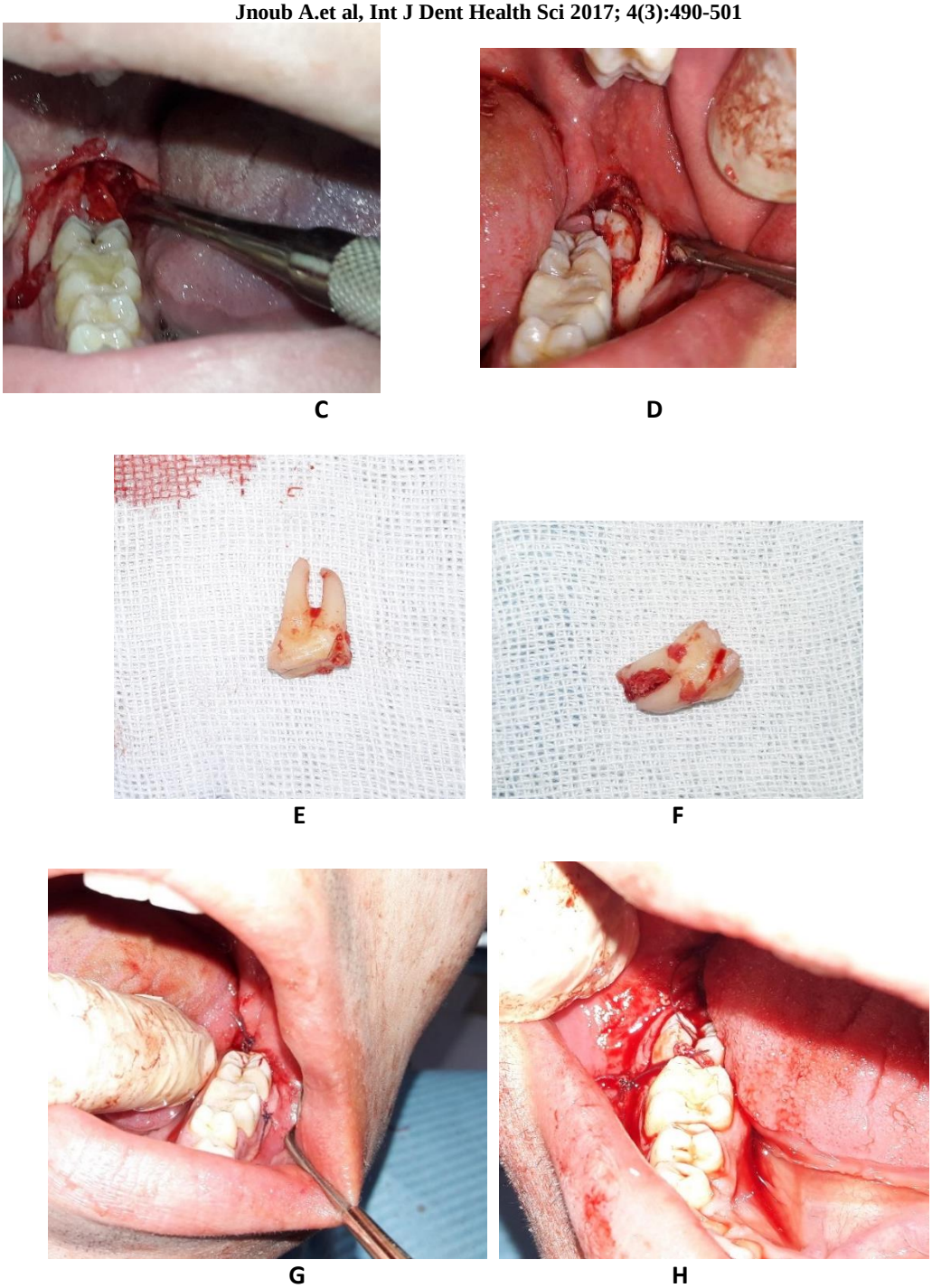

Figure 7 First and second cases: (A) clinical view of the right side before the surgery (B) clinical view of the left side before the surgery (C) periosteal reflecting of the right side (D) periosteal reflecting of the left side (E) extracted tooth of the right side (F) extracted tooth of the left side (G) suturing of the right side (H) suturing of the left side.

Figure 8 Postoperative panoramic radiography