ORIGINAL RESEARCH

Prediction of Risk Factors Associated with the Severity of Pain Following Impacted Lower Third Molar Surgery: A Prospective Study

Ra'ed Mohammed Ayoub Al-Delayme[1], Qutaiba AbudAl Razaq[2], Mona Abdulhadee Alsafi[3]

Senior Lecturer [1&2]
Oral and Maxillofacial Surgery Dept., Dentistry Dept., AL-Yarmuk University College, Baghdad, Iraq.

Assistant Prof[3]
Dean of Dentistry Dept., AL-Yarmuk University College, Baghdad, Iraq

ABSTRACT:

Objective: The main object of this study was to evaluate all the predicting variables that may influence the intensity of pain after surgical removal of lower third molar.

Methods: In this prospective cohort study 159 consecutive cases in which removal of impacted lower third molars were evaluated. Twenty three groups of variables that may affect the severity of pain after mandibular third surgery have been studied. The intensity of pain was measured on the 1st and 2nd days and 1st and 2nd week postoperatively, by asking the patient to rate the nociceptive experience on a visual analogue scale (VAS) at each time respectively.

Results: Pain was reported to be most intense during in first post-operative day, and then there was a drop in mean pain intensity on each subsequent postsurgical extraction days

Conclusion: The intensity of pain was highly significant correlated to the operative trauma of the contentious issue

Key words: Surgical removal, lower third molar, pain

INTRODUCTION

The removal of lower third molars is still the most common routine surgical procedure done by oral and maxillofacial surgeons[1] which is not risk free because it involves trauma to soft and bony tissue, resulting in pain, which has a significant effect on the patient's quality of life.[2] This pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage.[3]

Literature[1, 4, 5] shows that the main factors of predisposition for pain exacerbation during post surgery days are age and gender, in addition to the surgical difficulty of the case. The older the patient, the higher the correlation regarding surgical duration, bone density, and risk of injury to local tissues.

Many studies[5-8] have been published about the management of post operative pain, but in this prospective study we will evaluate all the predicting variables that may influence the intensity of pain after surgical removal of the lower third molar in different post operative periods in order to localize the most significant risk variables that influence the severity of post operative pain.

MATRIAL AND METHODS

Data Sampling and Criteria

The present prospective cohort study investigated 159 consecutive cases of removal of impacted lower third molars in 107 outpatients with the mean age of (25.54 ± 3.75) years and range of

Email for correspondence:
Raedmaxfax@yahoo.com

(16-31) years. The study was performed by two members of the Dental Department of AlYarmouk University College between October 1, 2009 and December 31, 2010. The Ethics Committee of University had approved the study protocol. The inclusion criteria included healthy individuals with no systemic diseases; Patients were not given preoperative antimicrobial drugs or other medications that might influence healing, only one impacted tooth were extracted each visit and for all procedures and local anesthesia alone was used. The exclusion criteria included the lingual splits technique and female patients who were pregnant or lactating

Study Variables

The variables of the study were sets of variables suspected to be related to complications. These sets of predictor variables were divided into five groups as shown in (Table 1):

1. Patient variables included sex, age and the side (Right/Left). Age was classified into three groups(19-22), (23-26) and (27-31) years

2. Indication for extraction included pain, prophylactic, resorption of adjacent distal root of second molar, orthodontic purpose, associated pathological lesion and atypical facial pain.

3. Preoperative conditions variables included smoking, oral contraceptive and pericoronitis.

4. Radiographical variables in which the Pell and Gregory[10] and Winter[11] radio graphical classifications were used to document the position of the impacted man-dibular third molars. The numbers of roots were assessed then these classifications were used to predict the surgical difficulty and classified into: simple, moderate and difficult.

5. Operative-specific variables included type of flap (envelop or triangular), lingual flap retraction, bone removal, tooth sectioning, visibility of inferior alveolar nerve after extraction, intraoperative bleeding, the surgeon (both right-

handed operators) and the operation time, which was with the mean of 27.41±12.44 minutes and was range of 8-53 minutes and is classified into three groups (<21), (21-40) and (>40) minutes.

Surgical Technique

All surgical procedures were performed in the same clinic with similar equipment by one of two surgeons. Both surgeons had the same experience and work with the same principles; the surgical field and all the surgical material were sterile, the 5th year dental student were used as a surgical assistant in all the cases. One lower third molar extracted in each operation with the protocol that include local anesthesia, all teeth were removed from a buccal approach using either triangular or envelop flap. When it was necessary to raise a lingual flap, a Howarth periosteal elevator was used to protect the lingual periosteum and the lingual tissues .Bone removal was done with burs in the conventional manner and, if necessary, the tooth was divided with burs before elevation. The flaps were sutured with a 4-0 silk suture. Postoperative instructions and prescribed drugs are explained to the patient. For the first 5 postoperative days all patients have given antibiotics (amoxicillin 750 mg every 8 hours), drugs for patient with peptic ulcer (ranitidine 300 mg three times daily) and an anti-inflammatory drug (ibuprofen 600 mg every 8 hours for 4-5 days). And a mouth rinse (0.2% chlorhexidinedigluconate) was performed every 12 hours for 15 days.

Postoperative Assessment

Patients were told to contact the clinic for any postoperative problem or if certain symptoms occur, such as pain that could not be relieved by the prescribed analgesics or post-operative bleeding. All patients were reviewed 1st and 2nd days and 1st and 2nd week postoperatively. The suture material was removed after one week.

Pain Intensity Measurement

Following each surgery the level of postoperative pain on the 1st, 2nd days, 1st and 2nd week postoperatively was estimated subjectively by

asking the patient to rate the nociceptive experience on the visual analogue scale (VAS)

Pain was assessed using a six-point category rating scale on (VAS). Pain was recorded as "0-no pain", "1- Faint pain", "2- Weak pain", "3- Moderate pain", "4- Strong pain", "5- Intense pain". Before patients were discharged, the surgeon ensured they were thoroughly instructed on how to complete the pain self-assessment questionnaire. The patients were asked to answer the questionnaire on a daily basis for 14 days.

Statistical analysis

The data obtained were statistically analyzed by SPSS (SPSS for Windows, version 13, SPSS Inc., Chicago, IL, USA) using the chi-square test(X^2) and was used to investigate whether one or more of the given variables had a significant effect on postoperative pain according to each factor independently. The probability (P) was also calculated using the chi-square test (X^2). The level of significance was set at (P) less than. $P<0.01$ / $P<0.05$.

RESULTS

Post-Operative Pain Evaluations

Pain was reported to be most intense during in first post-operative day, and then there was a drop in mean pain intensity on each subsequent postsurgical extraction days until the end of the second post-operative week, when we found that there was a few patients who still complained from faint or weak pain (table2).

Risk Factors

There was no statistically significant difference between patient variables; the indication for removal variables and preoperative conditions on the postoperative pain intensity on the post-operative times were shown in (table3)

The result of this study revealed that the effect of the radiographical variables and operative-specific variables range from no statistically significant to a highly statistic significant effect on the intensity of

post operative pain either only on one post operative times or may be extended to all the post operative times as shown in (table3). The significant risk factors with high strengths of correlation to the intensity of post operative pain in all the post-operative times as shown in (table3) were:

1. Angulations: Destoangular

2. Difficulty index: Moderate difficulty and very difficult

3. Lingual flap retraction

4. Visibility of Inferior alveolar nerve

5. Operation Time: 21-40 and >40 minutes

DISCUSSION

The surgical removal of impacted mandibular third molars is one of the most commonly performed dentoalveolar procedures in oral and maxillofacial surgery in which the patients usually suffer from pain in the postoperative period which regarded as the most common finding that influence a patient's quality of life in the days after surgery[11-13]

Post-operative pain doesn't occur haphazardly but tend to occur due to potential risk factors. A detailed knowledge of these risk factors is important as it facilities planning of proper management.

In the current study the intensity of post-operative pain reached a maximum on the first post-operative day, and this is in agreement with finding of a recent multicenter trial.[14,15] The pain then started to reduce gradually, although some patients still had faint or weak pain after the second post-operative week.

The patient's age, gender, pericoronitis, contraceptives and indication for removal treatment were not significantly correlated to the postoperative pain intensity, which has equally been confirmed by two other studies.[16, 17]

Although smoking has been shown to have a deleterious effect on the oral cavity (18), the patient assessment for severity of pain revealed that

smoking is not a risk for the severity of postoperative pain, and this coincides with the observations published by other authors.[17,19]

The severity of pain had a highly significant correlation with the angulations' of impaction, especially distoangular impaction, which was significantly associated with a higher score of pain intensity (p = 0.000) when compared with the other types of impaction. This finding has been asserted in previously published articles.[20, 21]

The other important radiographical position factor in the predication of the intensity of post-operative pain was the preoperative index of difficulty for the extraction of lower wisdom teeth according to the Pell and Gregory classification,[22,23] intense and strong pain was highly associated with a difficult or moderate surgical extraction (p = 0.000), especially when the case included a deeply impacted molar that was associated with exposure of the inferior alveolar canal or the presence of intraoprative bleeding and insufficient space available in relation to the ramus. The result coincide with an observation made by Graziani et al, who believed that surgical complexity was often a valuable predictor of inflammation-related sequelae after dentoalveolar surgery.

According to Baqain et al study[21] the lingual flap retraction is regarded as a risk factor for post-operative pain. In our result we found that the lingual flap retraction was strongly associated with intense pain (p = 0.000), while the trapezoidal flap of buccal flap affects the intensity of pain only in the first operative days. This statement is confirmed in the Grossi etal study.[17]

A statistically significant difference for increase in the intensity of post-operative pain is recorded with the bone removal and tooth sectioning during lower third molar surgery, till the end of first than those whose surgical procedure did not include the both Hence, the greater the trauma, the more intensive the pain. These results have

statistically significant differences that go with other studies.[16,21]

The increase in the duration of surgical operation had a more profound influence in both the intensity of pain as well as in resolution outcomes. The intense pain was highly significant (p = 0.000) when the surgeon spent more time in performing the operation. This came in agreement with others.[20,24, 25] They gave an explanation that this is due to the fact that the longer the duration of tissue injury, the more the amount of mediators are released. Therefore; this could be a reflection of the severity of pain

The experience of the surgeon in risk factors for intensity of post-operative pain is a debatable issue in all articles.[20,25,26] In this article, we recorded that the experience of the surgeon did not have any statistically significant differences on the intensity of the post-operative pain, We can give an explanation about these result, may be both surgeons graduated from the same school and have the same principles in their work.

CONCLUSIONS

A steady increase in the intensity of pain was highly significant when correlated to the operative trauma of the contentious issue. This is observed with increased difficulty of surgical extraction and prolonged operation time. The surgeon's experience does not appear to have any significant effect on the intensity of post-operative times

Conflicts of interest

The author denies any conflicts of interest related to this study

REFRENCESS

1. Ustun Y, Erdogan O, Esen E,, Karsli Ebru Deniz, Comparison of the effects of 2 doses of methylprednisolone on pain, swelling, and trismus after third molar surgery .Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003;**96**:535-539

2. Khan A., Khitab U., Tariq Kh., Impacted Mandibular Third Molars: Pattern of Presentation and Postoperative Complication .Pakistan Oral & Dental Journal 2010; **30, 2**:307

3.   Al-Khateeb T., Alnahar A. Pain Experience After Simple Tooth Extraction J Oral Maxillofac Surg 2008;**66**:911-913

4.   Sato F., Ricardo L., sprino L., de Araújo D., Emanuel S., de Moraes M., Short-Term Outcome of Postoperative Patient Recovery Perception After Surgical Removal of Third Molars. J Oral Maxillofac Surg2009; **67**:1090-1091

5.   White RP, Shugars DA, Shafer DM, et al: Recovery after third molar surgery: Clinical and health-related quality of life outcomes.J Oral Maxillofac Surg 2003; **61**:544.

6.   Tiigimae-Saar J., Leibur E., Tamme T. The effect of prednisolone on reduction of complaints after impacted third molar removal .Stomatologija Baltic Dental and Maxillofacial Journal2010;**12;1**;17-22

7.   Buyukkurt MC, Gungormus M, Kaya O. The effect of a single dose prednisolone with and without diclophenac on pain trismus and swelling after removal of mandibular third molars. J Oral Maxillofac Surg 2006;**12**:1761-1765

8.   Khiavi R., ourallahverdi M., Pourallahverdi A., Khiavi S., Oskouei S. si ,Mokhtari H. Pain Control Following Impacted Third Molar Surgery with Bupivacaine Irrigation of Tooth Socket: A Prospective Study J Dent Res Dent Clin Dent Prospect 2010; **4**:105-109

9.   Pell GJ, Gregory GT. Impacted mandibular third molars: classification and modified technique for removal Dent Dig1933; **39**:330-8.10.

10.   Winter GB. Principles of exodontias as applied to the impacted mandibular third molar. St Louis (MO). American Medical Book. Co; 1926

11.   Chopra D, Rehan HS, Mehra P, et al: A randomized, doubleblind, placebo-controlled study comparing the efficacy and safety of paracetamol, serratiopeptidase, ibuprofen and betamethasone using the dental impaction pain model. Int J Oral Maxillofac Surg 2009;**38**:350

12.   Markovic´ AB, Todorovic´ L: Postoperative analgesia after lower third molar surgery: Contribution of the use of long-acting local anesthetics, low-power laser, and diclofenac. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2006;**102**:4

13.   Kirmeier R, Truschnegg A, Payer M, et al: Evaluation of a muscle relaxant on sequelae of third molar surgery: A pilot study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2007;**104**:8

14.   White RP, Shugars DA, Shafer DM, Laskin DM, Buckley MJ, Philips C: Recovery after third molar surgery: clinical and healthrelated quality of life outcomes. J Oral Maxillofac Surg 2003, **61**:535-544.

15.   Babatunde O. B., Jelili A. A., Wasiu L. A., Akinola L. L., Godwin T. A.and Mobolanle O. O. Effects of co-administered dexamethasone and diclofenacpotassium on pain, swelling and trismus following third molarsurgery Head & Face Medicine 2005, **1**:11

16.   Panduric D. G., Brozovic J., Mato S., Katanec D., Bego K., Kobler P.Assessing Health-Related Quality of Life Outcomes after the Surgical Removal of a Mandibular Third Molar Coll. Antropol2009. 33; **2**:323

17.   Grossi GB, Maiorana C, Garramone RA, Borgonovo A, Creminelli L, Santoro F: Assessing postoperative discomfort after third molar surgery: A prospective study. J Oral Maxillofac Surg 2007; **65**:901,

18.   Campbell HS, Sletten M, Petty T. Patient perceptions of tobacco cessation services in dental offices. JADA 1999; **130**:219-26.

19.   López-Carriches C, Gómez-Font R, Martínez-González JM, Donado-Rodrí-guez M. Influence of smoking upon the postoperative course of lower third molar surgery. Med Oral Patol Oral Cir Bucal 2006; **11**:E58

20.   Bello S. A., Adeyemo W., Bamgbose B., Obi E., Adeyinka A. A Effect of age, impaction types and operative time on inflammatory tissue reactions following lower third molar surgery Head & Face Medicine 2011, **7**:8;3

21.   Baqain Z. H., Abu Karaky A., Sawair F., Khaisat A., Rajab L.., Frequency Estimates and Risk Factors for Postoperative Morbidity After Third RemovalMolar Removal: A Prospective Cohort Study J Oral MaxillofacSurg 2008; **66**:2276-2283.

22.   Garcia AG, Sampedro FG, Rey JG, Vila PG, Martin MS. Pell-Gregory classification is unreliable as a predictor of difficulty in extracting impacted lower third molars. Br J Oral Maxillofac Surg 2000: **38**: 585-587.

23.   Yuasa H, Kawai T, Sugiua M. Classification of surgical difficulty in extracting impacted third molars. *Br J Oral Maxillofac Surg* 2002; **40**:26–31.

24.   Graziani F., D'Aiuto F., Arduino P. G., Tonelli M., Gabriele M.: Perioperative dexamethasone reduces post-surgical sequelae of wisdom tooth removal. A split mouth randomized double-masked clinical trial. Int. J. Oral Maxillofac. Surg. 2006; **35**: 245-5.

25.   Lago-Méndez L, Diniz-Freitas M, Senra-Rivera C, et al: Relationshipsbetween surgical difficulty and postoperative pain in lower third molar extractions. J Oral Maxillofac Surg 2007 **65**:979

26.   Jerjes W, El-Maaytah M, Swinson B, Banu B, Upile T: Experience versus complication rate in third molar surgery. Head and Face Medicine2006, **2**:14

Table 1: Study variables

Variable	Total number (Percentage)		Variable	Total number (Percentage)	
Patient variables					
Gender	Male	73(68.2)	Teeth in male	103 (64.8)	
	Female	34(31.8)	Teeth in Female	56 (35.2)	
Age	19-22 years	46(28.9)	23-26 years	76(47.8	
	27-31 years	37(23.3)	Age Range	(16-31)	
			Age Mean	(24.54±3.26)	
Location	Teeth in Right	84 (52.8)	Teeth in Left	75 (47.2)	
Indication for removal variables			**Preoperative conditions variables**		
Pain		53 (33.3)	Smoking habit	Yes	91(57.2)
Prophylactic		44 (27.7)		No	68 (42.8)
Resorption of adjacent distal root of 2nd molar		22 (13.8)	Contraceptives	Yes	13(8.2)
				No	146(91.8)
Orthodontic purpose		17 (10.7)	Pericoronitis	Yes	38(23.9)
Associated pathological lesion		14 (8.8)		No	121 (76.1)
Atypical facial pain		9 (5.7)			
Radiographical variables					
Angulations	Mesioangular	71 (44.7)	Vertical	29 (18.2)	
	Horizontal	36 (22.6)	Destoangular	23 (14.5)	
Width	I	57 (35.8)	II	74 (46.5)	
	III	28 (17.6)			
Depth	A	57 (35.8)	B	83 (52.2)	
	C	19 (11.9)			
Number of roots	Multiple	87(54.7)	Single	57 (35.8)	
	Uncompleted	15 (9.4)			
Difficulties	Difficult	24 (15.1)	Moderate	98 (61.6)	
	Simple	37(23.3)			
Operative-specific variables					
Flap type	Triangular	138 (86.8)	Lingual flap retraction	Yes	21 (13.2)
	Envelop	21 (13.2)		No	138 (86.8)
Bone removal	With	124 (78)	Tooth Sectioning	With	117 (73.6)
	Without	35 (22)		Without	42 (26.4)
I.A.N. visibility	Yes	14 (8.8)	Intra-operative bleeding	Yes	7 (4.4)
	No	145 (91.2)		No	152(95.6)
Operation time	<21 (minutes)	41 (25.8)	Range	(8-53minutes)	
	21-40 (minutes)	87(54.7)	Mean	(27.41±12.44)\	
	>40 (minutes)	31 (19.5)			
Surgeons	Surgeon 1	84 (52.8)	Surgeon 2	75 (47.2)	

Abbreviations: IAN, inferior alveolar nerve.

Table 2: Postoperative pain intensity as assessed by VAS, in different post-operative times

Studied Variable	Category	1st Day		2nd Day		1st Week		2nd Week	
		Frq.	%	Frq.	%	Frq.	%	Frq.	%
Pain Category	No Pain	0	0	13	8.2	138	86.8	150	94.3
	Faint	0	0	0	0	0	0	7	4.4
	Weak	72	45.3	87	54.7	21	13.2	2	1.3
	Moderate	55	34.6	34	21.4	0	0	0	0
	Strong	9	5.7	18	11.3	0	0	0	0
	Intense	23	14.5	7	4.4	0	0	0	0
	Total	159	100	159	100	159	100	159	100

Abbreviations: P.O., postoperative; Frq., Frequency;%., percentage; VAS: visual analogue scale

Table 3: The relation between most statistics significant variables with the postoperative pain in different post-operative times

Variable	1st P.O. Day		2nd P.O. Day		1stP.O.Week		2ndP.O.Week	
	Chi Square Value	Sig.	Chi Square Value	Sig.	Chi Square Value	Sig.	Chi Square Value	Sig.
Angulations	50.074	0.000**	41.069	0.000**	13.029	0.005**	13.239	0.039*
Width	103.747	0.000**	99.275	0.000**	34.387	0.000**	5.689	0.224
Depth	66.550	0.000**	63.855	0.000**	20.761	0.000**	4.983	0.289
Difficulty	184.123	0.000**	138.713	0.000**	40.055	0.000**	13.676	0.008**
Flap Type	13.358	0.004**	8.540	0.074	1.506	0.220	3.429	0.180
Lingual Flap Retraction	15.823	0.001**	19.921	0.001**	0.720	0.396	8.190	0.017*
Bone Removal	16.277	0.001**	15.840	0.003**	4.194	0.041*	2.926	0.232
Tooth Sectioning	13.571	0.004**	11.231	0.024*	3.552	0.059	3.150	0.207
Visibility of Inferior alveolar nerve	64.229	0.000**	58.859	0.000**	6.784	0.009**	8.038	0.018*
Intraoperative Bleeding	30.198	0.000**	26.650	0.000**	1.508	0.219	0.439	0.803
Operation Time	102.098	0.000**	103.723	0.000**	26.620	0.000**	13.577	0.009**

Abbreviations: P.O., postoperative; Sig., Significant;
*: Significant at (p-value < 0.05),
**: Significant at (p-value< 0.01)