

Changes in Pocket Depth, Clinical Attachment Level , and Alveolar Bone Height Distal to Lower Second Molar After Impacted Lower Third Molar Removal

Dr. Shehab A.Hamad BDS, MSc, FIBMS, MOMS RCPS (Glasg)

Dr. Khadija M. Ali BDS, MSc

Dr. Othman A. Omer BDS, FIBMS

Abstract

The purpose of this retrospective clinical and radiographic study was to evaluate the periodontal condition of mandibular second molar after surgical removal of adjacent impacted mandibular third molars in patients who had undergone a unilateral, partially or fully impacted third molar extraction, at the Outpatient Clinic, Department of Oral and Maxillofacial Surgery, College of dentistry, Hawler Medical University, between the years 2010 and 2011. The sample size was 40 healthy patient with inclusion criteria aged between 18-32 years old.

The same operator removed the impacted third molars in all patients. Periodontal measurements including periodontal probing depth PPD, clinical attachment level CAL, & alveolar bone height ABH were examined at distal surface of second molars before & 6 months after surgical removal of impacted mandibular third molars. OPG was taken for each patients pre & post operatively. The data were analyzed using SPSS soft ware, version 12 (SPSS, Chicago, IL). A paired t- test was used to find a significant changes in the three recorded variables about 6 months post operatively. The results from this study showed that a significant improvements in all the periodontal parameters after removal of impacted mandibular third molars.

Introduction

Third molars, the last teeth to erupt into the human dental arch, have been shown to be the most frequently impacted teeth in all human ethnicities.¹ The main factors contributing to impaction are an inadequate dental arch space² and erratic eruption paths.^{3,4} Impacted third molars, like other impacted teeth, can lead to a variety of problems, such as pericoronitis and/or orofacial infection, caries and/or periodontitis of the adjacent tooth, root resorption of the adjacent tooth, cystic or neoplastic changes, orthodontic or prosthetic problems, or even temporomandibular joint symptoms.^{5,6}

Extraction of third molar teeth is the most common surgical procedure performed in the oral cavity. Numerous indications and contraindications for surgical extraction of third molars have been outlined^{7,8}, one of which is the prevention and/or improvement of periodontal defects in adjacent second molars⁹⁻¹¹ Surgical extraction of the third molar must attempt to conserve or even lead to the regeneration of the periodontal tissues on the distal surface of the adjacent second molar. However, the regeneration of such periodontal tissues seems difficult to achieve, because it represents a complex biologic process that is affected by local oral conditions, such as plaque accumulation, the inflammation of periodontal tissue, and the angulations of the third molar and its positional relationship with the adjacent second molar¹²

Several conflicting findings have been published in previous literature regarding the effects of impacted third molar extraction on the periodontal health of the adjacent second molar; some have suggested improvement of periodontal status distal to adjacent second molar^{13,14} contrarily, other studies demonstrated loss of attachment and reduction of al-

veolar bone height^{15,16} Periodontal defects after third molar surgery often can be anticipated before surgery based on the patient's age and preoperative periodontal health.

Although there is controversy regarding the removal of asymptomatic third molars, it is generally accepted that prophylactic removal of deeply impacted third molars is contraindicated in older patients with good periodontal health¹⁷. In general, periodontal defects after third molar surgery are most likely to occur in older patients (> 35 years), especially if there is existing bone loss along the distal aspect of the second molar and if periodontal lesions, which are commonly associated with partially erupted third molars. For these patients, it is not advisable to perform the extractions unless pathologic indications necessitate such surgery¹⁸ Because there is still a lack of consensus in the scientific literature addressing the effect of the extraction of lower third molars on adjacent second molars and on periodontal health, the aim of this study was to evaluate the periodontal conditions of mandibular second molars after surgical extraction of adjacent impacted Mandibular third molars.

Patients and Methods

retrospective clinical and radiographic study was designed to evaluate patients who had undergone a unilateral, partially or fully impacted third molar extraction, at the Outpatient Clinic, Department of Oral and Maxillofacial Surgery, College of dentistry, Hawler Medical University, between the years 2010 and 2011. In this study, convenience sampling method was used and the total of sample size obtained was 60 patients, but only 40 patients attained

6 months follow up visits. All these patients had been given informed consents. Patients had been examined clinically and radiographically pre and post surgical removal of lower impacted third molar. The criteria for patient inclusion were age range between 18-32 years old; availability of a good-quality pre-operative panoramic radiograph; patients' good oral hygiene. Exclusion criteria included pregnancy, patients with no adjacent mandibular second molar; patient with chronic periodontitis, pre-existing medical conditions that may impair wound healing including diabetes, immunosuppression caused by chronic steroid use, status-post organ transplantation or chemotherapy for malignant conditions, previous radiotherapy to the maxilla or mandible, liver or renal failure (including dialysis patients), no permanent address or phone number, failure to agree to return for follow-up, mentally retarded individuals. Smokers were also excluded.

Clinical examination and recording of periodontal parameters was performed by one examiner (KHM) pre-operatively and six months after impacted third molar removal. Periodontal pocket depth (PPD) & clinical attachment level (CAL) in mm was measured at the distal surface of adjacent lower second molar at the distobuccal and distolingual sites, their scores were then averaged using Williams periodontal probe. The probe tip was inserted into the gingival sulcus parallel to the long axis of the tooth until a slight resistance was met. All measurements were recorded to the nearest millimeter. Clinical attachment level (CAL) was defined as the measurements in a millimeter from the cement-enamel junction to the base of the pocket. Alveolar bone height (ABH) from the cement-enamel junction of the distal aspect of the second molar to the crest of the bone was measured on orthopantomogram radiographs (OPGs), using gutta percha as a measuring guide. The OPGs were scanned & digitalized. Measurements of bone height on digitized OPGs were made using Auto Cad program.

All lower third molars were extracted by the same surgeon (SHA) with patients under local anesthesia, (lidocaine 2% with 1:80:000 adrenaline). The surgeon raised a full-thickness flap with a vertical releasing incision mesial to the second molar. Bone was removed on the buccal and distal aspects of the third molar using a surgical bur under copious normal saline irrigation. The tooth was appropriately split and removed. To close the wound, No. 3-0 silk suture was used. After 7 days, the suture was removed. Data was analysed using SPSS software, version 12 (SPSS, Chicago, IL). A paired t-test was used to find if there was any significant change in the three recorded variables six months postsurgery. Differences were considered statistically significant at $P < .05$.

Results

The periodontal pocket depth (in mm) at baseline and six months following surgical removal of the impacted third molars is shown in Table 1. The pocket depth showed a high significant reduction at both distolingual and distobuccal sites ($p < 0.01$). The amount of reduction was approximately 1.64 mm (± 0.17 mm) for the former and 1.78 mm (± 0.19 mm) for the later site. The clinical attachment level (in mm) preoperatively and six months postsurgery is shown in Table 2. There was a significant gain in clinical attachment level ($P < 0.05$) at both distobuccal and distolingual sites. The amount of attachment gain was 1.23 mm (± 0.31 mm) for the former and 1.09 mm (± 0.25 mm) for the later site. Alveolar bone height (in mm) at the base line and six months postsurgery is shown in Table 3. The improvement in distal bone height was 1.35 mm (± 0.27) and was statistically significant.

Table 1: Mean periodontal pocket depth distal to lower second molar before and six months after impacted third molar removal. *highly significant

Periodontal Pocket Depth (mm)					
	Before surgery Mean \pm SD	6 months post-surgery Mean \pm SD	Difference Mean \pm SD	T-value	P -value
Distobuccal	4.907 \pm 0.37	3.265 \pm 0.28	1.642 \pm 0.17	2.964	<0.01*
Distolingual	5.123 \pm 0.29	3.339 \pm 0.22	1.784 \pm 0.19	2.771	<0.01

Table 2: Mean clinical attachment level distal to lower second molar before and six months after impacted third molar removal.
*significant

Clinical attachment level (mm)					
	Before surgery Mean ±SD	6months post- surgery Mean ±SD	Difference Mean ±SD	T-value	P-value
Distobuccal	3.480±0.22	2.253±0.27	1.227±0.31	2.226	<0.05*
Distolingual	3.579±0.26	2.496±0.18	1.083±0.25	2.108	<0.05

Table 3: Mean alveolar bone height distal to lower second molar before and six months after impacted third molar removal.
*significant

Alveolar Bone Height (mm)					
	Before surgery Mean ±SD	6months post- surgery Mean ±SD	Difference Mean ±SD	T-value	P-value
	4.620±0.33	3.265±0.27	1.355±0.23	2.301	<0.05*

Discussion

Surgical management of impacted third molars, whether for prophylactic or symptomatic reasons, is a common procedure provided by oral and maxillofacial surgeons. However, the removal of asymptomatic third molars is not without controversy and debate.¹⁹ Critics of this practice believe that among the postoperative sequel of this procedure is periodontal pocket formation on the distal aspect of the adjacent second molar.^{10, 13}

The results of this study show significant improvements in all the periodontal parameters evaluated (PPD, CAL, and ABH) from baseline to the final evaluation six months after the extraction. These improvements would partially stem from the better plaque control and oral hygiene performed by the subject after third molar removal. With partially impacted teeth, their removal provides access for adequate cleansing of the distal aspect of the second molar and the existing periodontal attachment can be maintained or improved.

It is plausible that third molar removal would effectively decrease the surface area of the biofilm gingival interface, thus altering subgingival anaerobic conditions that facilitate colonization of pathogens and an immune response to the bacteria, and potentially improve the periodontal condition.

The results of many studies support our findings. Blakey *et al*¹¹ concluded that removal of mandibular third molars significantly improved the periodontal status of the distal surfaces of the second molars and was also positive in terms of overall periodontal health. Along the same lines, Krausz *et al*¹⁶ reported that extraction of an impacted lower third molar re-

sulted in a significant gain of alveolar bone height on the distal aspect of the adjacent second molar on the test side, whereas a slight degree of bone loss was noted on the control side. In addition, Kim *et al*²⁰ concluded that third molar extraction in periodontitis patients showed an improvement in periodontal status in contrast the patients group having third molar, therefore earlier a removal of third molar may minimize radiographic bone loss of the adjacent second molar. Montero and Mazaglia²¹ also found that initial periodontal breakdown established on the distal surfaces of the second molars and in the periodontal health of the 4 posterior sextants can be significantly improved 1 year after surgical removal of the ipsilateral lower third molar.

In contrast, other studies have shown that impacted lower third molar removal have a negative impact on the periodontal status distal to adjacent second molar. Gröndahl and Lekholm²² 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 six months. Kugelberg²³ showed similar results where there were no gross changes of ABH following third molar extraction. However, in his study, they compared the ABH at 2 and 4 years after extraction. Osborne *et al*²⁴ and Quee *et al*²⁵ had also shown that there were no significant changes in PPD following third molar extraction regardless of the age and sex of the patients. Besides that, Dodson²⁶ conducted a review paper of eight articles about this topic. The inclusion criteria for this review paper were prospective cohort studies

or randomized clinical trials with follow-up periods of 6 months or more. They found that clinical attachment level and periodontal pocket depth on the distal side of second molar 6 months post removal of impacted molars were clinically insignificant.

This great variation in the opinion of researchers concerning the effect of surgical removal of impacted lower third molars on the periodontal status of adjacent second molars may be attributed to many factors. The sample size, duration of follow up visits, age of the patients, difficulty of surgical removal of third molar as well as amount of bone removed and type of flap design and suturing technique, all may be of importance. The oral hygiene of the patient and his commitment in dental home care, may also play a role.

Regarding age, Kugelberg *et al*¹² postulated that the effects of age on decreasing cellular immunity to dental plaque might underlie the discrepancies found between younger and older patients with

regard to their periodontal responses after third molar removal. The importance of age in periodontal healing was also confirmed in a study by Kaminishi *et al*²⁷ who stated that patients aged 40 years or older have an increased risk of periodontal problems after the removal of third molars.

Another possible explanation for the difference in the results between studies might be attributed to the differences associated with PPD measurements distal to the second molars with a neighboring impacted third molar²⁸.

One criticism of the study design may be that the six month duration of follow-up was inadequate. However, we believe that longer duration of follow up visits may need cooperation of patients as the majority may not attend for longer multiple visits if they have no complaint. We also believe that longer duration visits may mask any changes that had occurred due to the influence of many other variables on periodontal status.

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