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Original Research Article

Impact of Age, Procedural Duration and Impaction Type on Pain and Trismus After Surgery of Mandibular Wisdom Tooth

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Abstract

This study assessed the impact of patient's age, duration of surgical procedure and type of impaction on pain and trismus after surgery of impacted mandibular wisdom tooth.

Successive patients with impacted mandibular wisdom tooth were recruited. Winter's classification was used to classify impacted teeth. Surgical removal of impacted teeth was done using local anesthesia. The effect of age, duration of surgical operation and pattern of impaction on post-operative pain and trismus was studied after 3 and 7 days. Visual analogue score (VAS) was used to assess pain, trismus was measured as the inter-incisal distance using manual caliper and duration of surgical procedure was defined as the period between incision and finishing of suturing.

Seventy nine patients with age ranged 15 to 41 years were recruited. The highest percentage were male gender (57%). The highest pain VAS score was recorded in the age group (30-41) after 3 days and the lowest mouth opening was seen in the same population after 3 and 7 days. The mean of operation time was 38.5 and its effect after < 20 minutes recorded the least pain score and trismus after 3 and 7 days. Highest pain score and more trismus were related to horizontal impaction on day 3 (p=0.04, p=0.000); whereas lowest pain value and better mouth opening were related to vertical impaction.

Postoperative pain and trismus increased with advancing age, operation time and horizontally impacted tooth and trismus did not resolve within short time and may last for more than 10 days..

Key Words: wisdom tooth, oral surgery, post-operative pain, trismus.

الخلاصة

تم اختبار تاثير العمر وفترة العملية الجراحية ونوع السن المطمور على الالم وضيق فتحة الفم بعد عملية رفع سن العقل من الفك الاسفل جراحيا. مرضى يعانون من اسنان العقل المطمورة في الفك الاسفل استخدموا في هذه الدراسة. كل اسنان العقل المطمورة في الفك الاسفل قد تم تصنيفها حسب تصنيف winter's. وان عملية رفع سن العقل من الفك الاسفل جراحيا قد تم اجراؤها من قبل جراح واحد تحت التخدير الموضعي. ان تاثير العمر وفترة العملية الجراحية ونوع السن المطمور على الالم وضيق فتحة الفم قد تم دراسته بعد ٣ و٧ ايام من العملية. تم تسجيل شدة الالم حسب قياس VAS وفتحة الفم قيست حسب المسافة بين القواطع الامامية للفكين ومدة العملية الجراحية قد تم تعريفه على اساس الوقت المستغرق من قطع النسيج الفمي المحيط بعظم الفك المغطي لسن العقل وحتى اكتمال عملية خياطة الجرح.

كان عدد المرضى ٧٩ مريضا باعمار تتراوح بين ١٥ و ٤٠ سنة. نسبة المرضى من الذكور هي الاكثر ٥٧% في هذه الدراسة. اعلى قياس للالم سجل لفئة عمر (٣٠– ٤١) بعد ٣ ايام واكثر تحدد لفتحة الفم سجلت لنفس الفئة بعد ٣ و ٧ ايام. متوسط مدة العملية كان ٣٨،٥ وتاثيره بعد اقل من ٢٠ دقيقة كان الاقل بعد ٣ و٧ ايام. سن العقل المطمور افقيا كان قد اعطى اعلى نسبة من درجات الالم واقل فتحة فم بعد العملية في اليوم الثالث (p=0.04, p=0.000). بينما سن العقل المطمور عموديا كان قد اعطى اقل درجات الالم وافضل فتحة فم بعد العملية.

ان الالم وتحدد فتحة الفم بعد العملية الجراحية تزداد نسبيا مع عمر المريض ومدة العملية الجراحية والسن المطمور افقيا وان تحدد فتحة الفم لم يختف بفترة قصيرة وقد يستمر لأكثر من عشرة ايام.

الكلمات المفتاحية: سن العقل ، جراحة الفم، الام بعد العملية، تضيق فتحة الفم.

Introduction

Pain, swelling and limited mouth opening (trismus) are definitive events after surgical extraction of mandibular wisdom tooth [1]. Many factors, however, affecting the initiation and progression of these events postoperatively. These factors could be correlated with patient, tooth and surgical operation [2]. Patient's factors involve age, gender, size, race, cigarette smoking, contraceptive pills [3]. Tooth associated factors comprise pattern of impaction, presence of infection, proximity to inferior alveolar canal, density of neighboring bone and related pathological condition such as benign or malignant lesion [4]. Duration of surgical operation, shape of incision, suturing technique and surgeon skills are procedural related factors [5].

The impact of age on morbidity following wisdom tooth surgery was studied and found that patients beyond 30's developed more complications after surgical removal of lower wisdom tooth [6]. The mandibular wisdom tooth in youth patients incased in less harder bone than that of patients with advanced age, as bone is more compact , demanding longer duration to remove bone around the tooth, hence pain, trismus and swelling increase postoperatively [7,8].

The time of surgical procedure is another aspect which may induce the evolution of postsurgical complications following removal of lower wisdom tooth. The time of surgical procedure was described in different studies. It has been known as the time interval between osteotomy to finishing of surgical procedure [9]. Other study stated that it represents the period from soft tissue cutting to finishing of suturing [10].

The pattern of impacted lower wisdom tooth was classified by various techniques. The Winter's and Pell and Gregory techniques are commonly utilized for this purpose [11,12]. Pattern of impacted wisdom tooth was divided into vertical, mesioangular, horizontal and distoangular. The effect of these impaction pattern on postoperative pain and trismus have been studied widely. Research has indicated that the deeper the impacted lower third molar the more intense pain and trismus post-surgically [13]. Other study reported that increasing patient's age and angle of impacted lower last molar with adjacent tooth raise the incidence of postsurgical morbidity greatly [14].

The effect of age , duration of surgical procedure and pattern of impaction were the subject of research in many literature on postsurgical pain and trismus. Though, there is still no objective assessment and definitive answer about the relationship between these factors and increasing pain and trismus following mandibular wisdom tooth surgery. It is worth mentioning that many oral surgeons stated that pain and trismus should not be reduced by medications, as they are prophylactic events and can disappear within 3-5 days.

The objective of this study was to assess the impact of age, duration of surgical procedure and type of impaction on postsurgical pain and trismus following lower third molar surgery.

Materials and Methods:

Successive patients underwent surgical removal of impacted lower wisdom tooth in the department of oral surgery, college of dentistry, Babylon university from September 2013 to December 2014 were studied.

The impacted teeth were removed surgically using local anesthesia for all patients by single surgeon. In case of bilateral impaction, the second procedure was done after 3 weeks of previous one to permit for optimal healing. An envelope or two-sided flap was used to obtain adequate access and bone was removed using surgical bur with proper cooling system. After bone removal,

impacted tooth was removed and socket was irrigated with normal saline. Tooth separation was conducted according to the case. Standard post-operative instructions and a prescription of bactericidal drug and pain killer were given to patients before discharging home.

Duration of surgical procedure was defined as the time interval between soft tissue cutting to finishing of suturing. Post-operative pain and trismus were assessed after three and seven days of surgical operation. The patients reviewed on day 3 because most studies indicated that the intensity of pain and trismus reached highest level at this day; and on day 7 when the surgical suture should be removed.

Pain perception was assessed using visual analogue scale (VAS) (0/ no pain- 5/ very severe pain). The patient rated his/her own pain feature according to that scale. The manual caliper was used to measure the maximum inter-incisal distance (MID). The distance between the edge of the upper and lower central incisors was measured as the MID. The maximum mouth opening was determined before surgery and on day 3 and 7 post-surgically. The impact of patient's age, duration of surgical procedure and pattern of impaction was analyzed using one way analysis of variance (ANOVA). P value ≤ 0.05 is considered significant statistically.

Results

The total number of patients seen in this study were seventy nine. Male represented (57%) and female were 34 (43%). The age range of the studied patients was 15 to 41 years and their mean age was 24.77±6.13years. The age group (21-30) have the highest percentage of impacted teeth (78.5%); whereas the age group (31-40) have the lowest percentage (15.2%).

In the 79 patients, hundred impacted lower third molars were diagnosed. Bilateral impaction representing (21%) of all impacted teeth. The highest impaction pattern was vertical impaction (45%), followed by mesioangular impaction (38%); the least impaction type was horizontal impaction which representing (17%). No cases of distoangular impaction were seen.

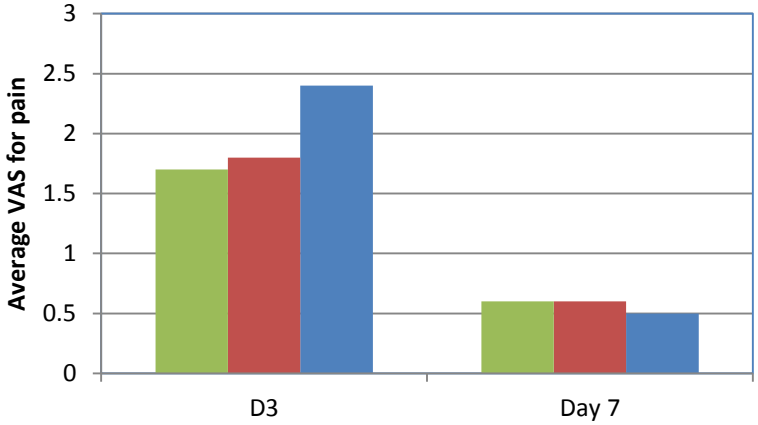

Figure 1: Impact of age on postsurgical pain: ▉(11-20),▉ (21-30), ▉ (31-40). On day 3 and 7 p value=0.02 and 0.8 respectively.

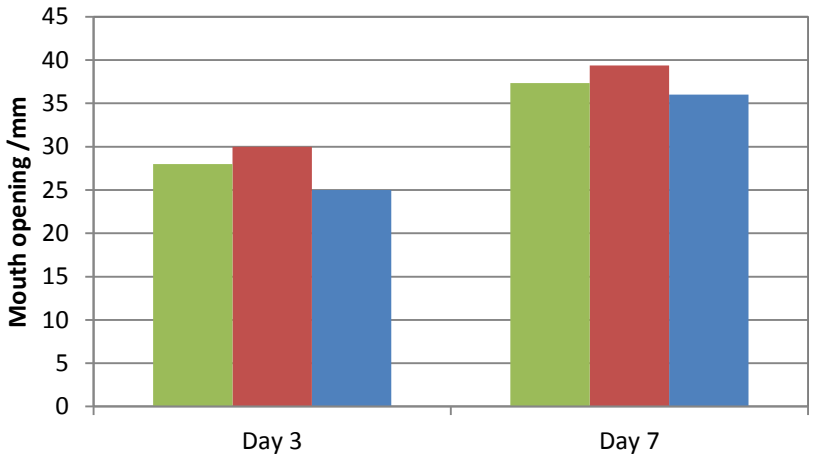

Figure 2: Impact of age on postsurgical trismus: ▉ (11-20),▉ (21-30), ▉ (31-40). On day 3 and 7 p value= 0.000 and 0.004 respectively.

The impact of age on pain and trismus is illustrated in Figure 1 and 2. The advanced age group (31-40) years recorded the highest pain values on the third day following operation in comparison with younger age group (p=0.02). The lowest pain score were observed in the advanced ag group on the seventh day after surgery; however, the difference in the pain values among age groups were statistically negligible (p=0.8). The advanced age group showed the least mouth opening on the third and seventh day after surgery (p=0.000, 0.004 respectively); while the younger age group (21-30) represented the best mouth opening.

The time of surgical operation ranged between 18-60 minutes and the mean was 38.5 ±12.24 minutes. The impact of surgical duration on pain and trismus after surgery is shown in table 1 and 2. A significant increase in pain and trismus were detected with raising procedural time on day 3 (p=0.000, p=0.006 respectively). The least pain values and trismus were listed on day 7 in comparison to that on day 3. It is worth mentioning that the best mouth opening were seen on day 7; though, the difference between MID pre and post-surgery was statistically significant (p= 0.001).

Table 1 : Impact of operation time on pain on day 3 and 7

Time	No.	D3		D7	
		MEAN	SD	MEAN	SD
<20	12	1.60	0.17	0.17	0.4
20-45	25	2.04	0.61	0.28	0.9
45-60	63	2.50	0.82	0.76	0.9
P value		0.000		0.017	

Table 2: Impact of operation time on trismus on day 3 and 7

Time	No.	D3		D7	
		MEAN	SD	MEAN	SD
<20	12	26.16	2.08	43.5	3.8
20-45	25	24.3	1.54	36.4	2.7
45-60	63	24.13	2.11	35.6	3.1
P value		0.006		0.000	

The impact of impaction pattern on pain and trismus is illustrated in tables 3 and 4. After removal of horizontal impaction the highest pain scores were recorded on day 3; while the least values were reported after surgery of vertical impaction. A significant difference (p=0.04) of pain scores on day 3 were seen after surgery of different impaction types. The pain values after 7 days of surgery were less than that on day 3 of different impaction types with significant statistical difference (p=0.003). After surgical removal of horizontal impaction, the more restricted mouth opening was detected on third and seventh day of surgery; while the largest mouth opening was observed after extraction of vertical impaction (p=0.000, p=0.000 respectively).

Table 3: Impact of types of impaction on pain on day 3 and 7

Type	No.	D3		D7	
		MEAN	SD	MEAN	SD
vertical	45	1.56	0.54	0.18	0.38
mesioangular	38	1.60	0.76	0.28	0.51
Horizontal	17	2.07	0.82	0.71	0.72
P value		0.045		0.003	

Table 4: Impact of impaction types on trismus on day 3 and 7

Type	No.	D3		D7	
		MEAN	SD	MEAN	SD
vertical	45	26.4	2.91	40.3	2.15
Mesioangular	38	24.47	2.47	36.8	3.12
Horizontal	17	23.14	1.65	34.5	1.91
P value		0.000		0.000	

Discussion

Inflammatory response like pain, swelling and trismus are the most common causes of patient distress following surgical removal of mandibular wisdom tooth [12]. Postoperative pain was assessed as it is the early sign of tissue injury after surgical maneuver and regarded as an indicator to measure the action of pain-killer drugs. The inability to open the mouth (trismus) was determined by measuring the space between the incisal edge of upper and lower central incisors when the patient open mouth widely. Swelling was excluded in this study as it is more complicated and difficult to measure by specific method.

Visual analog scale (VAS) was employed to measure pain in the present study. Pain is individual perception that can be investigated by VAS properly [15,16]. The classic VAS technique is dependable and responsive; therefore it was followed for measuring pain following surgical removal of mandibular wisdom tooth.

The advanced age group (31-40) showed the highest pain values and more restricted mouth opening on third day after surgery in comparison to other groups. These results are in agreement with other research [10,14] who found that more pain and trismus were observed in older age group on third day following surgery. This may be attributed to the fact that impacted wisdom tooth incased in a heavily condensed bone in advanced age patients and this requiring extensive manipulation and longer duration for osteotomy [1,17]. The effect of age on pain was less on day 7 compared to that on day 3 and the difference was statistically insignificant. Conversely, trismus was affected by age after 7 days

of surgery and the difference was statistically significant among different age groups. The least mouth opening observed in advanced age group on day 7 could be associated with the low healing rate compared to that of young patients as the recovery of the injured tissue is more faster.

In the present study the mean time of surgical procedure is higher (38.5) than that found by [12,18.19] where the operation time was 22.63, 21.9 and 25.0, respectively. This disagreement between the results of this study and others could be ascribed to the explanation of procedural time, feasibility of surgical equipment, patient assistance during surgical procedure.

The present study revealed that pain and inability to open the mouth increased significantly with maneuver time. The period of surgical procedure in the hand of operator is a mirror of difficulties and hence duration associated with operation [20]. It is claimed that the intensity of pain and trismus is proportional with the amount of released inflammatory mediators which increased with increasing time of tissue injury [19]. However, Benediktsdóttir and his-coworkers suggested that there is no relationship between complications after surgery and the period of surgical maneuver.

Higher pain values were reported on the third day following surgery of various operation time compared to that on day 7. This might be due to the fact that the severity of pain approximated the highest level in the early 2-3 days after surgery as a result of tissue injury and release of biochemical mediators. The trend of trismus is similar to that of pain, as it was less distinct on day 7 in comparison to that on day 3; this is because trismus is incompletely associated with pain. Research reported that trismus is obvious in the early 72 hours after surgery, then after 7 days a gradual amelioration and complete recovery occurred [21]. The variation in the MID measurement before and after 7 days of surgery because the injured tissue might be still in the process of recovery and patients hesitation to ovoid pain perception. The persistence of trismus for 10 days was mentioned by other report [22] after surgical extraction of mandibular wisdom tooth.

Highest pain values and least mouth opening were recorded on day 3 and 7 after removal of horizontal impaction in comparison to that of vertical and mesioangular impaction. This is because horizontal impaction is difficult to remove surgically as it needs more soft tissue reflection, more bone removal, tooth separation and longer surgical procedure [17]. This result is in agreement with study of Siedu et al who found that the highest pain values and trismus were correlated with horizontal and distoangular impaction. The point of elevator application and the motion required for tooth extraction is determined by the pattern of impaction [9]. Further, the morbidity after surgical operation of impacted mandibular wisdom tooth increases with increasing angle of the impacted tooth with adjacent teeth [14]. Hence, the removal of vertical impaction represented less pain values and trismus after day 3 of surgery. The less pain scores and trismus after surgery of different impaction types on day 7 is ascribed to the recovery of traumatized tissue after surgery.

Swelling was excluded as a postoperative complication in this study. However, it seemed that the amount of swelling increased concomitantly with duration of surgical procedure and pattern of impaction in a manner similar to that of pain and trismus; as all these complications are considered as inflammatory response of the injured tissues [23].

Conclusion

Pain and trismus following lower wisdom tooth surgery increased with advancing age, duration of surgical procedure and horizontally impacted teeth. Trismus did not resolve within short time and may last

for more than ten days. However, the effect of other factors such as correlation between radiographical and clinical appearance of impacted mandibular wisdom tooth, type of incision and technique of suturing on pain and trismus after surgery should be investigated.

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