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MANDIBULAR WISDOM TEETH IMPACTIONS AND THE RISK FACTORS THAT ARE ASSOCIATED WITH COMPLICATIONS FOLLOWING SURGERY
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ABSTRACT

Objectives: **To determine the pattern of impacted mandibular teeth among a Ghanaian population, as well as the prevalence and risk factors for complications following their surgical removal.**
Design: A descriptive retrospective study
Setting: **Department of Oral and Maxillofacial Surgery, University of Ghana Dental School and the Korle-Bu Teaching Hospital, Accra, Ghana.**
Subjects: **Medical records of patients who had surgical extraction of lower third molars done.**
Main outcome measures: **Variables obtained included sex, age, Winter's classification of impaction, Class and Depth of tooth, Root morphology, and the modified Parant scale. Other variables were the indication for extraction, difficulty grade (Kharma scale), the presence of complications at review, and whether the present management accounted for the first visit to a dentist.**
Results: **There was a total of 258 people included in the study. This consisted of 101 (39.1%) males and 157 (60.9%) females. Ranging from 18 to 74 years, the mean age was 29.6±9.4 years. Most impactions (47.3%) of the mandibular wisdom teeth were mesioangular. Recurrent pericoronitis was the most common reason for surgery, accounting for 115 (44.6%) of the study population. The occurrence of complications following the extraction of a mandibular wisdom tooth was found to vary significantly by the difficulty grade (p=0.021).**

Conclusion: **Mesioangular impactions were the most common types of third molar impaction, while about 18% of patients had varying complaints following management. Kharma scale was found to be significantly associated with the occurrence of complications following surgical extractions.**

INTRODUCTION

Impacted teeth, generally refer to teeth that fail to reach their physiological and functional positions in the dental arch within the expected time of eruption. The occurrence of impactions is a fairly common phenomenon, with many proposed theories(1). Causes of impactions have been described to be influenced by varying factors, which include lack of space, hereditary and the development of the jaws(2). Though many teeth could be impacted, the commonest is the mandibular third molar, which has been a subject of several studies, determining its occurrences and pattern(3).

The occurrence of impacted wisdom teeth has been suggested to be increasing worldwide due to evolving jaw anatomy and human diet(4). Aside its high incidence, several potential complications and pathologies have been identified to include pain, teeth crowding, pericoronitis, caries, development of cystic lesions, dentoalveolar abscess and ultimately, the life-threatening Ludwig's angina (5,6).

Several indices have been developed throughout history to classify, and estimate, to some extent, the difficulty of surgically removing impacted mandibular wisdom teeth. With the Pell and Gregory classification found not to be too reliable in predicting difficulty level, Pederson proposed a modification of the Pell–Gregory scale that included a 3rd factor, the angulation of the third molar (7). Following the introduction of the Pedersen scale, more recent and comprehensive WHARFE and Kharma scales have been developed, with variable conclusions in difficulty prediction (8,9,10). The surgical procedure for removing wisdom teeth, having evolved over the years could still be associated with complications such as post-operative pain, dry socket and persistent swelling. In Ghana, there are currently no guidelines for surgical extractions, though teaching focuses on best practice in the training of Dental surgeons and Oral and Maxillofacial specialists.

The objective of this study was to determine the current pattern of impacted mandibular teeth among a Ghanaian population. This study also sought to determine the prevalence and risk factors for complications following surgical extractions.

METHOD

Study Design and Area: This was a retrospective study, involving folders of adult patients who were managed for mandibular impacted third molars at the Department of Oral and Maxillofacial Surgery of the University of Ghana Dental School, Korle-Bu, Accra from January 2014 to December 2019.

Inclusion/Exclusion criteria and variables: All patients who were managed at the Department on account of mandibular wisdom tooth impaction, were included in the study. Patients with incomplete records were however excluded. Patients who were less than 18 years were also excluded. Independent variables included sex, age, side of impacted tooth, Winter's classification,

Class and Depth of tooth according to Pell and Gregory, Root morphology, and the modified Parant scale (8). Other variables were the primary presenting complaint, comorbidities and whether the present management accounted for their first visit to a dentist. The outcome variables were the presence of complications following management, and the Kharma scale, which was a composite score, obtained from the Winter's classification of impaction, Class and Depth of tooth, as well as Root morphology (8), as shown in Table 1. '*Easy*' was defined by a Kharma index of 1-2, '*slightly difficult*', 3-4, while '*moderately difficult*' and '*very difficult*' were defined by an index of 5-6 and 7-10 respectively.

Data collection and analyses: Records of patients meeting the inclusion criteria were retrieved, data extracted, and entered into a computerized data sheet. The Winter's classification, Class, Depth of tooth and Root morphology were determined for all patients managed within the study period using a Digital Dental Panoramic image (Carestream CS 9000). All surgeries for the study population were done by Residents of the department. Data extraction, review and data entry were carried out by the same Residents, supervised by a senior specialist and a consultant in Oral and Maxillofacial Surgery, who are both Fellows of the Ghana College of Physicians and Surgeons, and West African College of Surgeons. All patients were put on analgesics and antibiotics (Amoxicillin 500mg and Metronidazole 400mg to be taken three times daily for one week), given post-operative instructions and asked to return for review the following week. Data was entered using Microsoft Excel 2010, and analysed using Stata 14 software (StataCorp. College Station, TX). Descriptive summaries of variables were generated. Chi-square test with Fisher's exact test was used to compare the Kharma scale, as well as the occurrence of complications with categorical variables, testing their association, assuming an alpha level of 0.05

Table 1

Criteria of Kharma scale

Classification	Score
Angulation	
Mesioangular	0
Horizontal/transverse	1
Vertical	2
Distoangular	3
Depth	
Level A: High occlusal level	1
Level B: Medium occlusal level	2
Level C: Deep occlusal level	3
Ramus relationship/Class	
Class 1: Sufficient space	0
Class 2: Reduced space	1
Class 3: No space	2
Root form	
Convergent	0
Divergent	1
Bulbous	2
Difficulty index	
Easy	1-2
Slightly difficult	3-4
Moderately difficult	5-6
Very difficult	7-10

RESULTS

There was a total of 258 people included in the study. This consisted of 101 (39.1%) males and 157 (60.9%) females. Ranging from 18 to 74 years, the mean and median ages were 29.6±9.4 years and 27.5 years respectively. Though females accounted for a proportionate number of the patients, mean ages did not vary significantly between the sexes (P=0.941). Most of the patients (78.3%) were younger adults. About nine percent of the patients had bilateral impactions of the mandibular wisdom tooth, while 7.4% of the patients were categorized as 'very difficult'. Nearly seventy percent of the patients were seeing the dentist for the first time on account of the impacted wisdom teeth.

Most impactions (47.3%) of the mandibular wisdom teeth were mesioangular, while 1.2% were inverted. Classification by the depth of impaction showed the following distribution: Level A, 139 (53.9%); Level B, 56 (21.7%); and Level C, 63 (24.4%). According to the Class however, 59 (30.6%) were Class 1, 112 (58%) were Class 2, and 22 (11.4%) were Class 3. The greatest proportion of presentations (38%) of the impacted teeth were categorized as being 'moderately difficult', while most (51.9%) required ostectomy in completing the extraction. Other characteristics of the impacted mandibular wisdom teeth are described in Table 2.

Table 2

Pattern of mandibular wisdom teeth impactions in Ghanaian adults

Variable	Number (n)	Percentage (%)
Sex		
Male	101	39.1
Female	157	60.9
Age		
18-35	202	78.3
36-55	52	20.2
>55	4	1.6
Symmetry		
Right side	125	48.5
Left side	110	42.6
Bilateral	23	8.9
Winter's		
Mesioangular	122	47.3
Horizontal	55	21.3
Vertical	43	16.7
Distoangular	35	13.6
Inverted	3	1.2
Parant Scale		
Extraction requiring forceps only	27	12.5
Requiring ostectomy	113	51.9
Ostectomy and coronal section	36	16.7
Complex extraction (Root section)	40	18.5
Kharma scale		
Easy	51	19.8
Slightly difficult	90	34.9
Moderately difficult	98	38.0
Very difficult	19	7.4
First visit		
First visit	180	69.8
Previous dental visit	78	30.2

Recurrent pericoronitis was the most common reason for surgery, accounting for 115 (44.6%) of the extractions done in this study. This was respectively followed by pain (19.8%), complicated caries of the wisdom tooth (15.1%), and routine extractions (10.1%). Impacted wisdom teeth had caused dentoalveolar abscess in 2.7% of the study population and trismus in an additional 1.2% (Figure 1).

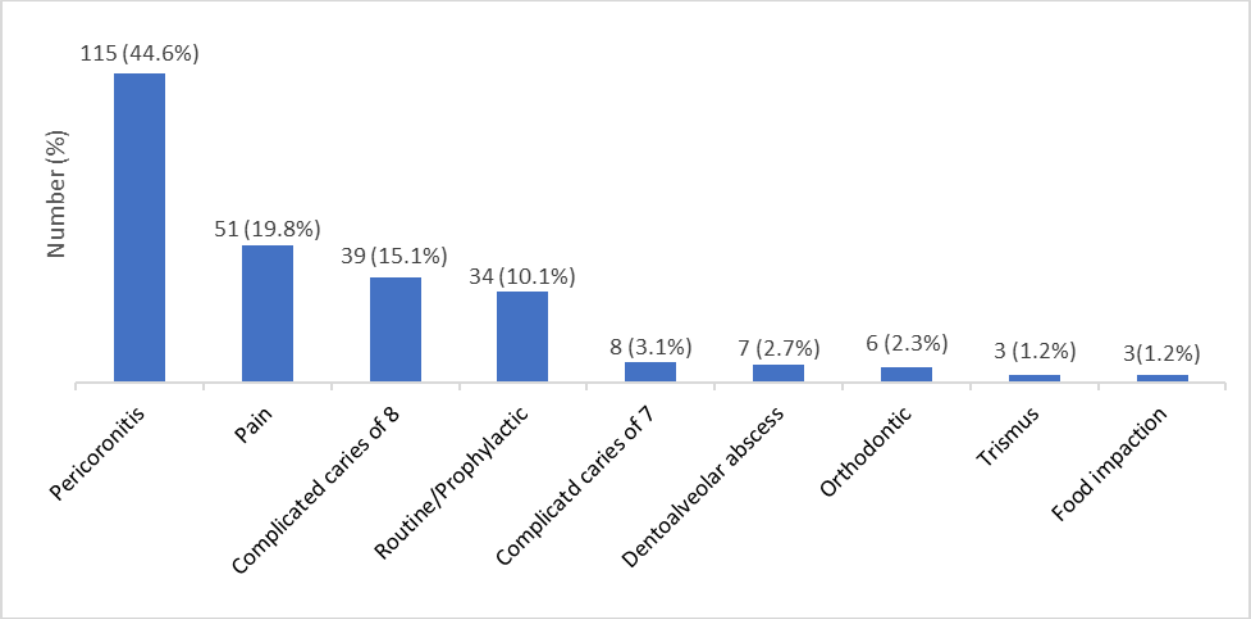

Figure 1: Pattern of presenting complaints of impacted lower wisdom teeth

Figure 2 shows the pattern of complications following extractions of mandibular wisdom teeth. Among the study participants, 82.5% had no complications following the surgical extraction. Of these, 48.8% did not have any complication as of the following week's review, while 33.7% did not turn up for review, but confirmed on phone that they were fine. Ten participants had persistent pain (without dry socket), while seven had some degree of nerve damage, representing 3.9% and 2.7% of the study population respectively. The prevalence of dry socket in this study was 1.6%.

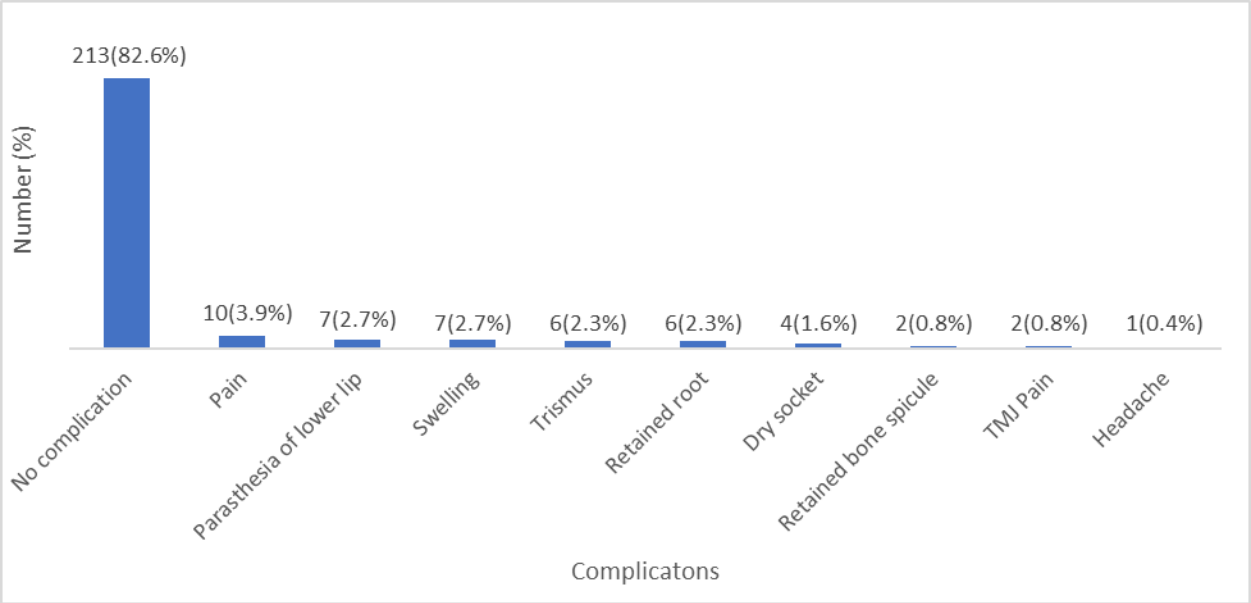

Figure 2: Distribution of complications of surgical extractions

The occurrence of complications following the extraction of a mandibular wisdom tooth was found to vary significantly by the difficulty grade (p=0.021), as well as a previous visit to the dental surgeon (0.048). In investigating the factors that might influence the occurrence complications, sex, age, side of impaction, and the modified Parant scale were found not to be statistically significant in the distribution of complications following surgical extractions of lower wisdom teeth.

Table 3

Influence of background characteristics in complications of lower wisdom teeth

Variable	Number with Complication	X^2 value[!]	P-value
Sex		0.006	0.939
Male	17		
Female	27		
Age		5.096	0.078
18-35	30		
36-55	12		
>55	2		
Symmetry		3.870	0.144
Right side	27		
Left side	15		
Parant Scale		4.960	0.291
Extraction requiring forceps only	3		
Requiring ostectomy	23		
Ostectomy and coronal section	5		
Complex extraction (Root section)	12		
Kharma scale		9.713	0.021*
Easy	4		
Slightly difficult	11		
Moderately difficult	25		
Very difficult	4		
First visit		4.217	0.062
First visit	25		
Previous dental visit	19		

[!] *Fisher's test used where applicable*

**Statistically significant values*

DISCUSSION

Surgical extractions are very common procedures performed in the practice of Oral and Maxillofacial surgery(11), therefore requiring continuous evaluation in improving its outcomes. This study, thus, assessed the pattern of impacted mandibular teeth among a Ghanaian population, as well as their associated complications following surgery. Mesioangular impaction was the most common type of teeth impaction.

In this study, similar to Al-Anqudi et al. and Hashemipour et al., we found a high prevalence of females, while most patients were between the ages of 18 and 35 years

(12,13). A previous report attributed the higher female predilection to differences in growth patterns, suggesting that the female jaws would generally have ceased growing during the eruption of third molars, while in males, the jaws continue to model during the same period(14). Most impactions in this study were mesioangular, followed by horizontal impactions. The prevalence of mesioangular impactions is very common in literature(15,6), while other reports suggested horizontal impactions to be the most prevalent in the mandible(16). Corroborating our finding however, previous studies by Abdulai et al. and Obiechina et al. in Ghanaian and Nigerian populations respectively, also found mesioangular impactions to be most common (17,3).

For seventy percent of our study population, symptoms of the impacted wisdom teeth accounted for their first visit to the dentist. This observation highlights the need for sturdier and sustainable oral health promotion interventions to improve routine visits among the general population. With insufficient oral health behavior and awareness, affected individuals are more likely to suffer unduly from devastating pain while risking progression of related pathologies. The high prevalence of 'dental-treatment-naïve' patients also presents an opportunity for such patients, though referred for advanced procedures, to receive general oral health education. The main reason for attendance in our study population was recurrent pericoronitis, followed by pain and complicated caries of the third and second molars. This high proportion of patients with pericoronitis seems to be consistent with many studies (4,17,18,19).

Occurrence of complications following extraction of wisdom teeth is a significant source of distress to both the surgeon and patient(6). Complications may occur after surgical extractions, even for the minimally angulated wisdom tooth, despite the surgeon's expertise. Patients should therefore be informed of the potential risks and alternatives to management. Risks of complications could however be reduced with adequate knowledge and standard practice by the surgeon. In this study, pain (without dry socket) was the most common complaint following extraction of the wisdom tooth (4%). About 3% had some paresthesia of the lip, while 1.6% had dry socket. The complication rate following wisdom teeth extraction has been reported by Deliverska & Petkova to vary between 2.6 and 30.9 %(20). Occurrence of complications may be influenced by both surgeon-related and patient-related factors. These may include: age, pre-existing health conditions of the patient, gender, surgeon's experience, smoking, intake of contraceptive medicine, quality of oral hygiene, and surgical technique among others(21,22). Among the variables explored, this current study however, found only the Kharma scale to be significantly associated with the occurrence of complications following surgical extractions.

The retrospective design for this study limited the number of variables that were explored. All surgeries were also performed by Oral and Maxillofacial surgery Residents, therefore, excluding analysis to explore the effect of the rank of the operator.

The symptom, management and outcome of lower third molar impactions could potentially be a significant source of discomfort for the patient. With suggestions that the prevalence of wisdom teeth impactions may rise in the future (22), this study provides data that could be used to inform institutional and professional recommendations. This current study could

also be used in hypotheses generation for future research.

Wisdom teeth impaction is quite a common finding among patients presenting to the Dentist in Ghana. This study found mesioangular impactions to be the most frequent type of mandibular third molar impaction. While about 18% of patients had varying complaints following management, Kharma scale was found to be significantly associated with the occurrence of complications following surgical extractions.

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