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ORIGINAL ARTICLE

Impacted mandibular third molars among patients attending Hospital Universiti Sains Malaysia

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Keywords

Complication,
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Abstract The aim of this study was to identify the position of impacted mandibular third molars based on the classifications of Pell & Gregory and Winter, the indications for extraction, and the relation of post-operative complications and position. Records of patients who attended Hospital Universiti Sains Malaysia between January and December 2007 for surgical removal of mandibular third molars were reviewed. The angulation type, width and depth of impaction were determined by reviewing the orthopantomograms. The indications of extraction and occurrence of any post- operative complications were recorded. A total of 238 impacted teeth were surgically extracted from 194 patients (97 males, 97 females). The reasons for extraction include recurrent pericoronitis (43.1%) followed by prophylactic purposes (33.5%). Mesioangular impactions accounted for 52.3% and Class IIA position of impaction accounted for 45.7% of extractions. The most common post-operative complication was persistent pain and swelling (14.7%) followed by trismus (4.1%) and dry socket (3.0%). There was no significant relationship between the angulation, width and depth of impaction and the occurrence of complication. Mesioangular type and Class IIA position of impaction were the most common impaction. Although the association was not significant, high frequency of post-operative complications was observed in mesioangular, horizontal, IIA and IIC positions.

Introduction

The mandibular third molars are the most frequently impacted teeth in the human (Dimitroulis, 1997) and surgical extraction has become one of the commonest dentoalveolar surgeries (Gbotolorun *et al.,* 2007). Impacted mandibular third molars are often associated with pericoronitis, periodontitis, cystic lesions, neoplasm, pathologic root resorption and can cause detrimental effects on adjacent tooth (Ma'aita and Alwrikat, 2000). Studies have shown that patients with retained impacted third molars are significantly more susceptible to mandibular angle fracture of the mandible (Fuselier *et al.,* 2002, Meisami *et al.,* 2002). Patients with impacted mandibular third molar may present with pain, caries, gingivitis and oral infections (McGrath *et al*., 2003). Studies suggest that third molars play at least some role in crowding (Beeman, 1999) and in severe cases, removal of the impacted molars could be recommended (Lindqvist and Thilander, 1982). To relieve these symptoms, mandibular third molars are indicated to undergo either simple or surgical extraction.

Many impacted mandibular third molars remain asymptomatic for years (Polat *et al.,* 2008) but are often surgically extracted to prevent development of future complications and pathologic conditions. Many dental surgeons in Europe and America consider prophylactic extraction of fully impacted wisdom teeth as the ideal approach (Sağlam and Tüzüm, 2003; Adeyemo *et al.,* 2006; Blondeau and Daniel, 2007). Many clinicians recommended removal of impacted third molars for denture construction.

Several factors have been associated with the occurrence of complications which include age, health of patient, gender, smoking status, use of contraceptive pills, degree of impaction, surgeon's experience and the surgical technique used (Muhonen *et al.,* 1997; Bui *et al.,* 2003). Almendros-Marqués *et al.*

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(2006) stated that position of the impacted third molar may be associated with complications resulting from extraction.

To the knowledge of the authors, there is no published data regarding impacted third molar position and post-operative complications among patients attending Klinik Pakar Pergigian, Hospital Universiti Sains Malaysia (HUSM). Thus this study aimed to investigate the position of impacted mandibular third molars, indications of surgical procedure, and the post-operative complications after surgical removal of impacted teeth.

Material and methods

Study design

A review was done on dental records of patients who had undergone surgical removal of mandibular third molars at Klinik Pakar Pergigian of HUSM in 2007. Records with missing orthopantomograms (OPG), showing incomplete root formation of third molar, and absence of adjacent second molar were excluded.

Research tool and data collection procedure

The age, sex, number of impacted mandibular third molar extracted, pathological conditions such as caries, pericoronitis, or prophylactic was recorded. The outcome of extraction was documented as presence or absence of inflammatory complications which include persistent pain and swelling, surgical site infection, alveolar osteitis (dry socket), trismus, paresthesia, ulceration, and bleeding.

The position of the impacted third molar was determined by OPG. The depth of third molar in relation to occlusal plane (Class A, B, C) was documented along with the distance or width between the vertical ascending mandibular ramus and the distal surface of the second molar (Class I, II, III) according to classification of PELL & GREGORY (Monaco *et al.,* 2004). The angulation of impacted third molar was recorded based on WINTER's classification with reference to the angle formed between the intersected longitudinal axes of the second molar and third molars. The angulation of impaction was measured using Quek *et al.* (2003) method to classify vertical impaction (10° to -10°), mesioangular impaction (11° to 79°), horizontal impaction (80° to 100°), distoangular impaction (-11° to -79°), others (111° to -80°) and buccolingual impaction.

Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 12.0. The age, gender, number of mandibular third molar extracted, indications of removal, classification of impaction and complication of surgery were displayed by frequency and percentage. The relation between occurrence of complications and position of impaction were analyzed by using the Pearson Chi-square test.

Ethical consideration

Ethical clearance was obtained from the Human Research Ethics and Committee, Universiti Sains Malaysia (Approval date: 2/6/2008 and reference number USMKK/PPP/JEPeM 202.3[11]). All data regarding patient identification and medical conditions were kept confidential.

Results

There were 194 patients consisting equal number of 97 males and females age between 17 to 56 years with mean age of 25.9 years (SD=6.60). Most extractions were carried out in the 16 to 25 years old group where in this group 31.4% were females. Only 197 impacted third molar extractions were reviewed out of total 238 teeth extractions due to 25 missing OPG. Recurrent pericoronitis was the most common indication for extraction affecting 43.1% of impacted teeth. About 33.5% were extracted for prophylactic reasons and 20.8% were extracted due to caries. About 2.5% of extractions were not justified because of incomplete clinical records. Table 1 illustrates the type of impaction. Mesioangular impaction was the most frequently seen (52.3%) followed by horizontal (26.4%), vertical (12.2%) and distoangular impaction (9.1%).

Table 2 showed Class IIA as the most common position of impaction (45.7%) and IIC was the least common (1.5%). There were no Class IIIA and Class IC impaction found in this study group. Among all extractions, the complication rate was 32.5%. Persistent pain and swelling were the most common post-operative complication in mesioangular, vertical and horizontal type of impactions which were 17.5%, 16.7% and 13.5% respectively. Trismus was documented only in mesioangular (2.9%) impaction whereas a higher rate was observed in the horizontal type (9.6%). There was 1.0% case of parathesia post-operatively which occurred in the horizontal and distoangular type of impaction. Dry socket occurred in extractions of mesioangular type, vertical type and horizontal type accounting to 1.9%, 8.3% and 3.8% respectively. The remaining 4.1% of impacted teeth were excluded because of incomplete records.

With regard to the width and depth of impaction, pain and swelling was the common complication in all positions except Class IIIB. Trismus occurred in 4.5% of teeth in position Class IA, 4.4% in position Class IIA, and 9.2% in position Class IIIB and IIIC. Dry socket appeared in 2.3% of extraction of Class IA impaction, 4.4% of Class IIA and 33.3% of Class IIC impaction. Table 3 showed that the occurrence of complications was not significantly associated with types of impaction angulation (P=0.192). Similarly, there was no significant association between the width and depth of impaction (Class IA, IIA, IB and IIB) and post-operative complications (P= 0.279).

Table 1*:* Number and percentage of surgically extracted mandibular third molars according to type of angulation and postoperative complications

Post operative Complications	Types of angulation				
	Mesioangular *n* =103 (52.3%)	**Vertical *n* = 24 (12.2%)**	**Horizontal *n* = 52 (26.4%)**	**Distoangular *n* = 18 (9.1%)**	**Total *n* = 197 (100%)**
Persistent pain and swelling	18 (17.5)	4 (16.7)	7 (13.5)	0 (0)	29 (14.7)
Infection	1 (1.0)	0 (0)	2 (3.8)	0 (0)	3 (1.5)
Trismus	3 (2.9)	0 (0)	5 (9.6)	0 (0)	8 (4.1)
Dry socket	2 (1.9)	2 (8.3)	2 (3.8)	0 (0)	6 (3.0)
Paresthesia	0 (0)	0 (0)	1 (1.9)	1 (5.6)	2 (1.0)
Ulceration	3 (2.9)	1 (4.2)	0 (0)	0 (0)	4 (2.0)
Bleeding	2 (1.9)	0 (0)	0 (0)	0 (0)	2 (1.0)
Others	5 (4.9)	0 (0)	3 (5.8)	0 (0)	8 (4.1)
Nil	69 (67.0)	17 (70.8)	32 (61.5)	17 (94.4)	135 (68.5)
Total complications	34 (33.0)	7 (29.2)	20 (39.5)	1 (5.6)	62 (32.5)

Table 2*:* Distribution of complications and types of depth and width of impaction

Post operative Complications	Types of depth and width of impaction							
	IA *n* = 44 (22.3%)	**IIA *n* = 90 (45.7%)**	**IB *n* = 17 (8.6%)**	**IIB *n*= 21 (10.7%)**	**IIIB *n* = 11 (5.6%)**	**IIC *n* = 3 (1.5%)**	**IIIC *n* = 11 (5.6%)**	**Total *n* = 197**
Persistent pain and swelling	5 (11.4)	12(13.3)	2 (11.8)	5 (23.8)	0 (0.0)	1(33.3)	4 (36.4)	29 (14.7)
Infection	0 (0.0)	3 (3.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (1.5)
Trismus	2 (4.5)	4 (4.4)	0 (0.0)	0 (0.0)	1 (9.1)	0 (0.0)	1 (9.1)	8 (4.1)
Dry socket	1 (2.3)	4 (4.4)	0 (0.0)	0 (0.0)	0 (0.0)	1 (33.3)	0 (0.0)	6 (3.0)
Paresthesia	0 (0.0)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (9.1)	2 (1.0)
Ulceration	1 (2.3)	1 (1.1)	0 (0.0)	1 (4.8)	0 (0.0)	1(33.3)	0 (0.0)	4 (2.0)
Bleeding	1 (2.3)	1 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.0)
Others	2 (4.5)	4 (4.4)	0 (0.0)	1(4.8)	0 (0.0)	0 (0.0)	1 (9.1)	8 (4.1)
Nil	32(72.7)	60 (66.7)	15 (88.2)	14 (66.7)	10 (90.9)	0 (0.0)	4 (36.4)	135 (68.5)
Total complication	12 (27.3)	30 (33.7)	2 (11.8)	7 (33.3)	1 (9.1)	3 (100.0)	7 (63.6)	62 (32.5)

Table 3: Type of angulation of impaction according to Winter's and Pell and Gregory Classification and associated occurrence of complication

Variables	***n***	**Complication Freq (%)**	**No complication Freq (%)**	**x^2 statistic *(df)***	***P*-value**
Winter's classification					
Mesioangular	69	34 (49.3)	35 (50.7)	3.30 (2)	0.192
Vertical	19	7 (36.8)	12 (63.2)		
Horizontal	32	20 (62.5)	12 (37.5)		
Pell and Gregory classification					
IA	30	12 (23.5)	18 (29.0)	3.84 (3)	0.279
IIA	60	30 (58.8)	30 (48.4)		
IB	10	2 (3.9)	8 (12.9)		
IIB	13	7 (13.7)	6 (9.7)		

Discussion

The positions of impacted mandibular third molars, pre-operative pathology, and post-operative complication have been studied in various populations. A study among Jordanians found that vertical angulation type was the most common (61.4%) and mesioangulation type was only 18.1% (Bataineh *et al*., 2002). However, studies in Nigeria showed that mesioangular type of impaction was the most frequently seen (Gbotolorun *et al.,* 2007; Obiechina *et al.,* 2001). Likewise, it was also the most common type among Chinese (80%) and Korean populations (46.5%) (Quek *et al.,* 2003). A study in Thailand revealed that out of 680 impacted molar extractions, 402 teeth were mesioangularly impacted (Unwerawattana, 2006). One Spanish study done by Chaparro-Avendaño *et al.,* (2005) showed similar results where mesioangulation was most common (71.5%) while another study in Barcelona documented that vertical angulation type of impaction was predominant (47.9%) and meisoangular was about 20.5% (Almendros-Marqués *et al.,* 2006,). In the present study, mesioangular impaction was the most common type (52.3%).

Assessment of width and depth of impaction with reference to the ascending ramus and occlusal plane of the second molar, it was found that the greatest percentage was seen in Class IIA (45.7%). In a Spanish population the predominant position was Class IIB (Almendros-Marques *et al*., 2006). Among Nigerians, Obiechina *et al.* (2001) identified the commonest position as Class A (31.9%) and Class II position (60.8%). Monaco *et al.* (2004) reported a similar finding where the highest percentage of impacted molar position fell on Class A (56.2%) and Class II (63%) among Italians. The findings of the present study was thus in accordance with most reports that most impacted third molars were at Class II position, where half of the crown was in the ramus and the position of the highest portion of third molar was at occlusal level which is Class A.

Recurrent pericoronitis was the most frequent indication for removing impacted mandibular third molars in this study. This was similar with other reports (Almendros-Marqués *et al*., 2006; Gbotolorun *et al.,* 2007; Bataineh *et al.,* 2002; Obiechina *et al*., 2001; Brickley and Shepherd, 1996). On the other hand, Adeyemo *et al.* (2008) found that caries and its sequelae was the major reason of extraction, followed by pericoronitis and periodontitis.

Prophylactic surgical extraction accounted for 33.5% removals in this study, which was the second most common indication. Considerable controversy exists regarding prophylactic removal of asymptomatic impacted molars. Some surgeons favour a conservative approach while others opted for more interventional strategies (Almendros-Marqués *et al.,* 2008). The prophylactic removal was justified on the basis that the risk of surgical morbidity increases with increasing age (Adeyemo *et al.,* 2006). McArdle and Renton (2006) suggested that the early or prophylactic removal of a partially erupted mesioangular third molar could prevent distal cervical caries forming in the mandibular second molar.

The “Clinical Practice Guidelines” of the Ministry of Health, Malaysia for management of unerupted and impacted third molar teeth advised against the prophylactic removal (MOH, 2005). However, the surgeon’s decision to remove asymptomatic teeth might be conditioned by the perceived risk of clinical manifestations derived from impaction, age of patient, position of molar and patient request. Since most impacted molar patients in this study were medical and dental students who had knowledge of the natural course of impacted teeth, most demanded for prophylactic extraction.

Third molar surgery is not risk free, the complications and suffering following surgery may be considerable. Persistent pain and swelling, infection, trismus, alveolar osteitis (dry socket), nerve damage, permanent labial anesthesia, ulceration, bleeding, dentoalveolar fracture, displacement of tooth, adjacent tooth injury, temporomandibular joint injury, and possible fracture of the mandible are possible post-operative complications (Mercier and Precious, 1992). In this study, persistent pain was the most common complication (14.7%) and dry socket and trismus were developed in less than 5%. Other complications such as bleeding, ulcerations and paresthesia were observed infrequently.

In a study by Gbotolorun *et al.,* (2007), 14.2% of the extractions had post-operative complications and dry socket was most common (53.2%). Sağlam and Tüzüm (2003) reported that removal of fully impacted molars caused complications such as pain, cysts, resorption of adjacent teeth, infection, crowding and axial changes in the position of the adjacent teeth were associated with 28.4% of impacted teeth. Blondeau and Daniel (2007) found only alveolitis (3.6%), infection (2.2%) and paresthesia (1.1%) as complications after extraction and these low incidences was similar to our study.

Although there was no significant association between post-operative complications and angulation of impacted molars, we highlighted that the third molars within a mesioangular impaction had the highest number of complications. Likewise, Blondeau and Daniel (2007) reported the higher rate of complications in extractions of mesioangular and distoangular impacted mandibular third molars compared to the other types. They concluded that there were direct relation between the degree of impaction of extracted tooth and the incidence of complications. On the other hand, the greatest incidence of infections and neurological complications were observed in the extraction of third molars in vertical position (Almendros-Marqués *et al.,* 2006). They

concluded that there was a significant relationship between the degrees of impaction with non-infectious neurological complications.
In this study the number of impacted teeth in each position was small, hence the occurrence of post-operative complication of teeth from Class IIIB, IIC and IIIC were not comparable.

This study found no significant relation between the depth and width of impaction and the occurrence of complication. However, our results showed that extraction of mandibular third molars classified in Class IIA position had the highest complication. Almendros-Marqués *et al.* (2006) also reported similar findings. This is understandable because the space between the second molar and the ramus of the mandible is less than the mesiodistal diameter of the third molar resulting in a reduced space for elevation. This factor causes difficulty during removal and increases the risk of complication. Blondeau and Daniel (2007) found that the teeth at the position of Class IC, IIC and IIIC had more complications. Deeper impaction leading to greater likelihood of tissue disturbance and longer operation times, which explained the tendency for more complications than other positions (Kim *et al.,* 2006).

The above study has several limitations such as the difficult to trace all the dental records notes and OPG. There were also incomplete data in some dental records.

Conclusions

The most common indication for removing impacted mandibular third molars was recurrent pericoronitis. Mesioangular and horizontal type of impaction were most common and should be taken into consideration for high frequency of complications after extraction. Impaction depth classification of IIA and IIC are the teeth most inclined to develop complications**.**

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