

Risk Indicators of Operative Difficulty of Impacted Mandibular Third Molar in a Nigerian Tertiary Hospital

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Introduction

An impacted tooth is the one that fails to erupt into proper functional position in the dental arch within the expected time [1-3]. The wisdom tooth, also known as the Mandibular Third Molar (M3) is the most commonly impacted tooth in the mouth and is closely followed by maxillary third molar, maxillary canine and mandibular canine respectively [3-7]. The extraction of impacted wisdom tooth, also known as the Mandibular Third Molar (M3) is the most common minor oral surgical procedure performed by Oral Surgeons [7-9] and vast amount of human and material resources are being expended on third molar related conditions annually [10].

The prevalence of impacted M3 and the associated symptom in form of pain makes the tooth a subject of great concern to dental practitioners globally [11-13]. The surgical removal of M3 is a subject of debate because of varying degree of difficulty of the operation [14] and researchers have related operative difficulty of impacted M3 to attendant inflammatory complications of the procedure and the resulting morbidity [14,15]. Morbidity from M3 surgery affects patient's daily activities and most authors have reported the deterioration in oral health quality of life following M3 removal [16-20].

The duration of operation of M3 has been regarded as the gold standard in measurement of operative difficulty and hence a predictor of postoperative morbidity [11,14,21-24]. Operation time has been related to patients' factors such as age, gender and weight on one hand and radiographic factor like angulation of M3 on the other hand [23-25]. While most authors agree on the correlation between radiographic factors such as M3 angulation, depth of impaction and number of roots/curvature [11,14,17,21-26], controversy exists in the literature about the correlation between patient factors and the actual duration of surgery [11,14,21,27,28]. Different studies have examined the influence of patient factors such as age, sex, weight, total body surface area and anxiety on duration of M3 surgery, yet there is wide variation in their findings.

Thus, information regarding estimated operation time, postoperative pain and other complications must be thorough and based on scientific knowledge. This will help the general dental practitioner to appropriately triage cases of M3 impaction for referral to the oral surgeon. There is dearth of literature on the correlation between patients' factors and perceived operative difficulty of impacted M3 among Nigerians and hence it is difficult to draw comparison with foreign literature. The aim of the present study was to assess the risk indicators of extended operation time in mandibular third molar surgery at our institution.

Methodology

It is a descriptive clinical study which was carried out at the Oral and Maxillofacial Surgery clinic of Ekiti State University Teaching Hospital, Ado-Ekiti, Nigeria. Patients that presented for wisdom tooth excision between January 2010 and December 2011 were recruited into the study. Patients were briefed about the study and only those who consented to participate were included. Pregnant women and those

who refused to partake in the study after being duly informed were excluded. Those with co existing jaw lesion such as dentigerous cyst and malignant lesions were also excluded.

Demography, body weight, height and Body Mass Index [BMI] of each patient was recorded on individual proforma. A standard periapical radiograph of the impacted wisdom tooth was used to determine the angulation of the impacted mandibular third molar according to winter's classification. All extractions were done under local anaesthesia using 2 cartridges of 1.8 ml 2% xylocaine (adrenaline concentration of 1:80,000). Similar surgical modality was employed for all patients; this included a 3-sided mucoperiosteal flap and buccal guttering bur technique with continuous irrigation using sterile normal saline.

The operation time was used as a measure of operative difficulty and it included the period from the beginning of incision to the placement of the last suture. The operation time was recorded with a stop watch. The operation was classified as slightly difficult (10-20 minutes), moderately difficult (20.01-30 minutes) and very difficult (30.01 minutes and above). At the end of the procedure, each patient received a prescription of prophylactic oral antibiotics namely; Amoxicillin clavulanate 650 mg 12 hourly and metronidazole 400 mg 8 hourly for five days. They were also given analgesic prescription of diclofenac sodium tablets 50 mg 12 hourly for three days.

Post operative review was done at the 7th postoperative day. Signs of acute alveolar osteitis, nerve injury and wound infection were noted and recorded on each patient's proforma. Each patient was given a record sheet for post operative pain which was marked at 24 hours and 7th post operative day respectively. Pain measurement was done on a visual analogue scale of 1-10, 10 being the extreme of pain while 1 corresponds to the lowest pain intensity.

Data analysis

Data analysis was done with Statistical Package for Social Science (SPSS version 17.0). The demography and BMI of the patients were analyzed and measure of central tendency was determined. Spearman's Correlation test was used to determine the patient factors with significant correlation to operation time. The results of these tests were compared and only those factors with $p < 0.05$ were selected for multiple regressions with operation time as the dependent variable. Paired

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sample *t*-test analyses were also conducted to determine whether there were significant differences in the postoperative visual analogue score between 24 hours and 7th post operative day.

The level of significance was set at a *p* value less than 0.05.

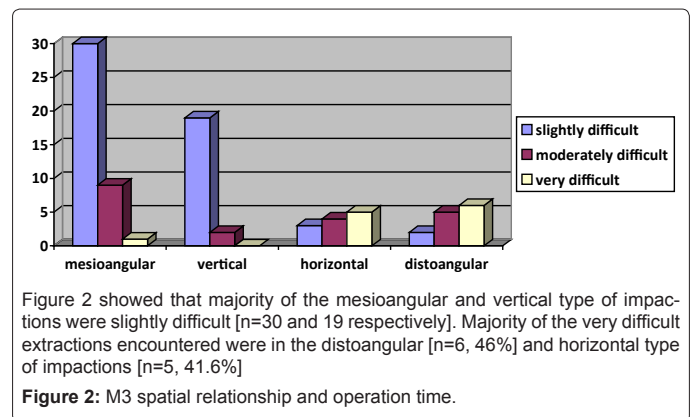
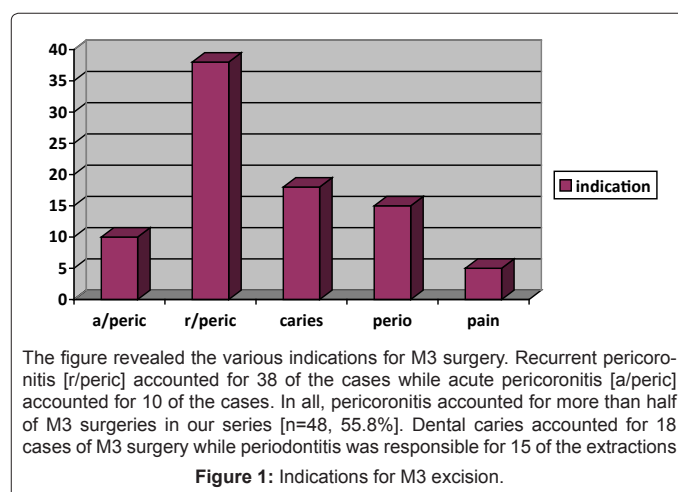
Results

A total of 109 patients were seen during the study period among which 86 patients successfully completed the study. Those excluded were 7 pregnant women, 8 patients who could not participate due to inability to meet up with follow up appointment and 8 patients who couldn't complete the questionnaire. The mean age of the patients was 27.67 ± 7.19 (range 19-56 years) while male to female ratio was 1:1.15.

The commonest indication for wisdom tooth extraction is recurrent pericoronitis (44.2%) followed by dental caries (Figure 1). On the spatial relationship of the impacted teeth, mesioangular variety was the commonest (46.5%) while the distoangular impactions constitute the least (14.0%). Figure 2 showed the relationship between spatial relationship of impacted wisdom teeth and measure of operative difficulty in our series. Most of the mesioangular and vertical variety were slightly difficult (75% and 90.48% respectively) while majority of horizontal and distoangular impactions were very difficult (46% and 41.6% respectively).

Operation time ranged from 11.05 to 34.10 minutes with the mean being 17.92 ± 5.11 . Analysis of correlation between operation time and patient factors (age, sex, weight, height, BMI and wisdom tooth angulation) with Spearman correlation coefficient (Table 1) showed that only age of the patient and angulation of impacted wisdom tooth have statistically significant correlation with operation time ($p=0.038$ and 0.008 respectively). Linear regression analysis of patients' age and angulation of M3 (Table 2) showed that both contribute 44.8% risk of increased operation time (regression coefficient=0.448). Mandibular third molar angulation contribute more significantly to increase operation time ($p=.001$) than increasing age of the patient ($p=0.005$) (Table 3).

Comparison of mean visual analogue score showed a statistically significant difference between the measurements at 24 hours and 7th postoperative day ($p=0.00$). Regarding complications following M3 surgery in our series, only 14% of cases developed post operative infection. Nerve injuries were observed in three cases, 2 cases of inferior alveolar nerve and 1 case of lingual nerve injuries.



Correlations [Spearman's rho]		Surgical difficulty
Age	Correlation Coefficient Sig. (2-tailed)	.224 .038*
Weight	Correlation Coefficient Sig. (2-tailed)	.091 .089
Height	Correlation Coefficient Sig. (2-tailed)	.148 .067
Body mass index	Correlation Coefficient Sig. (2-tailed)	.163 .064
Sex	Correlation Coefficient Sig. (2-tailed)	.020 .853
M3 angulation	Correlation Coefficient Sig. (2-tailed)	.008*

NB: * Significant variables

Table 1: Correlation between patients' factors and surgical difficulty

Model Summary				
Model Estimate	R	R Square	Adjusted R square	Std. Error of the
1	.448 ^a	.201	.182	4.621

a. Predictors: (Constant), angulation, age

Table 2: Regression model summary

Coefficients ^a					
Unstandardized Coefficients			Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	9.200	2.182		4.217	.000
age	.199	.070	.280	2.857	.005
angulation	1.600	.453	.346	3.531	.001

a. Dependent Variable: time

Table 3: Regression coefficient.

Discussion

Researches on various aspects of third molar surgery are quite numerous in the literature. In spite of this, many dental surgeons are still faced with the dilemma of explanations regarding operation time, associated risk factors of operative difficulty and attendant postoperative morbidity. Information regarding duration of surgery and perceived operative difficulty of M3 surgery is a subject of controversy in the literature. The present study is an attempt to contribute more knowledge on the influence of patient and radiographic variables on operative difficulty of impacted M3.

The mean age (27.10 years) in this study compared favourably with findings from previous studies where patients in third decade of life predominate. There was a slightly higher female preponderance in this study with the male to female ratio of 1:1.15. Most authors also

reported a higher female preponderance in the literature [5,7,13,24].

The duration of surgery is generally regarded as the gold standard for measurement of intraoperative difficulty in mandibular third molar surgery [11,14,21-25]. The mean duration of surgery in this study (17.9 ± 5.11 minutes) and range of 11.05 to 34.10 minutes was comparable to some previous reports of cases performed under similar conditions i.e. using bur technique under local anaesthesia [9,14,21]. Varying mean operation times have been reported by different authors, ranging from 7.74 minutes to 105 minutes [9,21,22,25]. Factors that may account for this variation includes surgeon's experience, types of anaesthetic technique, speed and sharpness of bone cutting instrument and overall state of facilities employed [9,21]. In the present study, all surgeries were performed by the same surgeon under similar condition for all subjects.

Patient factors that were found to correlate significantly with increased operation time were age and degree of angulation of the impacted third molar tooth. Previous report by Renton et al. [21] showed that age, weight and ethnicity were relevant for predicting difficulty of third molar surgery. Contrary to their findings, Susarla and Dodson [22] reported that ethnicity, patient age and body weight were not statistically associated with operative time while angulations of impacted teeth and sex were statistically significant patient factors in this regard. The present study however did not reveal any statistically significant correlation between sex and operation time. This is in agreement with the study of Gbotolorun et al. [14].

Contrary to the findings of Gbotolorun et al. [14], there is no correlation between BMI and duration of surgery in our series. No clear explanation could be adduced for the contribution of weight to surgical difficulty. Although bone weight contributes a significant proportion to total body weight, the proportion vary from one population to another and it may be difficult to conclude that large weight is entirely due to bigger or thicker bone. Another factor which may contribute to body weight is body size. A fat or obese patient tends to have full and thick cheeks which may reduce access during third molar surgery thus prolonging operation time. Perhaps culture and demographic differences may be responsible for the variation in findings of different authors.

The present study corroborated other authors' assertion that spatial orientations of impacted tooth have been known to influence difficulty of extraction [11,14,22,25]. However, Renton et al. [21] did not agree that spatial orientation of the tooth is a factor that may influence surgical difficulty, instead they identified bony impactions as a factor that affects difficulty, this is reasonable as it is generally known that impactions against soft tissues can be easily relieved by mere excision of the overlying tissue. Isolated soft tissue impactions were not involved in the present study.

The difference in the mean visual analogue scores between 24 hours and 7th postoperative day can be explained by the inflammatory postoperative response which may be responsible for higher VAS scores during the first 24 hours after surgery.

Conclusion

Findings from this study have shown that increasing age of the patient and the angulation of M3 impaction increases the risk of operative difficulty of impacted M3 significantly. However, gender and patient's weight did not appear to have significant correlation with operation time.

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