

# Mandibular Second Molar Periodontal Parameters after Surgical Extraction of Adjacent Impacted Third Molar

## Original Article

Majid Fereidooni<sup>1</sup>, Oveis Khakbaz<sup>2</sup>, Najme Danesh Alukande<sup>3</sup>, Soraya Khafri<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Periodontics, Faculty of Dentistry, Babol University of Medical Sciences, Babol, Iran.

<sup>2</sup>Assistant Professor, Department of Oral and maxillo-facial surgery, Faculty of Dentistry, Babol University of Medical Sciences, Babol, Iran.

<sup>3</sup>Dental Student, Faculty of Dentistry, Babol University of Medical Sciences, Babol, Iran.

<sup>4</sup>Assistant Professor, Department of Social Medicine and Health, Babol University of Medical Sciences, Babol, Iran

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### **Corresponding Author:**

**Najme Danesh Alukande**

**Address:** Faculty of Dentistry, Babol University of Medical Sciences, Babol, Iran.

**E-mail:** Mojtabamarzban6868@yahoo.com

**Telephone:** +989113585899

## **Abstract**

### **Introduction:**

Impacted mandibular third molar surgery may affect periodontal status of the adjacent second molar. The purpose of this study was to evaluate the changes in periodontal health parameters distal to the adjacent second molar following surgical extraction of an impacted mandibular third molar.

### **Materials and Methods:**

We selected 50 subjects with a mean age of 22.8 (ranging from 18 to 25) years, of which 42 completed the study. Patients had no systemic problems and had a mesioangular impacted mandibular third molar categorized at C1 class based on Pell and Gregory classification. PD (probing depth) and AL (attachment level) were measured before surgery and four months after surgery on the distal aspect of adjacent second molar. Data analyses were conducted by using SPSS Software analysis (Version 22) and a probability level of 0.05 was used throughout.

The results were analyzed statistically using paired-sample t-test and ANOVA (repeated measures).

### **Results:**

Surgical extraction of fully impacted mesioangular third molar resulted in statistically significant decrease in PD on the distal aspect of mandibular second molar ( $p=0.001$ ). AL improvement was statistically significant ( $p=0.001$ ).

### **Conclusion:**

Surgical extraction of mesioangular deeply impacted mandibular third molars causes decreased PD at the distal aspect of the second molar and improves AL. Therefore, periodontal improvement was shown in our study. But further research that reduces the limitations of this study and the use radiographic follow-up can provide better results.

### **Key words:**

•Molar •Third Molar •Tooth Extraction.

## Introduction

An impacted tooth is one that fails to erupt into the dental arch within the expected time.<sup>(1)</sup> The most common impacted teeth are the maxillary and mandibular third molars, because they are the last teeth to erupt; therefore, they are the most likely to have inadequate space for eruption.<sup>(1)</sup> Mandibular third molars are found in 90% of the general population while 33% of them having at least one impacted third molar.<sup>(2)</sup>

If impacted teeth are left in the alveolar process, some problems may result, such as deep periodontal pockets in distal aspect of adjacent second molar, caries, pericoronitis, adjacent tooth root resorption, developing odontogenic cysts and tumors, jaw fracture, and orthodontic problems.<sup>(1,2,3)</sup>

Impacted mandibular third molar surgery is one of the most frequent surgical procedures carried out by oral surgeons and may be associated with the significant morbidity including pain, swelling, trismus, and potential complications, such as nerve injury and injury to the adjacent tooth.<sup>(2,4)</sup> A probable side effect of this surgery is developing periodontal defects on the distal aspect of adjacent second molar. There is controversy about this subject. Some authors have shown improvement of periodontal status after surgery<sup>(5,6)</sup>, whilst others have demonstrated loss of attachment level and alveolar bone height.<sup>(2,7)</sup> Montero et al., demonstrated that initial breakdown of periodontal status occurs on the distal surface of the second molars three and six months after surgical extraction of the lower third molars, but it can be significantly improved one year after surgery.<sup>(8)</sup> Faria et al. showed clinically and statistically significant bone healing at 12 months after surgery, with the most notable improvement at the first three-month follow-up.<sup>(6)</sup>

Hence, the aim of our study was to evaluate periodontal status on distal aspect of second molar after surgical extraction of impacted third molar by using PD (probing depth) and AL (attachment level) parameters.

## Materials and Methods

We selected 50 subjects with mean age of 22.8 (ranging from 18 to 25) years from patients who referred to the dental school of Babol Univer-

sity of Medical Science for surgical extraction of the mandibular third molar. Informed consent was obtained from patients (MUBABOL.REC.1394.193).

For this study, subjects had no systemic problems and had a mesioangular impacted mandibular third molar categorized at C1 class based on Pell and Gregory classification.<sup>(1,2)</sup> Twenty-one of them were on right side and twenty-nine were on the left. C1 impaction occurs when an occlusal of the surface of the impacted tooth is below the cervical line of the second molar and the mesiodistal diameter of the crown is completely anterior to the anterior border of the mandibular ramus (Figure 1). Periodontal status in the distal aspect of second molar must be healthy, with no radiographic bone defect, no bleeding on probing (BOP), no abnormal mobility, and no furcation involvement.



**Figure 1.** Mesioangular mandibular third molar categorized at C1 based on Pell and Gregory classification.

Before surgery, periodontal PD (probing depth) was measured on buccal, medial, and lingual sites of distal aspect with using a customized occlusal stent as a guide for the path of insertion of a periodontal probe and a Michigan O periodontal probe (PD1). AL (attachment level) also was measured from the cemento-enamel junction (CEJ) (AL1). All lower third molars were extracted by one surgeon under local anesthesia, generally with lidocaine in a 2% solution with epinephrine at 1:100,000 (Persocaine-E, Darou pakhsh factory, Iran). The surgeon raised a full thickness triangular flap. A sterile moderate speed (30,000 rpm) hand pieces and sterile saline solution was used for osteotomy and tooth sectioning.

To close the wound, No. 3-0 vicryl suture was used. Patients were recalled 17 weeks after surgery. Forty-two subjects completed the study. PD and AL were measured with the same method (PD2, AL2).

Data analyses were conducted by using SPSS Software analysis (Version 22), and a probability level of 0.05 was used throughout.

The results were analyzed statistically using paired-sample t-test and ANOVA (repeated measures).

## Results

Fifty patients enrolled in this study, and forty-two of them completed it. Eight patients were excluded from analyses because they failed to complete regular follow-up.

The preoperative PD (PD1) and 17 weeks post-operative PD (PD2) were measured; PD measurements ranged from a mean SD of  $4.55 \pm 1.75$  mm to  $3.12 \pm 0.59$  mm in buccodistal,  $5.48 \pm 1.83$  mm to  $3.19 \pm 0.83$  mm in middistal, and  $4.07 \pm 1.02$  mm to  $2.98 \pm 0.60$  mm in lingodistal. The mean number of PD in the three sites (buccal, medial, and lingual) of the distal aspect of the second molar changed from  $4.69 \pm 0.04$  mm to  $3.09 \pm 0.39$  mm. For all of periodontal PD (probing depth) measures, there was a statistically significant decrease between PD1 and PD2 measurements ( $p = 0.001$ ). [Table 1]

The AL measurements ranged from a mean SD of  $2.67 \pm 0.82$  mm to  $2.33 \pm 0.97$  mm. There was a statistically significant decrease between A11 and A12 measurements (i.e., the distance between CEJ and pocket depth was decreased) ( $p = 0.001$ ). [Table 1]

**Table 1.** Pre-operative and 17 weeks post-operative PD and AL and evaluation by t-test.

Periodontal parameter	Pre-operation (Mean±SD)	Post-operation (Mean±SD)	P-Value
PD in distal- buccal	$4.55 \pm 1.75$	$3.12 \pm 0.59$	0.001
PD in distal- medial	$5.48 \pm 1.83$	$3.19 \pm 0.83$	0.001
PD in distal- lingual	$4.07 \pm 1.02$	$2.98 \pm 0.60$	0.001
Mean PD	$4.69 \pm 0.04$	$3.09 \pm 0.39$	0.001
AL	$2.67 \pm 0.82$	$2.33 \pm 0.97$	0.001

## Discussion

In surgical removal of mandibular impacted third molar, the risk for developing persistent periodontal defects on the distal aspect of adjacent second molar should be considered.

In this study, surgical extraction of fully impacted mesioangular third molar resulted in statistically significant decreased PD on the distal aspect of mandibular second molar. In this study, improvement in AL measurements were not clinically impressive (0.34 mm) after surgery, but it was statistically significant ( $p = 0.001$ ). Therefore, the periodontal status was improved.

Three important factors were commonly referenced in literature to affect periodontal status at the distal aspect of second molar after surgery; patient's age, third molar angulation type, and impaction depth, and pre-surgical periodontal defects<sup>(6,9)</sup>, so only asymptomatic, fully impacted mesioangular third molars that categorized at C1 class based on Pell and Gregory classification were evaluated in this study.

All patients were young with the mean age of 22.8 (ranging from 18 to 25) years.

To avoid confounding factors, we used full thickness triangular flaps in all patients, and all procedures were performed by one surgeon.<sup>(10)</sup>

Because the entire distal aspect of the second molar is at risk from the presence of pre-operative and post-operative defects and iatrogenic injury during third molar surgical removal, we measured periodontal parameters (PD and AL) at three sites of the distal aspect of the second molar (buccodistal, middistal, and lingodistal), but in nearly all previous similar studies, only one specific PD site was noted. Tabrizi et al. showed a breakdown of periodontal status on distal aspect of second molar after surgical extraction of fully impacted mesioangular mandibular third molar in C1 class. Their study included 50 subjects. PD and AL were measured on distobuccal sites of the distal aspect, pre-operative and six months after surgery. PD ranged from a mean  $\pm$  SD of  $2.71 \pm 0.59$  mm to  $3.60 \pm 0.88$  mm. The AL measurements ranged from a mean  $\pm$  SD of  $3.62 \pm 0.69$  mm to  $3.48 \pm 0.74$  mm.<sup>(2)</sup> Results of this study are different from ours because just one point of distal aspect was evaluated in Tabrizi et al. study.

Petsos et al. selected 78 patients with asymp-

tomatic fully impacted mandibular third molar. The plaque and gingival indices, PD and AL were recorded prior and six months after surgery. The indexes and parameters were improved after surgery.<sup>(12)</sup> Thus, the results were similar to ours, while the sample size was bigger and the follow-up duration was longer.

Our study did not have post-operative radiographic evaluation because of ethical impediments for unnecessary x-ray exposure to patients. Faria et al. recorded radiographic bone height (RBH), radiographic infrabony defects (RIDs), and bone loss (BL) in 22 young healthy patients before extractions of mesioangular impacted third molars at 3, 6, and 12 months after surgery.

They concluded that bone healing is clinically and statistically significant at 12 months, with the most notable changes at the first 3-month follow-up.<sup>(6)</sup>

## Conclusion

We concluded that extraction of mesioangular deeply impacted mandibular third molars causes decreased PD at the distal aspect of the second molar and AL improvement. We can recommend removal of third molars that are in similar situations, but more studies with fewer limitations are needed.

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