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Original research

Prevalence of caries and cervical resorption on adjacent second molar associated with impacted third molar☆☆

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ABSTRACT

Introduction: Impacted third molars are the most frequently impacted teeth in humans and can predispose the adjacent second molar to an array of detrimental effects such as caries, periodontitis and cervical resorption. The objective of this study is to determine the incidence of caries and cervical resorption on the adjacent second molar associated with impacted third molar.
Materials and method: A prospective cross sectional study involving patients presenting with impacted third molar. Periapical radiographs were exposed using the paralleling technique. The type of impaction, extent of caries, presence of cervical resorption were collated. The impacted third molar was classified using the Winter's classification. Data was analysed using SPSS version 21.0. The analysis was done using frequency distribution, cross tabulations, test of significance with chi square.
Result: A total of 122 participants with 150 impacted third molars were recruited for this study. Mandibular left third molar was the most frequently encountered impacted third molar (52.0%). Mesioangular impaction was the most common impaction encountered (50.7%). Less than half (44.7%) of the second molar adjacent to an impacted third molar had a carious lesion while only 4.7% of the second molars had associated cervical resorption. There was statistically significant association between the caries status of the second molar and type of impaction on the third molar with a higher tendency for mesioangular impaction to have associated caries on the second molar.
Conclusion: Impacted third molar is associated with complications which manifest on the adjacent second molar.

1. Introduction

Impaction has been defined as a tooth that fails to erupt into the dental arch within the expected time [1]. Usually the roots are expected to be completely formed with an open apex by age 18 years and by age 24 years 95% of all third molars that will erupt should have completed their eruption [2].

Impaction has also been defined as a tooth which is prevented from completely erupting into a normal functional position, due to lack of space, obstruction by another tooth or an abnormal eruption path [3], inadequate bony length [4], insufficient development of the retromolar space [5] with the tooth either partly visible/in communication with the oral cavity or completely invisible [6].

Impacted third molars can predispose the adjacent second molar to an array of detrimental effects such as caries, periodontitis and cervical resorption [6–9]. This may lead to loss of hard tooth tissue, pain and discomfort to the patient and ultimately loss of the tooth with its attendant consequences [10,11]. These detrimental effects could also affect the quality of life of the patient [12].

Varying incidence of caries [6,8,9,13,14] and cervical resorption [9,15–18] in the adjacent second molar from impacted third molar has been reported from other climes but a paucity of such studies in Nigeria. It was on this premise this study was designed to determine the prevalence of caries and cervical resorption on the adjacent second molar as an effect of an impacted third molar.

☆ AsianAOMS: Asian Association of Oral and Maxillofacial Surgeons; ASOMP: Asian Society of Oral and Maxillofacial Pathology; JSOP: Japanese Society of Oral Pathology; JSOMS: Japanese Society of Oral and Maxillofacial Surgeons; JSOM: Japanese Society of Oral Medicine; JAMI: Japanese Academy of Maxillofacial Implants.
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2. Methods

This was a prospective cross sectional study involving patients presenting with impacted third molar to the Dental Centre of the University of Benin Teaching Hospital. The minimum sample size expected to make the study result reliable was 120 calculated using a formula by Araoye [19].

The data collection instrument was a pre-tested interviewer administered questionnaire. The questionnaire elicited information on demographic characteristics, number and type of impacted third molar, caries and cervical resorption status of the adjacent second molar, extent of caries on the second molar and symptoms associated with the second molar.

The standard International Labour occupational classification system [20] was adapted to classify occupation into five (5) socioeconomic groups: Professionals and managerial officers and retirees of this type (e.g doctors, lawyers), skilled workers (e.g teachers, nurses), semi-skilled workers (e.g artisans), unskilled workers (traders), dependents (students and other unemployed individuals).

Informed consent was obtained from all the participants. Ethical approval was obtained from the ethics and research committee of the College of Medical Sciences, University of Benin before commencement of the study.

Inclusion criteria was all consenting patients with at least one impacted third molar and standing second molar. Patients who have had either their impacted third molars or second molars extracted or second molars filled were excluded from the study.

Periapical radiographs were exposed using the long cone paralleling technique, for all impacted third molars and adjacent second molar teeth to enable classification of the type of impaction, extent of caries, presence of cervical resorption and any other radiographic findings associated with the second molar. The long cone paralleling technique for exposing periapical radiographs was used because it is regarded as the technique of choice due to its reduced radiation dose; less magnification and demonstration of the true relationship between the bone height and adjacent teeth [21]. Since the dental film is highly flexible, literally and figuratively, its processing can be suboptimal and often leading to a poor image [22] a digital probe was used along with a digital Xray machine for this study instead.

The impacted third molar was classified as partial impaction when the superficial portion of the tooth is covered only by soft tissue but the height of the tooth's contour is below the level of the surrounding alveolar bone and complete impaction when the tooth is completely encased in bone so that when the gingiva is cut and reflected back, the tooth is not seen [23].

The third molars were also classified using the Winter's classification based on the inclination of the long axis of the impacted third molar to the long axis of the second molar [24]. The various types of impactions in maxillary third molars is similar to that of the mandibular third molars based on the orientation to the second molar hence Winters classification has been adapted to the maxillary third molars [23,25–29] The tooth was classified as mesio-angular when the impacted third molar is tilted towards the second molar in a mesial direction; disto-angular when the long axis of the impacted third molar is angled distally/posteriorly away from the second molar; horizontal when the long axis of the impacted third molar is horizontal and vertical when the long axis of the impacted third molar is parallel to the long axis of the second molar.

The data so obtained was analysed using IBM Statistical Package for Social Sciences (SPSS) version 21.0. The analysis was done using frequency distribution, cross tabulations, test of significance with chi square. $P < 0.05$ was considered statistically significant. Logistic regression was used to predict the probability of the second molar coming down with caries.

Table 1
Socio-demographic characteristics of the participants.

Characteristics	Frequency	Percent
Gender		
Male	42	34.4
Female	80	65.6
Age (years)		
<20	5	4.1
17–25	30	24.6
26–35	55	45.1
>35	37	30.3
Marital status		
Married	60	49.2
Single	62	50.8
Socioeconomic status		
Professionals	13	10.7
Skilled worker	36	29.5
Semi-skilled workers	5	4.1
Unskilled workers	27	22.1
Dependants	41	33.6
Total	122	100.0

Table 2
Distribution of third molar teeth and type of impaction among the participants.

Characteristics	Frequency	Percent
Third molar		
Mandibular left	78	52.0
Mandibular right	49	32.7
Maxillary left	11	7.3
Maxillary right	12	8.0
Type of impaction		
Complete	41	27.3
Partial	109	72.7
Winter's classification		
Mesioangular	76	50.7
Disto angular	23	15.3
Horizontal	15	10.0
Vertical	36	24.0
Total	150	100.0

3. Results

A total of 122 participants with 150 impacted third molars were recruited for this study. The number of impacted third molar in an individual ranged from 1 to 4 with a mean of 1.23 ± 0.61 teeth. The participants' age ranged from 17 to 81 years with majority being in the 26–30 years age group. The mean age of the participants was 33.07 ± 11.03 years. Majority were females with a male female ratio of 1:1.91 and 33.6% were dependents (Table 1).

Mandibular left third molar was the most frequently encountered impacted third molar (52.0%). Majority (72.7%) of the impacted teeth were partially impacted. Mesioangular impaction was the most common impaction encountered (50.7%) while horizontal impaction was the least (10.0%) (Table 2).

Less than half (47.3%) of the impacted third molars were in contact with the second molars while 52.7% had no contact with the second molars. Less than half (44.7%) of the second molar adjacent to an impacted third molar had a carious lesion while only 4.7% of the second molars had associated cervical resorption. Of the carious second molars, the extent of caries in79.1% of them was the pulp.

Table 3 depicts a statistically significant association between the caries status of the second molar and type of impaction on the third molar with a higher tendency for mesioangular impaction to

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