

Effect of Surgery Difficulty According to Impaction Level on the Incidence of Alveolar Osteitis Following Mandibular Third Molar Surgery

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Abstract: One of the most common complications following impacted third molar surgery is alveolar osteitis (AO). Various variables affect the incidence of AO following impacted third molar extraction. The aim of the present study was to evaluate the effect of surgery difficulty on the incidence of AO after impacted mandibular third molar surgery. Patients with the age range of 18-30 years old with at least one impacted mandibular third molar participated in the present study. In order to determine the difficulty of the surgery, the direction, depth of impaction, and relationship with ramus of the impacted third molar was evaluated on the panoramic radiograph according to the Pederson scale. Data were collected in SPSS version 11.5 software and analyzed using chi-square and t-test. 31 (20.8%) of the sockets developed AO within the first postoperative week. Higher difficulty level of the surgery was associated with significantly higher rate of AO (P-value < 0.05). Difficulty of the surgery and impaction level has significant effect on the rate of AO following impacted mandibular third molar surgery.

Keywords – Alveolar Osteitis, Difficulty Level, Pederson Scale, Mandibular Third Molar.

I. Introduction

One of the most prevalent complications following surgical removal of impacted mandibular third molar is Alveolar osteitis (AO). The rate of AO is 1% to 4% in nonsurgical removals and 5% to 30% in surgical extractions [1].

AO is characterized by progressive and severe pain, foul taste, halitosis, and regional lymphadenitis. Although AO is a self-limited phenomenon which initiates 24 to 72 hours after the surgery and resolves after 5 to 10 days, it affects the patient's quality of life at this period. Hence preventing AO is of high importance to the healthcare provider whose primary aim is to bring relief along with the treatment [1-3].

One of the factors affecting the incidence of AO following impacted tooth surgery is the amount of trauma has been received by the socket and alveolar bone during the extraction. Tooth sectioning and bone removal during the surgery accounts for the amount of trauma. The main determinant of the need for tooth sectioning and the amount of bone removal are impaction level, impaction depth, and also the direction of impacted tooth [2]. These three factors can be evaluated on panoramic radiograph and be included in the Pederson's scale to determine the difficulty level of surgery [4].

The aim of the present study was to evaluate the effect of surgery difficulty level on the incidence of AO following mandibular third molar surgery.

II. Materials and Methods

The research was performed at Mashhad Dental School, Oral and Maxillofacial Clinic. The study protocol was reviewed and approved by the ethical committee of Mashhad University of Medical Sciences. All participants signed a detailed informed consent prior entering the study.

2.1 Patients Population:

107 patients with at least one impacted mandibular third molars participated in this study between August 2013 and December 2013. The inclusion criteria were being in the age range of 18 to 30 years old, being American Society of Anesthesiologists physical status score I or II, and having at least one bony impacted mandibular third molar.

Patients who were smoker, pregnant, lactating, receiving systemic antibiotics two weeks before the surgery, taking contraceptive drugs, and having periapical lesion in panoramic radiograph were excluded from the study.

2.2 Difficulty Level Based on Panoramic Radiograph:

Prior the surgery, the difficulty level of each surgery was determined based on panoramic radiograph; the impacted tooth was given scores based on three criteria including spatial direction, depth of impaction, and relationship with ramus. The scores of the mentioned three criteria were summed up to determine the Pederson's difficulty level of surgery (Table 1) [4].

2.3 Surgery Procedure:

All surgeries were performed under the same protocol. A single experience surgeon performed surgeries under local anesthesia using 2% lidocaine + 1:80000 epinephrine cartridges. Mucoperiosteal envelop flap was created to provide an access to the impacted tooth. To extract the tooth, alveolar bone was removed and the tooth was sectioned with handpiece under sufficient irrigation. After the surgery, tooth socket was irrigated with 60 ml of sterile normal saline. The flap was sutured with 3-0 silk sutures. To alleviate the postoperative pain, a regimen of Acetaminophen (500 mg, every 8 h) was prescribed.

2.4 Data Collection:

The main variables were surgery difficulty level (determined using Pederson's scale) and incidence of AO. In addition, age and gender were recorded for each patient.

AO was determined by a severe and progressive pain starting 1-3 days after surgery and also regional lymphadenitis, clot loss, foul taste, or halitosis. To evaluate the socket healing and the occurrence of AO, two follow-up appointments (2nd and 7th days after surgery) were held.

Patients with AO received socket irrigation with sterile normal saline and intra-alveolar dressing of alvogyl iodoform (Septodont, Cambridge, Canada). In addition, in some cases systemic analgesic and antibiotics were prescribed.

2.5 Statistical Analysis:

Data were analyzed using t-test and chi-square tests in SPSS version 11.5 software with the confidence interval of 95%.

III. Results

105 patients (69 females and 36 males) with 149 impacted mandibular third molars included in this study. Two patients excluded due to taking antibiotics within the previous two weeks. The mean age of participants was 22.39 ± 3.88 years old.

Among the surgeries, 31 (20.8%) cases developed AO. Table 2 summarizes the distribution of demographic variables and difficulty level according to the AO development. No significant association was found between the mean age or gender of patients with development of AO (P-value > 0.05). The incidence of AO in easy, moderate, and hard surgeries was 9.3%, 22.9%, and 34.8%, respectively. According to the chi-square test, the rate of developing AO was significantly higher in surgeries with higher level of difficulty based on Pederson's scale (Table 2).

IV. Discussion

The aim of the present study was to evaluate the effect of surgery difficulty and impaction level on the incidence rate of AO following mandibular third molar surgery. We observed a significant association between surgery difficulty and AO development.

Surgeries with higher level of difficulty according to depth and direction of impaction had significantly higher rate of AO. The increase in impaction depth and difficulty of the surgery leads to the further need to remove alveolar bone to expose the impacted tooth. Hence it increases the amount of trauma during surgery. Trauma leads to the release of tissue activator factors which enhance the fibrinolytic activity in the extraction socket; the result of which is the loss of blood clot and exposure of the alveolar bone to the oral cavity and development of alveolar osteitis (AO) or dry socket [2].

One of the factors affecting the amount of trauma during impacted third molar surgery is the surgeon's experience. Sisk et al [5] observed that the rate of postoperative complications was higher in the surgeries performed by residents in comparison to the surgeries performed by oral and maxillofacial surgeons. Larsen [6] reported that surgeries performed by experienced surgeons in comparison to inexperienced surgeons results in lower rate of postoperative complications. In order to eliminate the surgeon experience as a confounding variable, all surgeries were performed by a single surgeon in the present study.

The incidence of AO is age-dependent. Most of the reports indicate the peak age is between 20 and 40 years of age [1,6,7]. Moreover, gender has been reported to influence the rate of AO [3,9]. However, no significant association was found between the mean age or gender and the incidence of AO.

Infection enhances the release of tissue activators which would increase the rate of AO. As a result, patients with periapical lesion in panoramic radiograph were excluded from the study. While antibiotics eliminate the bacterial infection in the extraction socket and affect the amount of tissue activators released at the socket, patients who had received systemic antibiotics within the last two weeks were also excluded from the study [2,10].

One of the limitations of the current study was the sample size. It is recommended to perform further researches with higher number of sample size. In addition, it is recommended to evaluate the effect of surgery difficulty on other postoperative complications of impacted mandibular third molar surgery including pain, trismus, swelling, and quality of life.

V. Conclusion

Based on the present findings, difficulty level of surgery significantly affects the incidence of developing AO; higher levels of difficulty results in significantly higher rate of AO. Hence preventive measures are of high importance in difficult surgery to reduce the risk of developing AO.

VI. Figures and Tables

Table 1: Difficulty level of surgery according to the Pederson's scale

Spatial Direction (score)	Depth (score)	Ramus Relationship (score)	Difficulty Level (sum of scores)
Mesioangular (1)	Level A (1)	Class I (1)	Easy (3-4)
Horizontal (2)	Level B (2)	Class II (2)	Moderate (5-7)
Vertical (3)	Level C (3)	Class III (3)	Hard (8-10)
Distoangular (4)			

Table 2: Distribution of AO according to the demographic variables and difficulty level

Variable	AO		P-value
	Yes	No	
Number	31 (20.8%)	118 (79.2%)	-
Gender	Male: 9 Female: 22	Male: 27 Female: 47	0.463*
Age	23.12 ± 2.09	22.03 ± 4.05	0.109**
Pederson's Difficulty Level	Easy: 4 Moderate: 19 Hard: 8	Easy: 39 Moderate: 64 Hard: 15	0.041*

*Based on chi-square test,

**Based on t-test.

Acknowledgements

Authors would thank the staff of Oral and Maxillofacial Surgery Clinic and also Dental material Research Centre of Mashhad Dental Faculty. Moreover, we thank Dr. Amir Hossein Nejat for his assistance with study design, statistical analysis, and language revising.

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