

Disimpaction of Mandibular third molar: The impact of age and gender on postoperative pain and swelling using partial and complete wound closure techniques

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ABSTRACT

Objective: The surgical removal of impacted mandibular third molar is a common procedure in oral surgery clinic, and is usually associated with post-operative morbidities that affects patients' quality of life. The study was to evaluate the impact of age and gender in the postoperative pain and swelling following surgical removal of mandibular third molar.

Methods: A total of 120 subjects of ages between 18 to 45 years who met the inclusion criteria and consented, were recruited into the study. They were allocated into two groups. Group 1 had complete wound closure while group 2 had partial closure. The research subjects were evaluated for the degree of pain and swelling at 24 hours, 3rd and 5th days postoperatively using verbal rating scale (VRS) for pain and visual analogue scale (VAS) for swelling. The chi (x²) test was used to determine associations between categorical variables and a p-value of 0.05 or less was considered significant.

Results: There were 62 (51.7%) males and 58 (48.3%) females, the mean age of the participants was 31.7 ± 5.7. Most patients fell within the 26 to 35-year-old age groups. Pain and swelling were maximal between the first 24 to 48 hours postoperative and this gradually reduced over time. The intensity of these parameters was higher in males than the females in both groups.

Conclusion: The wound closure technique elicits some differences in the severity of postoperative pain and swelling experienced by patients following mandibular third molar disimpaction. The intensity was observed to be more severe and higher as the age increases, and in males than the females irrespective of the wound closure techniques used.

Keywords: Third molar, disimpaction, age, gender

INTRODUCTION

Surgical extraction of mandibular third molar is one of the most frequently performed procedures in oral surgery clinic ((Saheeb & Obuekwe, 2001; Marciani, 2012). This is as a result of their high rate of impaction and association with symptoms and disorders such as

pericoronitis, caries, neurogenic pain, cysts and odontogenic tumors.

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Other reasons for their extraction can be classified as prophylactic or preventive, restorative, orthodontic and prosthodontic considerations (Saheeb & Obuekwe, 2001; Peterson, 2004; Marciani, 2012) The mandibular third molar is the last tooth to erupt in an adult human dentition. It erupts between the ages of 17 and 25 years (Major et al., 2003). The eruption dates may, however, vary with race (Peterson, 1998). The mandibular third molar may erupt as early as 14 years in Nigerians, but up to 26 years in Europeans (Peterson, 1998; Kruger et al., 2001; Major et al., 2003) Several studies also suggest that the average age for the eruption of mandibular third molar in males is approximately 3-6 months ahead of females (Kruger et al., 2001; Major et al., 2003; Khan et al., 2006)

During mandibular third molar development and eruption, it usually undergoes continuous positional and anatomical changes which in some cases may result in partial or complete submersion or impaction of teeth (Peterson, 1998; Kruger et al., 2001; Major et al., 2003; Khan et al., 2006). Apart from impaction, its development could as well alter the arrangement of other teeth in the mouth (Kruger et al., 2001). The process of mandibular third molar development is thought to be influenced by local and systemic factors, race, nature of diet, the intensity of the use of the masticatory apparatus and possibly genetic background (Kruger et al., 2001" (Khan et al., 2006: Richardson, 1975; Raghoebar et al., 1991).

Review of literature shows that there is considerable variation in prevalence of impacted tooth. The prevalence of third molar impaction ranges from 16.7% to 68.6% (Richardson, 1975; Raghoebar et al., 1991). Though previous studies have reported no gender predilection, recent findings revealed that there is a higher frequency of mandibular third molar impaction in females when compared to males (Richardson, 1975; Raghoebar et al., 1991; Proffit, 1978; Grover & Lorton, 1985; Odusanya & Abayomi, 1991; Adeyemo et al., 2006).

The incidence of impacted teeth is on the increase worldwide, with up to 73% of young adults in Europe (Grover & Lorton, 1985). New data suggest that 72% of the world population has at least one impacted tooth (usually lower third molar) (Grover & Lorton, 1985). In recent times, there has been an increase in cases of tooth impaction reported in hospitals from different ethnic groups which studies have attributed to people moving away from coarse and fibrous diet to a more refined and soft diet (Raghoebar et al., 1991; Proffit, 1978; Grover & Lorton, 1985; Odusanya & Abayomi, 1991; Adeyemo et al., 2006).

A few decades earlier, Latin American Indians was described as people with no impacted teeth, which corroborates some authors' findings that race and gender have an influence on occurrence of tooth impaction (Adeyemo et al., 2006; Thesleff &

Vahtokari, 1995). An impacted mandibular third molar is a potential source of problems to any individual, although not all impacted mandibular third molars usually present with symptoms which usually comprise pain, swelling and pericoronitis) (Adeyemo, 2006). Patients between 20 and 45 years of age are the most frequently affected with symptomatic conditions (Adeyemo, 2006; Adeyemo, 2011). As age increases the phenomenon of symptoms associated with impaction is reduced, and after the age of 50, it is in a range between 6 and 14% (Grover & Lorton, 1985; Olasoji 2002: Bishara & Andreasen, 1983)

Clinically and radiologically, there are two types of impactions namely complete and partial impactions. Complete impaction refers to a clinical state where the tooth is completely covered by bone and mucosa and is prevented from erupting into a normal functional position; whereas, partial impaction means that the tooth is partially visible or in communication with the oral cavity and has failed to erupt fully into a normal anatomical position (Grover & Lorton, 1985). Not all cases of impacted mandibular third molars present with symptoms as stated earlier, but a considerable number usually present at the dental clinic and may require surgical extraction (Brown et al 1982; Gintaras & Povilas, 2013).

This surgical intervention involves surgical injury to adjacent soft and bony tissues with resultant postoperative complications; such as pain, swelling and limitation of mouth opening (Fisher et al., 1998; Julia et al., 1994; Carvalho & Vascelost, 2011; Garcia et al., 2000; Osunde et al., 2011). Studies have shown that the degree of the postoperative pain varies and it can significantly influence patient's quality of life (QoL), mainly during the first three postoperative days (Anighoro et al., 2003). This immediate postoperative pain and swelling is as a result of inflammatory response secondary to trauma (Peterson et al., 1998). The intensity of this trauma-induced inflammatory response has been attributed to various factors: Gender, age, degree of impaction, soft tissues handling, wound closure technique among others (Capuzzi et al., 1994; McGrath et al., 2003; Anighoro et al., 2003;).

Literature review on the morbidity following surgical removal of mandibular third molar indicates that factors that increase the risk of operative difficulty of the impacted tooth significantly will also increase postoperative inflammatory pain and swelling. It means an older male patient with a horizontally impacted tooth may have increased duration of surgery and a more severe postoperative pain and swelling than a female of the same age and type of impaction (Saheeb & Obuekwe, 2001; Peterson, 2004; Adeyemo et al., 2011; Fisher et al., 1998; Adeyemo et al 2006; Kareem 2008; Pippi R, Perfetti, 2002; Pederson, 1985;

Chiapasco et al., 1993; Susarla & Dodson, 2004; Yuasa & Suguira, 2004;

In a standard setting, the commonest method for the removal of mandibular third molars consist of flap development (buccal extension flap, envelope flap or triangular flap), bone removal, luxation and tooth removal. Once an appropriate flap is reflected, the next logical progression is the removal of bone around the tooth, which is carried out by use of a slow, straight hand piece and round bur, under copious irrigation with normal saline. or Guttering Technique (Saheeb & Obuekwe, 2001; Peterson, 2004; Peterson et al., 1998). Depending on the level of the third molar impaction, bone is removed from the occlusal, buccal and distal positions as required. In some cases of distoangular impactions, bone may need to be removed from the mesial aspect.

The study aimed to evaluate the impact of age and gender in postoperative pain and swelling following surgical removal of mandibular third molar.

MATERIALS AND METHODS

This study was a randomized, double- blinded, center based prospective analysis of the impact of age and gender of patients on postoperative pain and swelling following mandibular third molar disimpaction. It was conducted amongst consenting patients between the ages of 18 and 45 years. The surgical extraction was carried out in Oral surgery and retainership clinics of Aminu Kano Teaching Hospital (AKTH), Kano. AKTH serves as a major referral center for dental patients in the Northwest geopolitical zone of Nigeria and other states like, Bauchi and Yobe. Patients with bleeding disorders, infective facial swellings, breastfeeding mothers and other systemic illness (e.g., uncontrolled hypertension, uncontrolled diabetes mellitus) were also excluded from the study. Other patients excluded also were patients who are receiving treatment for psychiatric illness or suffering from any form of mental retardation, patients on Chronic drug treatment with analgesic, anti-inflammatory treatment (both steroidal (SAIDS) and non- steroidal anti-inflammatory drugs (NSAIDS). Ethical approval was obtained from the Aminu Kano Teaching Hospital Ethical Review Committee. The surgical removal was carried out in the Oral Surgery Clinic of Aminu Kano Teaching Hospital (AKTH), Kano. Patients whose impactions have been confirmed and met the inclusion criteria were randomly allocated by balloting into two groups: group I (complete closure) and group II (partial closure). In Group I (partial wound closure) the flap was repositioned and sutured with one or two stitches (silk, 3-0) with the soft and hard tissues still maintaining their anatomical configuration. In group 1 (complete wound closure) the socket was completely closed by rotating the mesial mucoperiosteal flap and sutured over the socket to the mucoperiosteum on the lingual side to

cover the extraction socket. The mean duration of surgery, from incision to completion of the suture was recorded in minutes. All study participants received postoperative instructions and were placed on medications (amoxicillin, 500mg 8 hourly for 5 days, metronidazole 400mg 8 hourly for 5 days and diclofenac sodium 50mg 12 hourly for 3 days) to prevent possible wound infections and control pain. A total of 120 patients participated in this study. Data collection was obtained with the aid of a questionnaire (Appendix). Patients were evaluated for the degree of pain and swelling at 24 hours, 3rd and 5th days postoperatively using verbal rating scale (VRS) for pain and visual analogue scale (VAS) for swelling. Information collected included subject's demographics, pattern of impaction, reasons for surgical extraction and post-operative measurement for pain and swelling. The recording was done by the primary investigator with the help of a trained assistant.

RESULTS

A total of 120 subjects of ages between 18 to 45 years who met the inclusion criteria and consented, were recruited into the study. Mean age of the participants was 31.7 ± 5.7 years. Most patients fell within the 26 to 35-year-old age groups. The overall gender distribution was almost the same; there were 51.7% (n=62) males and 48.3% (n=58) females. The subjects were made up of Students 38.3% (n=46) and Civil servants 33.4% (n=40). Hausa and Fulani have almost equal number represented in the study with 51(42.5%) and 48(40.0%) respectively. (Table 1). Mesioangular impaction was the most common type in this study 70.0% (n=84) followed by Distoangular 12.6% (n=15). There was no equitable distribution of the participants in terms of reasons for third molar removal. Pericoronitis cases were 55.8% (n=68) and caries 36.7% (n=44) (Table 2).

The operation time was found to be 3.6 minutes longer in the complete wound closure technique. The postoperative pain at day 1 was 2.95 ± 0.22 and 2.88 ± 0.32 in the complete closure group and partial closure group respectively ($P=0.048$), while the postoperative swelling was found to be 4.87 ± 0.34 in the complete closure group and 4.83 ± 0.38 in the partial closure group (Table 3). At day 3, the mean pain score was found to be 1.20 ± 0.063 in the complete closure group and 1.18 ± 0.65 in group 2, while the swelling score was found to be 2.47 ± 0.62 in group 1 and 1.90 ± 0.66 in the partial closure group. The difference between the groups was found to be statistically significant for swelling ($p=0.001$) but not for pain ($p=0.864$). At day 5, the mean pain score was found to be 0.38 ± 0.49 in the complete closure group and 0.65 ± 0.76 in group 2, while the swelling was also found to be 0.75 ± 0.47 in the complete closure group and 0.18 ± 0.39 in the partial closure group. The difference between the groups was

found to be statistically significant for swelling ($p=0.001$) but not for pain ($p =0.564$) (Table 3). The result of age and gender with respect to postoperative pain and swelling for both groups, revealed a significant

correlation between these parameters. They were slightly higher as the age increases and in males. (Table 4 to 7)

Table 1: Sociodemographic characteristic of patients.

Characteristics	Complete closure n (%)	Partial closure n (%)
Age (years)		
18-25	8(13.30)	9(15.0)
26-35	36(60.0)	36(60.0)
36 and above	16(26.70)	15(25.0)
Gender		
Male	33(55.0)	29(48.0)
Female	27(45.0)	31(52.0)
Occupation		
Civil Servants	18(30.0)	22(36.7)
House wives	8(13.3)	10(16.6)
Students	25(41.7)	21(35.0)
Business/Traders	9(15.0)	7(11.7)
Tribe		
Ibo	6(10.0)	5(8.3)
Yoruba	4(6.7)	3(5.0)
Hausa	25(41.7)	27(45.0)
Fulani	24(40.0)	25(41.7)
Others	1(1.6)	0(0.0)
Educational qualification		
Quaranic	12(20.0)	14(23.3)
Primary	2(3.3)	3(5.0)
Secondary	4(6.7)	6(10.0)
Polytechnic	5(8.3)	3(5.0)
University	37(61.7)	34(56.7)

Table 2: Preoperative characteristics of study subjects.

Preoperative characteristics	Complete closure n(%)	Partial closure n(%)
Tooth location		
Right	35(58.30)	32(53.30)
Left	25(41.70)	28(46.70)
Type of impaction		
Mesioangular	41(68.4)	39(65.0)
Distoangular	9(15.0)	10(16.7)
Horizontal	5(8.3)	6(10.0)
Vertical	5(8.3)	5(8.3)
Indication for extraction		
Pericoronitis	35(58.3)	32(53.3)
Dental caries	19(31.7)	25(41.7)
Prophylaxis	6(10.0)	3(5.0)

Table 3: Duration of surgery

Variable	Complete closure mean (SD)	Partial closure mean(SD)	P—value
Surgical time (mins)	32.7 (5.62)	29.07(4.27)	
Pain (Days)			
1	2.95 (0.22)	2.88 (0.32)	0.048
3	1.20 (0.63)	1.18 (0.65)	0.864
5	0.38 (0.49)	0.65 (0.76)	0.564
Swelling (Days)			
1	4.87 (0.34)	4.83 (0.38)	0.453
3	2.47 (0.62)	1.90 (0.66)	0.001
5	0.75 (0.47)	0.18 (0.39)	0.001

Table 4: Relationship between gender and postoperative pain.

	COMPLETE CLOSURE					PARTIAL CLOSURE				
	NP	MP	MDP	SP	TOTAL	NP	MP	MDP	SP	TOTAL
GENDER						GENDER				
DAY₁						DAY₁				
Male	0	0	5	28	33	0	0	5	24	29
Female	0	0	3	24	27	0	0	5	26	31
TOTAL	0	0	8	52	60	0	0	10	50	60
DAY₃						DAY₃				
Male	0	1	12	20	33	0	7	14	8	29
Female	0	3	10	14	27	0	9	20	2	31
TOTAL	0	4	22	34	60	0	16	34	10	60
DAY₅						DAY₅				
Male	9	24	0	0	33	23	6	0	0	29
Female	8	19	0	0	27	26	5	0	0	31
TOTAL	17	43	0	0	60	49	11	0	0	60

Table 5: Relationship between gender and postoperative swelling.

	COMPLETE CLOSURE							PARTIAL CLOSURE						
	NSW	SN	MW	SSW	VSW	ESV	Total	NSW	SN	MW	SSW	VSW	ESV	Total
Gender								Gender						
DAY₁								DAY₁						
M	0	0	0	0	5	28	33	0	0	0	0	5	24	29
F	0	0	0	0	3	24	27	0	0	0	0	5	26	31
Total	0	0	0	0	8	52	60	0	0	0	0	10	50	60
DAY₃								DAY₃						
M	0	1	12	20	0	0	33	0	7	14	8	0	0	29
F	0	3	10	14	0	0	27	0	9	20	2	0	0	31
Total	0	4	22	34	0	0	60	0	16	34	10	0	0	60
DAY₅								DAY₅						
M	9	24	0	0	0	0	33	23	6	0	0	0	0	29
F	8	19	0	0	0	0	27	26	5	0	0	0	0	31
Total	17	43	0	0	0	0	60	49	11	0	0	0	0	60

Table 6: Relationship between age and postoperative pain.

	COMPLETE CLOSURE					PARTIAL CLOSURE				
	NP	MP	MDP	SP	TOTAL	NP	MP	MDP	SP	TOTAL
AGE (YEARS)										
DAY ₁										
18-25	0	0	2	5	7	0	0	4	5	9
26-35	0	0	3	35	38	0	0	4	32	36
36-45	0	0	0	15	15	0	0	0	15	15
TOTAL	0	0	5	55	60	0	0	8	52	60
DAY ₃										
18-25	0	3	4	0	7	2	4	3	0	9
26-35	4	23	11	0	28	4	21	11	0	36
36-45	2	9	4	0	15	2	8	5	0	15
TOTAL	6	35	19	0	60	8	33	19	0	60
DAY ₅										
18-25	5	2	0	0	7	5	4	0	0	9
26-35	24	14	0	0	38	25	11	0	0	36
36-45	10	5	0	0	15	11	4	0	0	15
TOTAL	39	21	0	0	60	41	19	0	0	60

Table 7: Relationship between age and postoperative swelling.

	COMPLETE CLOSURE							PARTIAL CLOSURE						
	NS W	S W	M W	SS W	VS W	ES V	TOTA L	NS W	S W	M W	SS W	VS W	ES V	TOTA L
AGE (YEARS)														
DAY ₁														
18-25	0	0	0	0	1	6	7	0	0	0	0	3	6	9
26-35	0	0	0	0	8	30	38	0	0	0	0	15	21	36
36-45	0	0	0	0	7	8	15	0	0	0	0	11	4	15
TOTAL	0	0	0	0	16	44	60	0	0	0	0	29	31	60
DAY ₃														
18-25	0	0	1	2	4	0	7	0	0	1	4	4	0	9
26-35	0	0	3	12	23	0	38	0	0	1	16	19	0	36
36-45	0	0	0	2	13	0	15	0	0	1	1	13	0	15
TOTAL	0	0	4	16	40	0	60	0	0	3	21	36	0	60
DAY ₅														
18-25	5	2	0	0	0	0	7	7	2	0	0	0	0	9
26-35	7	28	3	0	0	0	38	30	6	0	0	0	0	36
36-45	5	10	0	0	0	0	15	12	3	0	0	0	0	15
TOTAL	17	40	3	0	0	0	60	49	11	0	0	0	0	60

DISCUSSION

This study assessed the intensity of postoperative pain and swelling on age and gender following surgical disimpaction of impacted mandibular third molar using complete and partial wound closure techniques. The removal of impacted mandibular third molar is one of the most frequently performed procedures in oral

surgery clinic (Saheeb & Obuekwe, 2001; Peterson, 2004; Olasoji et al., 2002). This surgical intervention may be complicated by traumatic injury to adjacent soft and bony tissues with resultant postoperative complications such as pain, swelling and limitation of mouth opening. The extent of pain and swelling are the main indicators of patient discomfort during the first

postoperative days after third molar surgery. The concern of every dental surgeon is on how to minimize these postoperative indices and improve the quality of life of patients following surgical disimpaction of impacted mandibular third molar. Pain is generally reported to be brief, peaking in intensity in the early postoperative period within the first 24 to 48 hours post extraction (Fisher et al., 1998; Julia et al., 1994; Carvalho & Vascoelost, 2011). Pain, on one hand, is a subjective experience that is influenced by many factors such as the patient's age, gender, cultural background, educational level, previous experience of pain, pain threshold and tolerance, therefore, assessment of pain may be difficult (Ong & Seymour, 2004). It is a symptom that cannot be objectively assessed. Pain is whatever the experiencing person says it is, existing whenever he says it does (Breytenbach, 1978; Huskisson, 1994; Shevel et al., 2001; Ong & Seymour, 2004).

The result of this study revealed that the highest pain intensity was recorded on the first postoperative day review; it gradually decreased in value in both groups during the course of postoperative review. The pattern of pain in both groups decreased in a linear fashion (fig.1), and this agrees with the other various reports in literature.^{28,29} A comparison of the differences between the postoperative day 1, day 3 and day 5 reviews showed statistical difference between the two groups at day 1 only $P=0.048$, with intensity of pain higher in group 1. The difference between the groups was also found to be statistically significant for swelling with a $p=0.001$ at day 3 and day 5 respectively. In this study, the predominant age group was the third decade of life which correlates with previous studies (Osunde et al., 2011; McGrath et al., 2003; Anighoro et al., 2003; Adeyemo et al., 2011). Thus, more than half of the patients were in the third decade of their lives. However, in contrast to the previous studies, higher proportions of patients (25.8%) in the study population were older than 36 years. This may be due to the fact that lack of oral health awareness and self-medication may have led to unnecessary delay in treatment in these patients in our environment. However, a comparison between the postoperative day 1, day 3 and day 5 reviews showed a difference between the two groups; Firstly, the intensity of postoperative pain and swelling were slightly higher in the males than the females. This is in contrast with some author's findings (McGrath et al., 2003; Anighoro et al., 2003). Secondly, an increase in the intensity of postoperative pain and swelling were recorded amongst higher age group of above 37 years in both males and females. This agreed with others (Anighoro et al., 2003; Adeyemo et al., 2011). The explanation for this is the fact that the longer the duration of tissue injury, the more the number of mediators that are released. This reflects the severity of pain experienced by this group of patients in this study.

This finding agrees with some previous researchers (McGrath et al., 2003; Anighoro et al., 2003; Adeyemo et al., 2011) who all reported maximal facial swelling at day 3. Some other studies reported maximal swelling at 48 hours postoperatively (Kruger et al., 2001; Raghoebar et al 1991), the swelling was well noticeable amongst older age group as stated earlier. The differences may be due to variation in individual inflammatory responses resulting from surgical difficulties. This study's results were also comparable to those of Waite and Cherala who reported better postoperative outcomes in 366 cases of impacted third molar surgeries performed without suturing (secondary healing). That study differs in several respects from the present one in that it was retrospective, surgical access was via a small V-shaped incision and the main focus was on postoperative healing, haemorrhage, and alveolar osteitis which were not evaluated in the present study. The findings of this study with particular reference to postoperative pain also differ from those of Rakprasitkul and Pairuchvej who found no differences in postoperative pain in patients with tube drain and controls irrespective of the age and gender. These differences may be explained in terms of variations in individual inflammatory responses to a noxious stimulus such as surgical trauma.

CONCLUSION

The results from this study revealed how age and gender could possibly influence the intensity of postoperative pain and swelling following mandibular third molar disimpaction. This may be related to an acute post traumatic response in which inflammatory exudate accumulates within sockets and all factors that promote its accumulation will influence significantly the onset and prevalence of postoperative pain and swelling in mandibular third molar surgery.

Source of support

None

Conflict of Interest

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