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Research Article

Incidence of Distal Caries in Mandibular Second Molar due to Impacted Third Molar

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Abstract

Background: Mandibular third molar is the most common tooth to be impacted associated with the complication of distal caries on the mandibular 2nd molar. This can be prevented if the impacted tooth is diagnosed early and provided appropriate management. The aim of this study is to assess the incidence of distal caries in second molar due to impacted third molar in PIDC. The objectives of the study are to evaluate the incidence of distal caries in mandibular second molar by impacted third molar teeth together with the gender variation, angulation and age group in the incidence of distal caries of second molar.

Aims and Objectives: The present study is aimed to assess incidence of distal caries in second molar due to impacted third molar in Penang International Dental College (PIDC), Penang, Malaysia. The objectives of the study were to evaluate the incidence of distal caries in mandibular second molar by impacted third molar teeth, to assess the gender variation in the incidence of distal caries of second molar, to assess the association between distal caries and different types of angulations of third molar impaction and to assess the most prevalent age group having distal caries in mandibular second molar. Thus, the researchers are able to reduce the risk of distal caries in second molar by identifying its relation with the impacted third molar.

Methodology: This is an evidence based study conducted on 45 patients, who have impacted 3rd molar with the age of 18 and above that visit the college PIDC. The gender variation, ethnicity, including the age of the patient are recorded. The periapical radiograph or pre-op OPG are taken to determine the impaction and distal caries.

Results: According to this study results, 57.78% cases show caries on the distal aspect of the mandibular 2nd molar due to impacted 3rd molar. The incidence of distal caries with horizontal impaction was 46.15%. A majority of horizontal impaction cases were found as per the Pell and Gregory classification. Males show higher incidence compared to females (57.69%) with the age group of 23 - 27 and 28 - 33 (30.77%).

Conclusion: In conclusion, more than half of the patients in PIDC have distal caries in the second molar due to the impacted 3rd molar, hence prophylactic removal should be considered, especially in horizontal impaction. Besides, males and patients with the age of 23 and above should pay more attention to their impacted 3rd molar as they have higher risk of developing distal caries in the second molar.

Keywords: Impaction; Distal Caries; Mandibular Molar; Impacted 3rd Molar; Horizontal

Introduction

An impacted tooth is one that fails to erupt into the dental arch within the foreseeable time. Mandibular third molars are the most frequently impacted teeth because they are the last teeth erupting into the dental arch. Hence more chances of lack of space for their eruption [1]. The pressure exerted by the impacted third molars on the second molar will make the second mandibular teeth more prone to distal caries. Partially erupted mesio-angular and horizontally impacted teeth accumulate plaque against the distal surface of second molar thereby predisposing them to distal cervical caries [2]. Occurrence of third molar impaction is related to various factors such as age, ethnicity, facial skeleton, and genetics [3].

There have been numbers of published studies reporting dental decay development in the tooth immediately next to the impacted wisdom tooth [4,5]. The caries process usually affects the distal aspect of the second molar and this has been strongly associated with impacted mandibular third molar especially mesio-angular impaction. Besides, females have higher frequency compared to male [4,7]. Females have also been reported to have greater predilection in this aspect when compared to males.

Mandibular third molars are known to be associated with different pathologies and acquire varied position and angulation. Clinical and radiographic examination help in classifying these teeth and diagnose varied pathologies. It may also cause adverse effects which cannot be reversed on the adjacent tooth as reported by Allen RT, Witherow H., *et al*. [7].

All impacted teeth should be removed unless contraindicated. Extraction should be performed as soon as the dentist determines that the tooth is impacted. Removal of impacted teeth becomes more difficult with advancing age. The dentist should typically not recommend that impacted teeth be left in place until they cause difficulty. If the tooth is left in place until problems arise, the patient may experience an increased incidence of local tissue morbidity, damage to adjacent teeth and bone and potentially injury to adjacent vital structures [1].

Distal caries in the mandibular 2nd molar are difficult to restore, this may be to subject subgingival caries and may also have alveolar bone loss. Considering these factors, impacted third molars are often indicated for extraction. Hence, removal of the third molar remains the most frequent surgical procedure performed by the dental surgeon [7].

The treatment commonly encompasses root canal therapy or removal of the second and probably as well as the third mandibular molar. This can be prevented if it is diagnosed early and provided the appropriate management. The aim of this study is to assess the prevalence of distal caries in second molars due to impacted third molar among the patients reported to Penang International Dental College (PIDC) for distal caries in mandibular molar due to impacted third molar.

Materials and Methods

Retrospective radiograph records of 100 patients who visited Penang International Dental College (PIDC) were randomly selected for the study. Only the patients whose having impacted third molar and are indicated for 3rd molar extractions will be checked. Angulation of the third molars based on their long axis and angulation with reference to the longitudinal axis of the nearby second molar, impacted third molar's eruption condition, molar to molar contact, and presence and absence of dental caries in lower second molars will be noted. Patient's details including age, gender and ethnicity will be extracted from the patient's clinical record after getting approval from the clinic.

The study will include the participants reported to Penang International Dental College(PIDC) for distal caries in mandibular second molars due to impacted third molars who are willing to be included. The patients that are included in the study needed to be above 18 years old, having at least one impacted mandibular third molar and having fully erupted mandibular second permanent molars adjacent to the third molar. The patients chosen are those who are willing to participate in the study and ready to give informed consent and willing to undergo radiographs. For those who are below 18 years old, not having impacted mandibular third molars or having any of the missing mandibular second or third molars or having mobile second or third molars will not be included in the study.

The data collected from the participants will be recorded and analysed, then presented in the graph and chart form.

Results

The sample was composed of random 100 patients who visited Penang International Dental College (PIDC), and 45 patients were found to have third molar impaction and were indicated for extraction in PIDC. Figure 1 revealed the patient's third molar impaction angulation in PIDC. Of the 45 impactions, horizontal (35.56%) is the most common type of angulation, followed by mesioangular (33.33%), vertical (24.44%), and bucco-version (6.67%) impactions. There are none other types of impactions like distoangular, linguo-version, and torsoversion found.

Figure 1: Angulation of third molar impaction.

Figure 2 shows that out of 26 patients with third molar impaction cases which causes distal caries in mandibular second molar, 15 patients (57.69%) were male, and 11 patients (42.31%) were female. Male patients show slightly higher incidence of distal caries of mandibular second molar compared to female patients.

Figure 2: Gender variation in the incidence of distal caries of mandibular second molar.

Figure 3 shows that a total of 45 patients from PIDC with impacted third molar, 26 patients (57.78%) found to have distal caries in mandibular second molars. 12 out of 26 patients (46.15%) had horizontal impaction that led to distal caries in mandibular second molars. This was closely followed by mesioangular impactions, with a total of 9 patients out of 26 (34.62%) that had distal caries in mandibular second molars. Among 26 patients in PIDC with distal caries in mandibular second molar, only 4 patients (15.38%) with vertical impaction that had led to distal caries in mandibular second molars. Only 1 patient with bucco-version impaction had distal caries in the mandibular second molars (3.85%) in the study.

Figure 3: Presence of distal caries in mandibular second molar

Figure 4 shows the distribution of age groups having distal caries in mandibular second molar due to impacted third molar. Age group of 23 to 27 and 28 to 33 (30.77%) had the highest incidence of distal caries in mandibular second molar, followed by the age group of 34 to 38 (26.92%), 39 and above (7.69%) and lastly, 18 to 22 (3.85%).

Figure 4: Distribution of age groups having distal caries in mandibular second molar.

Discussion

Mandibular 3rd molar will erupt at the age of 17 to 25, which is why it's called 'wisdom tooth' [11]. It's a common finding when the mandibular third molar is impacted [12]. According to Durbeck WE 1943, impaction of a tooth is defined as cessation of its eruption caused by physical barrier (detectable by a clinical or radiological examination) in the eruption path or by an ectopic position of a tooth. A physical barrier can be neighboring tooth, dense bone, fibrous tissue or any other pathology or lack of space, or abnormal eruption path [11].

Impacted third are often associated with other pathologies like pericoronal abscess, cysts and unicystic ameloblastoma. Beside these pathologies, incidence of distal caries in the second molar is the utmost concern as the latter bears the maximum masticatory load [4].

According to the result, the researchers have found out that the most common angulation for impacted 3rd molar that will lead to distal caries on mandibular second molar is horizontal angulation. Both male patients and patients above the age of 25 have shown to have a higher risk of developing distal caries. However, statistics have shown that there is no relationship between the incidence of distal caries, its angulation, age and sex due to lack of sample of this study.

Horizontal impactions were commonly observed with mandibular third molars as shown in the study (35.56%), however studies done by AIMST Dental Institute, Malaysia showed that mesioangular type of impaction was the most frequently seen (49.8%) [13]. Ryalat S., *et al*. (2018), conducted a study involving 1198 impacted molars to access the incidence of distal caries in mandibular second molars due to impacted third molars, it showed that mesioangular position was the most common impaction as can be seen in Amman, Jordan by the incidenceof66.1%among all the impactions [14]. According to the authors, mesioangular impaction was also found to be the most common type of impaction in Turkey, Singapore, and China. Quek., *et al*. (2003) also reported that mesioangular impaction is the most common followed by horizontal impaction [15].

When comparing among male and female gender, male group showed higher incidence of distal caries in mandibular second molar due to impacted third molar compared to female group (57.69%). Jin X., *et al*. (2021) conducted a study in Affiliated Hospital of Yanbian University, Yanji, Jilin, China to analyze the factors that are contributing to distal proximal caries of mandibular second molar due to impacted third molar, the result showed that male group had higher incidence of distal caries on mandibular second molar(50.8%) when compared to female group [16]. Similar to this present study, males had higher incidence of distal caries than females in the study done by Chen YW., *et al*. in Taiwan [17]. However, contrary to the study, a study conducted by Almarshedy., *et al*. in 2019 showed that the female group had a higher incidence of distal caries when compared to male group (65.20%) [1].

In general, the study done by the researchers reported 57.78% incidence in distal surface caries of second molar in the presence of mandibular third molars. According to Kang., *et al*. (2016), their study concluded about the similar incidence of distal caries due to impacted third molar (52%) [18]. The majority of distal caries in the second molar was caused by horizontal impactions (46.15%) shown in the study. The study conducted by Marques J., *et al*. 2017 also showed the same result as the study done by the researchers [19]. Similar to the study, according to a study conducted in King Khalid University, Abha, Kingdom of Saudi Arabia, the incidence rate of distal caries in second mandibular molars due to impacted third molars was 39%, and the majority of distal caries in the second molar was also caused by horizontally impacted third molars (38.9%) in their patient series [8]. A study reported by AlHobali SQ., *et al*. in 2019 showed that 48.6% incidence in distal surface caries of second molar in the presence of third molars, the studies reported that mesioangular and horizontally placed third molars are more likely to be linked with caries development in the adjacent second molar [7]. However, Prajapati VK., *et al*. 2017 conducted a study and their result showed that mesioangular impaction had the highest incidence that leading to distal caries in mandibular second molar [20]. The result is similar to the study conducted by Kang., *et al*. (2016) in China [18].

The current study showed higher incidence of dental caries in distal surface of mandibular second molar due to impacted adjacent third molar in the age group of 23 - 27 and 28 - 33 years as compared to other age groups. KB Syed., *et al*. conducted a study in 2017, in their study, the age group 21 - 28 years had significantly higher incidence of distal caries in second molars (59.6%) [8].

According to the study conducted by Kang., *et al*. (2016), the result concluded that the incidence of distal caries on mandibular second molar due to impacted third molar increases with age [18]. The patients 27 to 59 years old were 2.18 times higher incidence compared to those 16 to 27 years old.

Conclusion

Based on the result of this study, the researchers have concluded that impacted 3rd molar, especially due to horizontal impaction will eventually lead to the complication of having distal caries on the mandibular second molar, hence prophylactic removal of impacted 3rd molar should be considered. This is because horizontal impaction of 3rd molar will lead to food debris accumulation and eventually cause caries formation on the adjacent tooth. Besides, male patients have to pay more attention to their impacted teeth since they have a higher risk of developing caries on the mandibular second molar. Lastly, according to the data collected above, patients older than 23 years old should pay close attention to their impacted 3rd molar as it will eventually lead to formation of distal caries in the second molar.

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