INCIDENCE OF DISTAL CARIES IN MANDIBULAR SECOND MOLARS DUE TO IMPACTED THIRD MOLARS – A CLINICAL & RADIOGRAPHIC STUDY

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ABSTRACT

Occurrence of distal caries in lower second molars has been associated with impacted mandibular third molars especially mesioangular impactions. Caries detection and restoration can be difficult and if it progresses, root canal treatment or extraction of the second molar may be necessary.

The aim of this retrospective study was to evaluate the incidence of caries on distal aspect of mandibular second molars in patients referred for corresponding third molar assessment and to identify its association with angular position and depth of the impacted mandibular third molars based on the classification of Pell & Gregory.

Two hundred impacted mandibular third molars were assessed in a total of one hundred and sixty seven patients presenting to the Department of Oral and Maxillofacial Surgery, Islamic International Dental College & Hospital from April 2011 to July 2012. These patients had age range between 18-57 (mean age of 37 years)

According to this study, 42.5% cases show caries on distal aspect of mandibular second molars. Incidence of caries with mesioangular impacted third molars was 51%. Majority of these mesioangular cases were level B and Class I as per Pell & Gregory Classification. Distal caries found in association with horizontal impactions was 29.10%, vertical impactions 15.2% and distoangular impactions 4.7%. No caries was found in relation to transverse impactions.

It was concluded that distal caries in second molars is common, especially in cases of mesioangular mandibular third molar impactions and prophylactic removal of these impacted teeth may be considered appropriate. If such a third molar is left in situ, close monitoring is necessary.

Key Words: Impacted third molar, distal caries mandibular second molars, prophylactic removal.

INTRODUCTION

Impaction is defined as failure of tooth eruption into normal position caused by obstacle in the eruption path, abnormal positioning of a tooth, lack of space, or other impediments. The term impaction was defined by Peterson in 1998 as a tooth that fails to erupt into the dental arch within the expected time. Incidence of impacted third molars is more common in the mandible (90%) than the maxilla. Most commonly affected teeth are third molars, followed by maxillary canines and mandibular second premolars. The rising incidence of the impacted teeth and their influence on the dental arches has long been of concern to oral surgeons and is now considered as a public health problem.

Many impacted third molars remain asymptomatic for years. However, retained third molars have been associated with the development of a series of pathologic sequelae which include caries, pericoroni-
Caries may also develop in clinical situations where no obvious communication exists between the mouth and impacted tooth while in partially impacted teeth occlusal and approximal sides are most commonly affected. Caries in such partially impacted teeth or adjacent teeth may or may not be cavitated. Cavitated lesions are a result of undisturbed dental plaque in that area, that is more difficult to be controlled by oral hygiene measures (Figure 1). In some cases caries is not evident clinically, but may be present in form of hidden caries which can be visualized radiographically. (Figure 2).

The tooth position and inclination play a main role in caries development process. In case of partially exposed mesioangular and horizontal mandibular third molars, occlusal surface form plaque accumulative crevices against the distal surfaces of the second molars leading to development of distal caries in second molars. As the gingival margin recedes cement-enamel junction becomes exposed, forming a bacterial retention site leading to formation of root surface caries (Jacobsen, 2008). (Figure 3)

The management of impacted tooth varies from routine follow-up by means of periodical radiological and clinical assessment to surgical removal. Estimate of the rate for incidence of caries on distal aspect of mandibular second molar varies from 1% to 5% which is difficult to be restored without extraction of the impacted third molar. Delay in seeking proper treatment for an impacted third molar may result in development of distal caries in second molar and the impacted tooth itself especially in case of mandibular mesioangular impaction.

In cases of restored lower second molar where third molar is left untreated, recurrent caries may develop in second molar extending to adjacent third molar resulting in loss of both teeth (Walmsley et al., 2002) (Figure 4). It is therefore suggested to go for prophylactic removal of an impacted mandibular tooth which is mesioangular in position. This could prevent distal caries formation in mandibular second molars.
METHODOLOGY

A review was carried out on dental records of patients who had undergone removal of mandibular third molars. A total of one hundred sixty seven patients presenting with lower 3rd molar impactions in the Department of Oral and Maxillofacial Surgery, Islamic International Dental College & Hospital were assessed. Demographic details and informed consent was taken from the selected patients. Number of impacted third molars, pathological conditions and chief complaint as caries, pericoronitis and recurrent pain were recorded. Patients in the present retrospective study belonged to ASA I or ASA II category of American Society of Anesthesiologists (ASA).

The selection criterion for patient inclusion was age above 18 years, clinical symptoms and pathology associated with mandibular third molars. The exclusion criteria included cases where adjacent mandibular second molars were absent and patients were below 18 years of age.

The depth of lower 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. Reference levels consist of the occlusal surface of the mandibular second molar and the cementoenamel junction of the mandibular second molar. Pre-op orthopantomograms and periapical radiographs were used using standard technique. The angulation and depth of mandibular third molar impaction, relationship between the incidence of caries in the second molars and the eruption status of the mandibular third molars were determined.

RESULTS

Among 200 impacted molars extracted, most extractions were carried out in patients in early third decade of life, where 49.5% were male and 50.5% female patients as shown in pie chart below (Graph 1). Incidence of mandibular impacted third molars on right side was 54% while 46% on left side of mandible where 67% were unilateral 33% were bilateral. (Graph 2 & 3). Mesioangular position was the most common impaction accounting for 41% of total mandibular third molar impactions as shown (Pie chart 4).

In general, level of impaction according to Pell & Gregory classification shows 45% third molars in class A, 40.5% in class B and 14.5% in Class C relationship. Impacted teeth associated with caries in distal aspect of mandibular second molars accounted for 43.7% in Class A, 45.8% in Class B, and 10.5% in class C.
Caries In Second Molars Due to Impacted Third Molars

respectively. Majority of mesioangular impacted third molars associated with carious mandibular second molars were in depth B (61%) followed by depth A and C. In horizontal impactions incidence of carious second molars was related to depth A. For distoangular impacted third molars, there was an equal incidence for depth A and B. Vertical impaction shows predilection of carious second molars in depth A. (Graph 5).

Impacted teeth in ramal relationship for type I were 66%, type II 30% and type III 4% respectively. Whereas, for carious second molars ramal relationship with impacted mandibular third molar was 67% for type I, 29.5% type II and 3.5% for type III. Both angulation and level were determined using Pell and Gregory classification. High incidence of carious mandibular second molars was related to impacted third molars in Class 1 ramal relationship for all angulations. However, horizontal impacted third molars, show high prevalence of caries in ramal Class 2.

Radiographic evidence of second molar distal caries was found in 42.5% of the cases in mandibular arch. When only mesioangular third molars were included this incidence increased to 51%. This was followed by 29.1% in horizontal, 15.2% in vertical, 4.7% in distoangular and 0% caries in buccolingual direction (Graph 7). Our study also recorded that caries was more frequently seen in level B occlusal relationship, with an incidence of 45.8%, followed by level A and C.

Our results show that mesioangular positioning of mandibular third molars had the highest caries inci-
Radiographic examination showed that these teeth were in contact with the second molar tooth at, or close to the amelocemental junction. Based on a total of 85 carious teeth in the mandibular second molar group, the adjacent third molar showed mesial angulations between 40-80° (majority of impacted mandibular third molars). Significantly high caries risk was found in mandibular second molar group where impacted third molars had angulation between this range. The relationship between third molar angulation and second molar distal caries was hence statistically significant.

**DISCUSSION**

Third molars are the last teeth to erupt and therefore, most commonly impacted teeth. Failure of rotation from the mesioangular to the vertical direction has been reported to be the most common cause of an impacted tooth. During tooth eruption into the oral cavity, organic pellicle a cellular covering which protects enamel surface disappears causing attachment of saliva and microorganisms to the enamel. Not every impacted third molar causes a problem, and an unknown percentage of unerupted third molars may remain asymptomatic for years. Others can cause complications as pain, infection, cysts, tumors, jaw fractures, or malposition of the mandibular anterior teeth, resorption of the adjacent teeth or periodontal bone loss. (Figure 5)

Third molars are the most common impacted teeth and pericoronitis associated with bad oral hygiene and lesser self-cleaning area lead to food and microorganism accumulation.

Partially exposed impactions do not participate in mastication and offer favorable conditions for bacterial accumulation, which cannot be cleaned through normal brushings, and flossing resulting in caries as described by Fejerskov& Kidd (2008). Sasano et al; (2003) demonstrates that the one-third partially impacted mandibular third molars had the highest propensity for developing a pathological condition as caries. This finding is also supported by another study, which reported that the risk for developing pathology along with partially impacted third molars seems to be 22% to 34% higher than molars completely embedded in bone.

Indications for removal of impacted teeth vary from orthodontics, prosthodontics, and pathologic causes. One of the reasons that impacted tooth is removed is its influence on the adjacent teeth with the development of associated carious lesion. As reported, it is one of the common features associated with extracted mandibular third molars (Battaineh et al., 2002), less commonly seen in impacted maxillary third molars. In a study done in 2008, caries and its sequelae (63.2%) was the major reason for the mandibular third molars extraction, followed by recurrent pericoronitis (26.3%) and periodontitis (9.2%). Allen et al. (2009) reported incidence of 42% of the distal second molar caries associated with partially or completely impacted mandibular third molars.

The development of distal cervical caries in mandibular second molar is a protracted process which develops over time and increases with continued exposure to the oral cavity. The incidence of second molar distal caries as reported is between 0.5–8%. A study done in 2002 showed an overall caries rate of 23% in impacted molars and 0.5% in the second molars associated with impacted molars. Another study done in 2006 suggests that second molar caries accounts for 5% of mandibular third molar teeth removals. However, data from different authors show that these numbers are even higher.

![Fig 5: Shows distal bone loss around mandibular third molar due to mesioangular impaction of third molar.](image)
later into life, and the incidence of distal cervical caries of the second molar as an indication would rise accordingly.

Angular position of an impacted mandibular third tooth has potential implications on adjacent second molar. This positioning of impacted tooth is intimately related to the clinical manifestations associated with impaction. Mesoangular position characterized by second molar making a convergence angle of > 30° (i.e. 40° and 80°) is the most common type of third molar impaction comprising about 43% of all third molar impactions (Kan et al., 2002) (Quek et al; 2003). The distribution of angulation and depth of impaction in the impacted lower third molars seen in our study shows same results.

In case of mesio-angular lower third molars partially exposed in the oral cavity, occlusal surfaces form plaque accumulative crevices against the distal surfaces of the second molars. Various studies outline changes in microbial species and inflammatory mediators associated with third molars. Such teeth are more critical to adjacent second molar, because impacted teeth in these positions cause caries and resorb distal surface and root on distal aspect of mandibular second molars. According to a study, teeth in a mesioangular, horizontal, or inverted position present a fourfold to tenfold greater risk of noninfectious problems.

Few studies have been conducted on comparison between the effects of the degree of angulation of the third molar on caries formation on distal aspect of second molars. McArdle and Renton evaluated record of 100 patients who had 122 mandibular third molars removed because of distal cervical caries in the mandibular second molars. Majority of these third molars had a mesial angulation between 40° and 80°. These findings suggest a meaningful relationship between the occurrence of distal caries on the mandibular second molars and the position of the mandibular third molars. With good oral hygiene maintenance, pericoronal tissues would be easily maintained however, the contact area between the second and third molars would remain relatively inaccessible with consequent long-term plaque accumulation.

Another factor that is associated with the risk of developing distal cervical caries is the point of contact that the third molar makes with the second molar. Partially erupted mesio-angular impacted mandibular third molars that contact the amelocemental junction of the second molar place this tooth are at risk of developing caries in the distal cervical region. Contact point localization above the amelocemental junction on the other hand, poses less risk than the other positions.

There is little evidence that removal of asymptomatic impacted molar is an appropriate treatment strategy. The guidelines of the National Institute for Clinical Excellence UK for the management of third molar teeth, advise against the prophylactic removal of an impacted third molar tooth. In the past the view that asymptomatic third molars should be removed because of the likelihood of future pathology was widely held. There is little empirical evidence supporting this view since the risk of disease associated with third molars is relatively low. However, the likelihood of developing pathologic conditions associated with it determines removal.

When evaluating the prevalence of the caries on the mandibular second molars, mesioangular impactions had significantly higher scores than others. The results revealed that second molar distal caries justifies prophylactic mandibular third molar removal that has an angulation of 40°–80° with a contact point on the amelocemental junction should be removed as one possible treatment modality to improve the prognosis of mandibular second molars and thus promote long-term oral health. Extraction of a mesioangular third molar before the development of distal cervical caries in the second molar could thus benefit the masticatory function and dental health of a patient.

CONCLUSION

Second molar distal caries justifies the prophylactic extraction of mandibular third molars. Results of the present study proves the notion that susceptibility to distal caries in second molar teeth is linked to mesioangular positioning of the impacted third molar particularly when its above 40 degrees. If such third molar is removed before distal caries develops in second molar then consequent dental treatment of this tooth may be avoided. In order to maintain the long term health of adjacent mandibular second molar, we
hypothesize that impacted third molar with mesial angulation between 40°-80° in particular lying at level B and Class I validate early/prophylactic removal of mandibular third molar.

REFERENCES


