EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 5
Issue: 8
619-623
Year: 2018

EVALUATION OF PERIODONTAL OUTCOME DISTAL TO THE SECOND MOLAR AFTER IMPACTED THIRD MOLAR SURGERY- A CLINICAL STUDY

Himanshu Thukral*[1] and Shweta Bhardwaj[2,3]

[1]Oral & Maxillofacial Surgeon, Sarita Dental Care, Delhi, India.
[2]Master of Public Health, University of Saskatchewan, Saskatoon, Saskatchewan, Canada.
[3]BDS, I.T.S. Dental College, Ghaziabad, UP, India.

***Corresponding Author: Himanshu Thukral**
Oral & Maxillofacial Surgeon, Sarita Dental Care, Delhi, India.

Article Received on 11/06/2018 **Article Revised on 01/07/2018** **Article Accepted on 22/07/2018**

ABSTRACT

Objective: Surgical exodontia of an impacted mandibular third molar may influence the periodontal outcome of the adjacent second molar. There is lack of consensus among the dentists and the oral surgeons concerning the effect of surgical extraction of an impacted molar on periodontal health of the adjacent second molar. The purpose of this study was to examine the postoperative periodontal outcome of the mandibular second molar following surgical extraction of an impacted mandibular third molar. **Materials and Methods:** A prospective cohort study was designed. The convenience sampling method was used to obtain a sample size of eighty. All the participants had a mesioangularly impacted mandibular third molar. The mean age of the participants was 28.1 years. To assess the impact of surgical extraction on the periodontal health of the adjacent molar, the probing depth (PD) and the attachment level (AL) were used as the primary outcomes. They were measured at baseline and at three months after the surgery. A total of sixty-nine patients completed the study. Data were analyzed using the Paired-Sample t-test and Repeated measures ANOVA at a significance level of 5% in SPSS Version 21 Software. **Results:** The analysis of the data showed a statistically significant decrease in PD ($p<0.001$) and improvement in AL ($p<0.001$) on the distal aspect of mandibular second molar following three months after the surgery. **Conclusion:** The results of our study demonstrate that surgical exodontia of impacted mandibular third molar improves the primary outcome of the periodontal tissues on the distal aspect of the adjacent second molar.

KEYWORDS: Mesioangular impaction, third molar, surgical exodontia, attachment level and probing depth.

INTRODUCTION

The prevalence rate of impaction is higher for third molars as compared to other teeth in the oral cavity.[1] A great number of theories have been proposed that contribute to the high incidence of mandibular third molar impaction. Some of the proposed theories are insufficient retromolar space[2,3], hereditary factors,[4] lack of sufficient eruption force for third molars, and the theory of phylogenetic regression of the jaw size.[5,6] The impacted third molars are frequently associated with pathological conditions such as pericoronitis and caries of the second molar or of the third molar itself.[7] Other conditions associated with impacted third molars are certain types of cysts or odontogenic tumors and primary or secondary dental crowding.[7]

Exodontia (also referred to extraction) of the third molar is the most common surgical procedure performed in the oral cavity by dentists and/or oral surgeons.[8] At an annual cost of over 3 billion, about 10 million third molars are extracted each year from approximately 5 million people in the United States.[9] The need for requiring surgical removal of third molars increased during the period between 1996 and 2002 among patients who were over the age of 40 as noted in a study by Kaminishi et al.[10] Although there are well-defined criteria for extraction of impacted third molars, there are no absolute indications and contraindications for carrying out surgical exodontia of asymptomatic third molars.[11] The indications and contraindications for the removal of impacted third molars have been discussed elsewhere.[12] Regardless, an effort should be made by the oral surgeon to protect the periodontal tissues during the surgical procedure. Ideally, it should lead to the improvement of the periodontal tissues on the distal surface of the adjacent second molar.

At present, there is a lack of studies that could validate the positive impact of removal or of deliberate retention of impacted third molars on the periodontal tissues of the adjacent second molar.[11] Several studies published in the scientific journal have reported contrasting findings on the effect of impacted third molar exodontia on the periodontal health status of the adjacent second molar.

While some studies have concluded improvement in the periodontal status,[13,14] few authors, on the contrary, demonstrated loss of attachment and reduction of alveolar bone height on the distal aspect of the adjacent second molar.[15,16] If removal of impacted third molar results in significant reduction in the attachment level and alveolar bone height distal to the lower second molar, the alveolar bone height could be maintained by placement of bone grafts or bone substitutes in the socket post-operatively.

Hence, the aim of our study was to examine the periodontal health on the distal aspect of the second molar by evaluating clinical paraments such as probing depth (PD) and attachment level (AL) following surgical exodontia of impacted third molar.

MATERIALS AND METHODS

A prospective cohort study was designed to examine the patients who underwent lower third molar extractions at the Sarita Dental Care, Delhi, India over a period of 8 months from May 2017 and December 2017. In this study, convenience sampling method was used to obtain a total sample size of eighty subjects. The final cohort, however, comprised of only sixty-nine patients as eleven patients were unable to complete the follow-up. The permission to start the study was received from the institution. The patients were enrolled in the study after obtaining written informed consents from them. According to Pell and Gregory classification, the Class C1 impactions of the mandibular third molars were included in the study.[17] The class C1 impaction is categorized as the one in which the occlusal plane of the third molar is as high as that of the second molar.[17] The decision was made to recruit subjects with only mesioangular impactions as they account for approximately 43% of all impacted mandibular third molars.[11] In addition, they are considered the least difficult to remove, thereby reducing the probability of complicated extractions.[11]

The patients were initially screened for the study based on their radiographic assessments (pre-operative panoramic radiograph), overall health, medical history and CBC with clotting profile. Both symptomatic and asymptomatic patients were enrolled in the study after a thorough evaluation of a strong indication for removal of their impacted molars against a strong contraindication to its retention.[11] The symptomatic patients who were enrolled in the study had an otherwise overall good dental hygiene. This criterion was established to avoid confounding factors.

The mean age of the study participants was 28.1 years with the age range of 18-32 years at the time of surgical extraction. The inclusion and exclusion criteria used in the study are displayed in the table 1 and 2, respectively.

Table 1: Inclusion Criteria.

Mesioangularly impacted mandibular third molars, categorized as Class C1 by Pell and Gregory.[17]
Age between 18-32 years.
Availability of a good-quality pre-operative panoramic radiograph.
Good oral hygiene of the patients.

Table 2: Exclusion Criteria.

Pregnant or lactating female patients at the time of extraction or during the follow-up period.
Presence of any systemic condition, particularly Diabetes Mellitus, that could interfere with periodontal healing or with bone growth.[18]
Use of immunosuppressive medications.
Presence of clotting disorders.
Pre-surgical periodontal/ bony defects.
Pre-surgical chronic periodontal diseases.
Any patient undergoing active periodontal treatment or underwent periodontal surgery during the time between the extraction and the follow-up period.

After the patients were enrolled, a detailed case history followed by extra-oral and intra-oral clinical examination of all the patients was carried out. The surgical exodontia of all the subjects was performed by the Oral and Maxillofacial Surgeon at the Sarita Dental Care, India. The surgical extraction was performed after the administration of local anesthesia, i.e., injection of 2% lidocaine/ epinephrine 1:100,000. A standard ward's incision was given by the surgeon and a full thickness triangular flap was raised for all the cases.[19,20] After exposing the surgical site, ostectomy was carried out with a sterile micromotor at a moderate speed. Tooth sectioning was done when necessary. The wound was closed using No. 3-0 silk ethicon suture. The wound was managed by gentle irrigation with warm saline followed by placement of a pack of iodoform gauze soaked with medication. The patients were prescribed with an antibiotic, a nonsteroidal anti-inflammatory drug (NSAID) and chlorhexidine mouthwash to prevent post-operative infection. Additionally, patients were given instructions to maintain good dental hygiene. The suture was removed after 7 days. The patients were recalled for a follow-up visit after 3 months of surgery. The same surgeon conducted the follow-up exam to avoid inter-examiner variability. The probing depth and the attachment level were used as the primary outcome to

assess the impact of surgical extraction on the periodontal tissues of the adjacent second molar. The periodontal examinations were conducted using the sterile William's calibrated periodontal probe. Measurements of the PD were taken at three different sites, i.e., distobuccal, mid distal and distolingual aspects of the adjacent second molar. The PD was measured as the distance between the base of the pocket and gingival margin and the AL was recorded as the distance from the CEJ after placing a customized acrylic stent. Clinical examinations were recorded in mm at the baseline and at 3 months postoperatively. Their scores were then averaged in mm.

The statistical calculations were done using the paired-sample t-test and Repeated measures ANOVA at a significance level of 5% (p-value ≤0.05) in the version 21 of the SPSS Statistical software. The paired sample t-test was used to determine whether the mean difference between the preoperative and postoperative observations (PD and AL) was zero. In addition, Repeated measures ANOVA was used to compare the means of PD measured on three different sites of the distal aspect of the mandibular second molar within the study participants.

RESULTS

The study population consisted of eighty patients who had mesioangularly impacted mandibular third molars. Among these participants, eleven patients were lost to follow-up after the surgery. They were excluded from the analysis. The final cohort consisted of sixty-nine subjects only. The age of the participants ranged from 18-32 years with mean age of 28.1 ± 4.1 years. The impacted third molars, classified as Class C1 as per the Pell and Gregory classification, were extracted for the patients during the study.[17] The PD and AL were used as the primary outcomes of the periodontal tissue on the distal aspect of the second molar adjacent to the surgically extracted molar. The PD and AL were obtained at baseline and at three months after the surgery. The comparison of the perioperative and three months postoperative values was made in the study. The results of the analysis are represented in table 3 and 4.

Comparison of the pre and post-operative mean PD and standard deviation (SD) for distobuccal aspect (4.33 ± 1.69 mm to 2.95 ± 0.47), mid-distal (4.95 ± 1.72 mm to 2.72 ± 0.75), distolingual (4.01 ± 0.12 mm to 2.89 ± 0.58 mm) by Repeated measures ANOVA test resulted in a statistically significant difference between them with *p-value* < 0.001 at the 5% significance level.

The analysis of the data revealed that the mean PD for all the three sites on the distal aspect of the mandibular third molar, i.e., the distobuccal, mid distal and distolingual, decreased from 4.43 ± 0.17 mm to 2.85 ± 0.23. The difference between the preoperative and postoperative PD measurements was found to be statistically significant by paired sample t-test with p< 0.001 at the significance level of 0.05.

Table 3: Probing Depth at Baseline and after three months follow-up.

Periodontal Outcomes	Preoperative Mean	Preoperative SD	Postoperative Mean	Postoperative SD	p-value
Distobuccal PD	4.33	1.69	2.95	0.47	0.001
Mid distal PD	4.95	1.72	2.72	0.75	0.001
Distolingual PD	4.01	0.12	2.89	0.58	0.001
Mean PD of three sites	4.43	0.03	2.85	0.29	0.001

Similarly, comparison of pre and post-operative mean AL ± SD showed a change from 2.81 ±0.74 mm to 2.44 ± 0.89 mm and thus, a statistically significant difference was found between them with $p < 0.001$ by paired sample t-test.

Table 4: Attachment at Baseline and after three months follow-up.

Periodontal Outcomes	Preoperative Mean	Preoperative SD	Postoperative Mean	Postoperative SD	p-value
AL	2.81	0.74 mm	2.44	0.89 mm	0.001
Changes in AL after 3 Months of Surgery	0.37 mm				

DISCUSSION

The dentists and/or oral surgeons should evaluate the clinical parameters, radiographic variables and patient's characteristics before surgical removal of impacted mandibular third molars to avoid development of periodontal defects and the postoperative morbidity. The literature has identified three important factors that can affect the periodontal health of the distal aspect of the second molar following surgery. These factors include the patient's age, third molar angulation type and depth of impaction, and pre-surgical periodontal defects.[21,22]

Our study involved exploration of the periodontal health in patients between the ages18-32 years with mesioangularly impacted third molars who underwent third molar surgery. The results of our study showed significant improvement in the periodontal outcome (PD and AL) from the baseline to the final evaluation at 3

months after the surgery. Although, the improvement in the primary outcome of the periodontal tissues adjacent to the second molar could have been overestimated due to the good dental hygiene practiced by the patient after the surgery. The effect of practicing good oral hygiene has been reported elsewhere.[23]

From our results, we found that there is a statistically significant decrease in the PD on the distal aspect of the mandibular second molar after the surgical exodontia of an impacted mesioangular third molar (1.58 mm). Moreover, the improvement in measurement of AL after surgery was observed. Although not clinically impressive (0.37 mm), it was statistically significant (p= 0.001). Therefore, we can say that an improvement was observed in the periodontal status of the cohort after the surgery.

Most of the similar studies have measured only one PD site. Due to the possibility of causing iatrogenic injury and/or presence of pre-operative and post-operative defects on the distal aspect of the second molar, a study conducted by Majid et al measured three different sites of the distal aspect of the second molar.[24] Our study used a similar approach, however, our study had a relatively large sample size (sixty-nine participants), included both asymptomatic and symptomatic patients, covered a broad age range (18-32 years) and also, the follow-up period in our study was short (i.e., 3 months). Despite that, the results of our study are similar to the study conducted by Majid et al.

Our findings were also agreed with Petsos et al who demonstrated improvements in the PD and AL along with the improvement in the plaque and gingival indices six months after the third molar extraction.[25] However, the follow-up period in their study was 6 months, while in our it was 3 months.[25]

Furthermore, a study conducted by Faria et al used radiographic parameters such as the bone loss (BL) and radiographic bone height (RBH) for evaluating the post-operative periodontal status.[26] The findings of their study showed that the clinically and statistically significant bone healing occurs at 12 months after the surgery with the most notable changes seen within the first 3-months of follow-up.[26] In spite of the fact that our study did not assess the postoperative radiographic improvement, their findings support the results of our study.

On the contrary, a study conducted by Tabrizi et al showed a significant increase of the PD on the distal aspect of the second molar following surgical extraction of a C1 class impacted mandibular third molar.[27] The results of our study differ from this study. They, however, measured PD only on one site of the distal aspect of the mandibular molar (i.e., the distobuccal) at baseline and at six months after the surgery.[27]

In addition, Yee et al conducted a study in which they evaluated the effects of surgical removal of the impacted third molar on periodontal pocket depth (PPD), clinical attachment level (CAL) and alveolar bone height (ABH) of the adjacent second molar. [28] They assessed the changes in AL and ADH based on both the clinical and radiological examinations after three months of surgery.[28] Though they measured PPD on three different sites of the distal aspect of the second molar unlike the study conducted by Tabrizi et al[27], the findings of their study contradict our results.[28] Their findings showed no significant changes in the PPD, CAL and ABH on the distal aspect of the adjacent second molar.[28]

In our study, patients with both asymptomatic and symptomatic impacted third molars were recruited in the study to increase the sample size of the study. However, the symptomatic patients who were enrolled had an otherwise overall good oral hygiene. Moreover, the PD measurements were recorded on three different sites of the distal aspect of the mandibular second molar in our study. Most studies, however, have measured PD on one site of distal aspect only. According to the results of our study, the surgical removal of an impacted third molar results in a decrease in the probing depth on the three sites of the distal aspect of the adjacent second mandibular molar and improves the attachment level of the second molar on its distal aspect.

CONCLUSION

From our study, we concluded that the surgical extraction of an impacted mandibular third molar improves the primary periodontal tissue outcome on the distal aspect of the adjacent second molar. It results in a decreased probing depth and improves the attachment level on the distal aspect of the adjacent second molar three months postoperatively.

REFERENCES

1. Santosh P. Impacted mandibular third molars: Review of literature and a proposal of a combined clinical and radiological classification. Annals of Medical and Health Sciences Research, 2015; 5(4): 229. 12.
2. Bishara SE, Andreasen G. Third molars: a review. Am J Orthod, 1983 Feb; 83(2): 131-7.
3. Grover PS, Lorton L. The incidence of unerupted permanent teeth and related clinical cases. Oral Surg Oral Med Oral Pathol, 1985 Apr; 59(4): 420-5.
4. Peck S, Peck L, Kataja M. Concomitant occurrence of canine malposition and tooth agenesis: evidence of orofacial genetic fields. Am J Orthod Dentofacial Orthop, 2002 Dec; 122(6): 657-60.
5. Bermúdez de Castro JM. Third molar agenesis in human prehistoric populations of the Canary Islands. Am J Phys Anthropol, 1989 Jun; 79(2): 207-15.
6. Lytle JJ. Etiology and indications for the management of impacted teeth. Northwest Dent, 1995 Nov-Dec; 74(6): 23-32.
7. Miloro M, Ghali GE, Larsen P, Waite P. Peterson's Principles of Oral and Maxillofacial Surgery. London: BC Decker, 2012; 97-103.

8. Hupp J, Ellis E, Tucker M, Peterson L. Contemporary oral and maxillofacial surgery. St. Louis, Missouri: Mosby; 2007.
9. Friedman J. The Prophylactic Extraction of Third Molars: A Public Health Hazard. American Journal of Public Health, 2007; 97(9): 1554-1559.
10. Kaminishi R, Lam P, Kaminishi K, Marshall M, Hochwald D. A 10-Year Comparative Study of the Incidence of Third Molar Removal in the Aging Population. Journal of Oral and Maxillofacial Surgery, 2006; 64(2): 173-174.
11. Mercier P, Precious D. Risks and benefits of removal of impacted third molars. International Journal of Oral and Maxillofacial Surgery, 1992; 21(1): 17-27.
12. Nordenram A, Hultin M, Kjellman O, et al: Indications for surgical removal of the mandibular third molar. Study of 2,630 cases. Swed Dent J., 1987; 11: 23.
13. Ash MM. Third molars as periodontal problems. Dent Clin North Am, 1964; 51–61.
14. Ziegler RS. Preventive dentistry – New concepts. Preventing periodontal pockets. Va Dent J, 1975; 52: 11-3.
15. Stephens RJ, APP GR, Foreman DW: Periodontal evaluation of two mucoperiosteal flaps used in removing impacted mandibular third molars. J Oral Maxillofac Surg, 1983; 41: 719.
16. Knutsson K, Brehmer B, Lysell L and Rohlin M: Pathoses associated with mandibular third molars subjected to removal. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 1996; 82(1): 10-17.
17. GJ P, BT G. Impacted mandibular third molars: Classification and modified techniques for removal. Dent Digest, 1933; 39-330.
18. Matthews DC. The relationship between diabetes and periodontal disease. J Can Dent Assoc, 2002; 68: 161–4.
19. Farish S, Bouloux G. General Technique of Third Molar Removal. Oral and Maxillofacial Surgery Clinics of North America, 2007; 19(1): 23-43.
20. Briguglio F, Zenobio EG, Isola G, Briguglio R, Briguglio E, Farronato D, et al. Complications in surgical removal of impacted mandibular third molars in relation to flap design: clinical and statistical evaluations. Quintessence Int., 2011; 42(6): 445-53.
21. Kan KW, Liu JK, Lo EC, Corbet EF, Leung WK. Residual periodontal defects distal to the mandibular second molar 6-36 months after impacted third molar extraction. J Clin Periodontol, 2002; 29: 1004–11.
22. White RP, Jr, Fisher EL, Phillips C, Tucker M, Moss KL, Offenbacher S. Visible third molars as risk indicator for increased periodontal probing depth. J Oral Maxillofac Surg., 2001; 69: 92–103.
23. Leung WK, Corbet EF, Kan KW, et al: A regimen of systematic periodontal care after removal of impacted mandibular third molars manages periodontal pockets associated with the mandibular second molars. J Clin Periodontol, 2005; 32: 725.
24. Fereidooni M, Khakbaz O, Danesh Alukande N, Khafri S. Mandibular Second Molar Periodontal Parameters after Surgical Extraction of Adjacent Impacted Third Molar. Journal of Dentomaxillofacial Radiology, Pathology and Surgery, 2016; 5(3): 1-4.
25. Petsos H, Korte J, Eickholz P, Hoffmann T, Borchard R. Surgical removal of third molars and periodontal tissues of adjacent second molars. J Clin Periodontol, 2016; 43(5): 453-460.
26. Faria A, Gallas-Torreira M, López-Ratón M, Crespo-Vázquez E, Rodríguez-Núñez I, López-Castro G. Radiological infrabony defects after impacted mandibular third molar extractions in young adults. J Oral Maxillofac Surg., 2013; 71(12): 2020.
27. Tabrizi R, Arabion H, Gholami M. How will mandibular third molar surgery affect mandibular second molar periodontal parameters? Dent Res J (Isfahan), 2013; 10(4): 523-6.
28. Yee, W., Rahman, R. and Taib, H. Effects of lower third molar extraction on attachment level and alveolar bone height of the adjacent second molar. *Archives of Orofacial Sciences*, 2009; 4(2): 36-40.