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CLINICAL PRESENTATION OF IMPACTED THIRD MOLAR TOOTH AND ITS EFFECT ON THE ADJACENT TOOTH, IN LUSAKA, ZAMBIA.

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ABSTRACT

Impacted tooth is a tooth which is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is dependent on its anatomical location. The prevalence of third molar impaction ranges from 16.7% to 68.6%. This study aimed at evaluating the clinical presentation of impacted third molar tooth and its effect on adjacent tooth. Objectives of the study were to determine the pathology of second molar and surrounding structures associated with third molar impaction and to determine the type of treatment modalities for impacted third molar and the adjacent tooth. The study revealed 81% of third molar impactions were associated with the mandibular arch and 68% of these were located on the right side of the mandibular arch. Clinical changes identified in this study were, 69% dental caries, while 76% was pain and swelling. Treatment for impacted third molar was surgical extraction, while adjacent molar was treated by supportive care. The diagnostic modality for third molar impaction was found to be intraoral radiology. Right mandibular arch is the commonest site for third molar impaction, and dental caries, pain, and swelling are the clinical presentations. Gum disease, periodontal pocket in the second molar and proximal dental caries in second molar were the pathological changes seen in the second molar adjacent to the impacted third molar in this study. Majority of the participants were diagnosed by an intraoral imaging procedure and surgical extraction was the mainstay treatment modality.

Key words: Third molar, Impaction, clinical presentation, extraction; Zambia.
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INTRODUCTION

Dental eruption occurs with great precision in the great majority of human beings. The deciduous and permanent teeth are formed inside the maxillary and mandibular bone and, at a certain point, erupt to fully develop chewing and speech functions (Pereira et al., 2017). Failure on dental eruption is a common clinical situation that represents an unfavorable aspect from the esthetic and functional points of view. Among the regions that are affected by this problem, a greater occurrence is observed in the third molars and canines, but this event can also be found in other regions of the oral cavity (Dinoi et al, 2016).

Impacted tooth is a tooth which is completely or partially unerupted and is positioned against another tooth, bone or soft tissue so that its further eruption is dependent on its anatomical location (Janakiraman et al., 2010). The etiology of third molar impaction depends on several factors, such as genetics, lack of space, retarded growth process, growth direction, eruption direction, and influence of external oblique line of the third molar relative to the long axis of the second molar. Impacted mandibular third molar

(M3M) may cause pain, periodontal disease, pericoronitis, caries, tumour, angle fracture, dental crowding, and cyst formation (Breik and Grubor .2008).

The prevalence of third molar impaction ranges from 16.7% to 68.6% (Kaya, et al., 2010). Most studies have reported no sexual predilection in third molar impaction. Some studies, however, have reported a higher frequency in females than males. Impacted teeth are often associated with pericoronitis, periodontitis, cystic lesions, neoplasm, and root restoration and can cause detrimental effects on the adjacent tooth (Ragini et al., 2003). Few studies have been carried out about the prevalence of third molar impaction among Africans. In a study which examined the pattern of impacted lower third molars in Calabar, Southern Nigeria the prevalence was low about 4% (Osunde & Bassey, 2016). Another study which was done in Tanzania on the prevalence of impacted third molars found a high prevalence of about 21.3% (Lema., 2002). In Zambia, no such studies have been published. According to the Patient's register at Dental clinic UTH, about 8 to 10 patients of impacted third molar tooth are seen every week. Hence the need for the study of this nature to be conducted, in order to explore third molar impaction and its clinical significance in a Zambian population.

MATERIALS AND METHODS

A cross sectional Prospective approach was used for this study; it was descriptive and quantitative in nature. The study was conducted at the University Teaching hospital (UTH), Dental Clinic. All patients with third molar impaction with age between 18 and 45 years old were included in the study while patients who had undergone 3rd molar surgery and had intraoral malignancy or untreated inflammatory processes were excluded from this study. Data was collected with a questionnaire (data collection tool personal formulated). Participants were given an explanation regarding the purpose of the study then asked to volunteer to participate in the study. Data was collected by the researcher using this questionnaire (Age, Gender, site of impaction, anomalies of third molar, pathologies on the second molar, treatment modalities types of radiographs). The researcher was confirming the diagnosis by the use of radiographs. A total of 126 patients were captured in this study. Data was analyzed using Statistical Package for Social Sciences (SPSS) software. Data was expressed as mean, SD, number, and percentage. The Mann Whitney test was used to determine significance for numeric variables and using Person's correlation for a numeric variable in the same group, $P > 0.05$ will not be significant, $P < 0.05$ will be significant, $P < 0.01$ will be moderately significant and $P < 0.001$ will be highly significant.

RESULTS

Site of Impaction of the Third Molar Tooth

There were 102(81%) mandibular impaction and 24 (19%) maxillary impaction (Figure 4.1).

Clinical presentation of the third molar impaction

Three anomalies were identified in this study; these were dental caries, pain and swelling. 87(69%) of participants had dental caries in the mandibular arch, 69 (67.6%) of these were on the right side, and 33 (32.4%) were found to be on left mandibular arch. 96(76%) of the participants had complained of pain, this pain was mostly 96 (76.2%) experienced on the mandibular arch, with 61(48%) of the participants having had complained of pain in the right mandibular

arch. Swelling was found to affect 96(76%) the mandibular arch and 61(48%) of the participants reported of swelling having to have affected the right mandibular arch.

Second molar and other structures involved

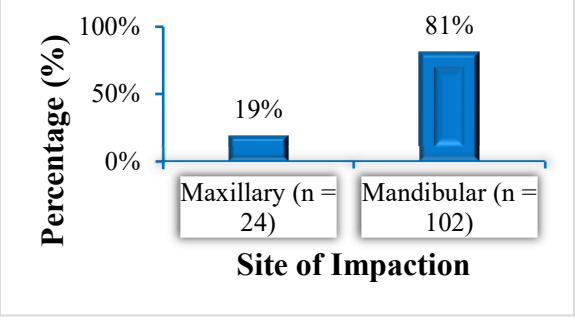

Figure 4.1: Bar chart showing sites of third molar tooth impaction among 126 participants

Table 1: Clinical presentation /Pathology of the third molar impaction and the effects on the second molar

Impact on molars	Site of Impaction		*p* value
	Maxillary n (%)	Mandibular n (%)	
Third molar impaction			
Dental caries	39 (31%)	87 (69%)	0.0001*
Gum swelling	30 (23.8%)	96 (76.2%)	<0.0001*
Pain	30 (23.8%)	96 (76.2%)	<0.0001*
Affected Jaw side			0.006*
Right	9 (37.5%)	69 (67.6%)	0.079
Left	15 (62.5%)	33 (32.4%)	0.053
Effects of third molar on second molar			
Gum disease	17 (46%)	20 (54%)	
Periodontal pocket in distal surface	23 (62.2%)	14 (37.8%)	
Dental caries	15 (28.8%)	37 (71.2%)	

Key: *Shows significant difference at 5% (0.05) level of significance with the Chi-square test

Gum disease was found in 37 (29.4%) of the participants and 20 (54%) of these were in the mandibular arch. 37(29.4%) of participants had periodontal pocket of second molar, 23 (62.2%) of these were in the maxillary arch, dental caries in the second molar were found in 52 (41.2%) of the participants, 37 (71.2%) of these were located in the mandibular arch.

Treatment modalities available for third molar impaction and associated adjacent tooth.

Among the treatment modalities, medical, surgical, and supportive/palliative treatment were the principal modalities identified in the study. For third molar impaction, the majority (88%)111/126 sought surgical treatment as a definitive management. While for second molar involvement the majority 78/126(62%) had undergone supportive/palliative treatment.

Table 2: Treatment modalities of impacted third molar and adjacent tooth

Treatment type	Type of Molar		*p* value
	Third molar	Second molar	
Medical treatment	104 (82.5%)	48 (38%)	<0.0001*
Surgical treatment	111 (88.1%)	(0%)	<0.0001*
Supportive treatment	15 (11.9%)	78 (62%)	0.0154*

Key: *Shows significant difference at 5% (0.05) level of significance with the Chi-square test

Radiological modalities

Radiological modalities were identified. 100 (79%) of the participants had intraoral X-rays and 26(21%) had OPG X-rays (Figure 4.2).

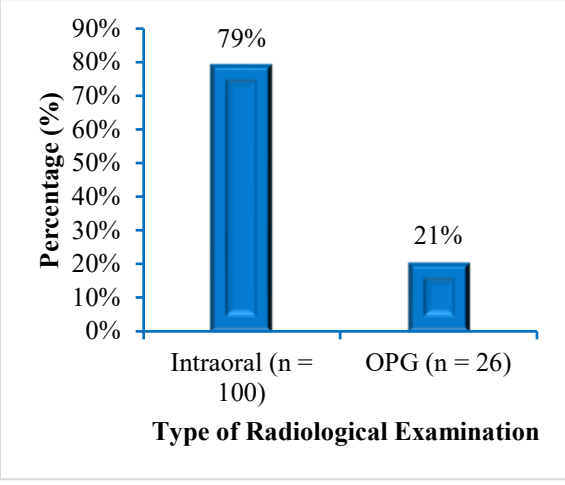

Figure 4.2: Bar chart showing types of Radiological examination

DISCUSSION

Third molars are the most impacted teeth, with an average worldwide rate of impaction of 24%, (Carter & Worthington, 2016). Impacted teeth may come with complications of clinical importance in a dental practice that require immediate attention these include, pericoronitis, erosion of the distal surface of the adjacent tooth, pocket formation, development of dentigerous cyst, and though rare, development of ameloblastoma (Lema. 2002). Impacted third molars are also associated with an increased risk of second molar pathology in middle-aged and older adult men (Nunn, 2013). The study was conducted at the University Teaching Hospital, Dental clinic, Lusaka.

Site of impaction of third molar tooth

The study found that 81% of third molar impactions were associated with the mandibular arch and 68% of these were located on the right side of the mandibular arch (Figure 1& Table 2) The study shows that third molar impactions are common on the right side of the mandibular arch. Similarly, Ferhat et al. 2017 reported that impacted third molars were more likely to occur in the mandible than the maxilla, in a study in which 57.3% of impacted third molars were in the mandible. These results confirm findings by (Carter & Worthington 2016; Selmi, Y, 2015). The mandibular third molar impaction is attributed to inadequate space between the distal of the second mandibular molar and the anterior border of the ascending ramus of the mandible (Santosh, 2015).

Clinical presentations of the third molar impactions

Three clinical changes were identified in this study, 69% of participants had dental caries, while 76% of the participants complained of pain and swelling (Table 2). In this current study, dental caries, pain, and swelling were found to be higher in males than in females. These clinical presentations were identified to be originating from the impacted third molar or the adjacent second molar. In the study by Santosh (2015), many pathologies were identified to be associated with third molar impaction, among them were dental caries, pain, and swelling. Santosh reported that the impacted lower third molars were extracted more commonly due to dental caries which affected either the impacted third molar or the root surface of the second molar, while pain was directly related to the presence of the impacted molar, having a prevalence that varied greatly from 5% to 53%. Contrastingly, Selmi et al., 2015 found

that pain, pericoronitis, lymphadenopathy, and trismus were common complications of third molar impaction, with pain and pericoronitis being the most common presenting complaint among the study group. Good dental hygiene also includes regular dental check-ups, however, among the low-income members of society, who made up most of this study, their visit to the dental clinic was entirely due to the discomfort of pain associated with the impacted molar.

Pathologies of the second molar associated with third molar impaction: Three pathologies of the second molar were identified in this study the majority 52(41.2%) was Dental caries, gum disease and periodontal pocket had similar incidence of 37(29.4%) (Table 2). The findings of this study agreed with study by Allen, 2008, who reported that distal caries in lower second molars related to a mesioangular third molar is a common finding in oral and maxillofacial patients in secondary care, especially if the third molar is fully or partially erupted. They are also in agreement with studies done by (Grover, 1986; Bishara, 1983; Daley, 1996; Song, 1997), who attributed the extraction of third molar impactions to dental caries found in the adjacent second molar. According to Kaye et al. 2020, in a study on the risks of loss of the second molar related to an impacted third molar, the prevalence of deep periodontal pockets (> 5mm) was higher on the second molars than the first molars while bleeding on probing was highly prevalent on both the first and second molars. Kaye concluded that with these complications, the prevalence of loss of a second molar was 32% higher when linked to an unerupted third molar relative to an absent third molar.

Treatment modalities

The study found that, (88%)111/126 of participants with impacted third molar, received surgical extraction as a treatment modality, however, this was after going through an initial treatment which either involved medical therapy or supportive/palliative. For the adjacent second molar, 78/126(62%) of participants presenting with anomalies in this tooth received supportive/palliative treatment, and few received medical therapies, none received surgical treatment (Table 3). Extraction of the third mandibular molar is a common surgical procedure in dentistry, post-operative side effects may include edema, pain, trismus, and oral dysfunction. A serious complication is a damage to the inferior alveolar nerve (Susarla et al. 2003). Because of these side effects and complications, surgical extraction is now being evaluated and restricted to specific indications. The NICE guidance of 2000 suggests limiting third molar surgery to patients with pathologies like unrestorable caries, untreatable pulpal or periapical pathology, cellulitis, abscess and osteomyelitis, resorption of the tooth or adjacent teeth, diseases of the follicle including cysts or tumors, teeth impeding surgery, teeth in the field of tumor resection. Unfortunately, this is hard to implement in the law income countries like Zambia were patients sort medical help after the condition as worsen, this contributed to high percentage of extraction of third molar impaction among the participants in this study.

Radiological modalities in the diagnosis of impacted third molar

The present study found that 79% of the participants were found to have third molar impaction after an intraoral imaging procedure and 21% had their diagnosis made through an Orthopantography (OPG) imaging technique (figure 2). These findings conflict with a study by Josefine and Anna 2012, in which the opposite was found, OPG was the most common radiological procedure for the diagnosis of impacted third molar followed by intraoral radiology. Zambia being a low-income country still utilizes less advanced medical equipment in its public

health facilities. Intraoral imaging modalities are cheaper to use and maintain compared to OPG, thus, intraoral is more commonly used as a cost-effective measure not only for the institution but for the patients as well.

CONCLUSION AND RECOMMENDATIONS

Right mandibular arch is the commonest site for third molar impaction and dental caries, pain, and swelling are the associated clinical presentations. Gum disease, root resorption in the second molar, periodontal pocket in distal surface of second molar and proximal dental caries in second molar were the pathological changes seen in the second molar adjacent to the impacted third molar in this study. Majority of third molar impaction were extracted deal to the fact that most participant had delayed sorting for dental services. Majority of the participants were diagnosed by an intraoral imaging procedure deal to high cost of OPG X – rays.

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REFERENCES

1. Allen. R. T, Witherow. H, Collyer. J, Roper-Hall. R., Nazir. M. A and Mathew. G. 2008. The mesioangular third molar to extract or not to extract? Analysis of 776 consecutive third molars. British Dental Journals. Macmillan Publishers Limited.
2. Bishara SE, Andreasen G, .1983. Third molars: A review. Am J Orthod: doi: 10.1016/s0002-9416(83)90298-1. PMID: 6572040. (Accessed, 12/2020)
3. Breik O, Grubor D.2006). The incidence of mandibular third molar impactions in different skeletal face types. Aust Dent J.; 53:320-4.
4. Carter. K and Worthington. S. 2016. Predictors of Third Molar Impaction: A Systematic Review and Meta-analysis. Journal of Dental Research, Vol. 95(3) 267–276.
5. Daley, T. D.1996. Third molar prophylactic extraction: A review and analysis of the literature. Gen Dent 44:310-20
6. Dinoi MT, Marchetti E, Garagiola U, Caruso S, Mummolo S, Marzo G .2016. Orthodontic treatment of an unerupted mandibular canine tooth in a patient with mixed dentition: a case report. J Med Case. 10, 170. https://doi.org/10.1186/s13256-016-0923-6 (30/11/2020)
7. Ferhat. A. M., Melih, O. E., Can, S., Zeki, R. (2017). Prevalence of Third Molar Impacted Teeth: A Cross-Sectional Study Evaluating Radiographs of Adolescents. Turkey, JCEI, vol 8; numb 2.
8. Grover, P. S., Lorton, L. (1985). The incidence of unerupted permanent teeth and related clinical cases. Oral Surg Oral Med Oral Pathol; 59:420-5
9. Janakiraman, N. E., Alexander, M. & Sanjay, P., 2010. Prospective Analysis of Frequency and Contributing Factors of Nerve Injuries Following Third-Molar Surgery, Pondicherry (Union Territory): Department of Oral and Maxillofacial Surgery, Mahatma Gandhi Postgraduate Institute of Dental Sciences.https://pubmed.ncbi.nlm.nih.gov/20485048 (14/12/2020)

10. Kaya GS, Aslan M, Ömezli MM, Dayi E .2010. Some morphological features related to mandibular third molar impaction. J Clin Exp Dent. Journal section: Oral Medicine and Pathology doi:10.4317/jced.2. e12 Publication Types: Research Faculty of Dentistry, Atatürk University
11. Kaye, E., B. Heaton, B., Aljoghaiman, E. A., Singha, C., Sohn, S., Garcia1, R. I. (2020). Third-Molar Status and Risk of Loss of Adjacent Second Molars. Boston, Journal of Dental Research 1–6
12. Lema.PA, 2002. A study to determine the prevalence of impacted third molars among patients, seen in, Dares Salaam Dental Clinics. Vol. 9 No 2 page 5-7
13. Nunn. M.E. Fish. M.D. Garcia. R.I. Kaye.E.K. Figueroa.R. A. Williams.D. E and Miyamoto.T. 2013. Retained Asymptomatic Third Molars and Risk for Second Molar Pathology. J Dent Res 92(12):1095-1099.
14. National Institute for Clinical Excellence (NICE). (2002). Guidance on the Extraction of Wisdom Teeth. London: NICE.
15. Osunde, O.D and Bassey, O.G. 2016. Pattern of impacted mandibular third molars in Calabar, Nigeria, Volume: 15 | Issue: 1 | Page: 14-17(04/03/2021)
16. Pereira, I. F., Santiago, F. Z. M., Sette-Dias, A. C. & de Souza Noronha, V. R. A. 2017. Taking advantage of an unerupted third molar: a case report. Dental Press J. Orthod. vol.22 no.4 Maringá.July/Aug.https://www.scielo.br/scielo.php?pid=S2176-94512017000400097&script=sci (8/11/2020)
17. Ragini, M. et al., 2003. Prediction of Third Molar Eruption, Department of Orthodontics, dental college, j Ind Orthod Soc; 36:103·11. Hamuna Naga (Haryana). https://journals.sagepub.com/doi/pdf/10.1177/097490982003020.8th (2/2/2021)
18. Santosh, J. (2015). Impacted Mandibular Third Molars: Review of Literature and a Proposal of a Combined Clinical and Radiological Classification. Annals of Medical and Health Sciences Research; Vol 5; Issue 4.
19. Santosh, P .2015. Impacted Mandibular Third Molars: Review of Literature and a Proposal of a Combined Clinical and Radiological Classification, Al Jouf, Kingdom of Saudi Arabia: Department of Oral Medicine and Radiology, College of Dentistry, Al Jouf University, Sakakah.https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4512113/(28/12/2021)
20. Selmi, Y., Mehmet, Z. A., Melda, M., Serap, Y. (2015). Assessment of Third Molar Impaction Pattern and Associated Clinical Symptoms in a Central Anatolian Turkish Population. Med Princ Pract. 169–175
21. Song, F, Landes, DP, Glenny, AM & Sheldon, TA .1997. 'Prophylactic removal of impacted third molars: an assessment of published reviews.' British dental journal, vol. 182, no. 9, pp. 339-346. http://www.ncbi.nlm.nih.gov/pubmed/9175290 (01/02/2021)
22. Song, F., Landes, D. P., Glenny, A. M., Sheldon T. A. (1997). Prophylactic removal of impacted third molars: An assessment of published reviews. Br Dent J; 182:339-46.
23. Susarla, S. M., Blaeser, B. F., Magalnick, D. (2003) Third molar surgery and associated complications. Oral Maxillofac Surg Clin North Am 15:177–186