Research Article

Association between Impacted Mandibular Third Molar and Distal Deep Caries on Mandibular Second Molar

Ashfaq Ahmed M, Raghu Sandhya* and Saravana Dinesh SP

Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India

Corresponding author: Raghu Sandhya, Department of Conservative Dentistry and Endodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Chennai, India, E-mail: sandhya.sdc@saveetha.com

Abstract

Impacted mandibular third molars may predispose an individual to other problems, such as pericoronitis, orofacial infections, periodontitis, external resorption of the adjacent tooth etc. Because the carious lesion in the distal surface of the 2nd molar is difficult to detect, such teeth could develop pulpitis or apical periodontitis. The aim of the study was to assess the association between impacted mandibular third molar and distal deep caries on mandibular second molar. Dental records of patients reported to the institution between June 2019 to March 2020 were retrieved. Dental records of patients who underwent extraction of impacted mandibular third molar teeth was assessed (n=641). Age, gender, type of impaction of third molar based on winter's classification, presence and absence of distal caries on the corresponding mandibular second molar was recorded. The frequency distribution was analyzed with descriptive statistics, the association between type of impaction and dental caries on second molar was analyzed by chi square test using SPSS. Results from this study showed that horizontal impaction (3.12%) was commonly associated with distal deep caries statistically significant (p-0.02, p<0.05). Within the limitations of the study, it was concluded that 5.93% of patients with impacted mandibular third molar had distal dental caries on the mandibular second molar. This association was more often identified in the age group of 36-65 years with relatively higher predilection in the male population. Considering the type of impaction, distal caries on the mandibular second molar was commonly seen in the cases of horizontally impacted third molars.

Keywords: Mandibular third molar; Impaction; 2nd molar; Distal caries; Winter's classification

Introduction

Impacted mandibular third molars may predispose an individual to other problems, such as pericoronitis, orofacial infections, periodontitis and external resorption of the adjacent tooth, cyst formation and even temporo mandibular joint disorders.

These diseases can lead to certain symptoms that seriously affect the patient's quality of life. Impacted mandibular third molars have been associated with several complications in adjacent mandibular second molars and distal deep caries is one of the most common complications seen. [1]

Dental caries is the most common cause for the loss of enamel in a clinical situation. Dental caries are easily detectable and reversible at an early stage.

Once the incipient lesion proceeds to cavitation, the condition becomes irreversible. Hence it is necessary to prevent the progression of dental caries at an early stage, rather than to develop treatment strategies for progressive dental caries. [2]

The prevalence of caries on the distal surface of the mandibular second molar due to the presence of an impacted third molar, varies between 7% and 32%. [3] Some studies have shown that the presence of caries on the distal surface of the mandibular second molar could be caused by the angulation of the mandibular third molar [4], the

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distance between the Cement Enamel Junction (CEJ), the level of impaction and the amount of contact between the second and third lower molar. [5]

Because the carious lesion in the distal surface of the 2nd molar is difficult to detect, such tooth could develop pulpitis or apical periodontitis [6], which requires endodontic therapy in which negotiation of small calcified canals is challenging or even extraction in severe cases [7,8].

Cone-Beam Computed Tomographic (CBCT) images can be used to improve the detection and depth assessment of proximal and occlusal carious lesions. Three-dimensional images have proved more accurate than 2-dimensional radiographs in caries detection. [9]

According to Pell and Gregory classification, Class I was labeled to a tooth which was present anterior to the anterior border of the mandible. Class II was labeled when the tooth was half covered by the anterior border of the mandible. When the crown was fully covered by the anterior border of mandible, it was labeled as Class III. [10-24]

Thus, the aim of the study is to assess the association between impacted mandibular third molar and distal deep caries on mandibular second molar.

Materials and Methods

Study setting

The study was conducted with the approval of the Institutional Ethics Committee (SDC/SIHEC/2020/DIASDATA/0619-0320). The study consisted of one reviewer, one assessor and one guide.

Study design

The study was designed to include all dental patients with mandibular third molar impaction. The patients who did not fall into these inclusion criteria were excluded.

Sampling technique

The study was based on a non-probability consecutive sampling method. To minimize sampling bias, all case sheets of patients who had mandibular third molar impaction were reviewed and included.

Data collection and tabulation

Data Collection was done using the patient database with the timeframe work 01 June 2019 and 31 March 2020. About 641 case sheets were reviewed and those fitting under the inclusion criteria were included. Cross verification was done with the help of Photographs and radiographic evidence. To minimize sampling bias all data were included.

The exclusion criteria were patients with systemic illness, caries due to improper oral hygiene. Data was downloaded from DIAS and imported to Excel, Tabulation was done. The values were tabulated and analyzed.

Statistical analysis

Descriptive statistics were performed using SPSS by IBM on the tabulated values. Chi-square test was performed and the p value was determined to evaluate the significance of the variables it was used to evaluate the association between the age, gender and type of impaction with the presence of caries in adjacent second molars. The results were obtained in the form of graphs.

Results and Discussion

In this study, we observed that there were a total number of 641 subjects out of which 242 subjects were from age 14-25 years (37.8%) and 284 subjects were 26-35 years (44.3%) and 115 subjects were 36-65 years old (17.9%) where the incidence of distal caries were more among the people aged 36-65 years (12/115 patients) [Figure 1].

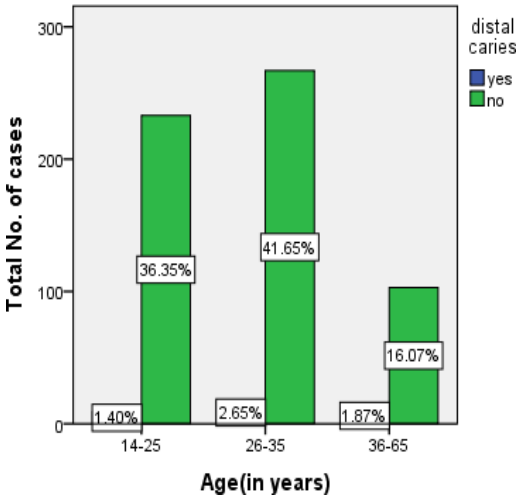

Figure 1: Bar graph showing association between age distribution of patients with impacted mandibular third molar and presence/absence of distal caries in the adjacent second molar. X-axis: Age of patient (in years) and Y-axis: Total number of cases. Majority of patients of all age groups did not have distal dental caries on the mandibular second molar adjacent to the impacted mandibular molar. However among 115 patients in the age group of 36-65 years, 12 patients had distal dental caries (chi-square test, p-0.043, $p<0.05$, significant).

In our study, we can observe that 374 subjects were males and 267 subjects were females. Males (4.52%) had more association to distal caries than females (1.40%) [Figure 2].

Results from our study also showed that horizontal impaction (3.12%) was commonly associated with the presence of distal deep caries followed by mesioangular (2.50%) and distoangular (0.31%). Distal caries were not identified in vertically impacted teeth and results obtained are statistically significant ($p<0.05$) [Figure 3].

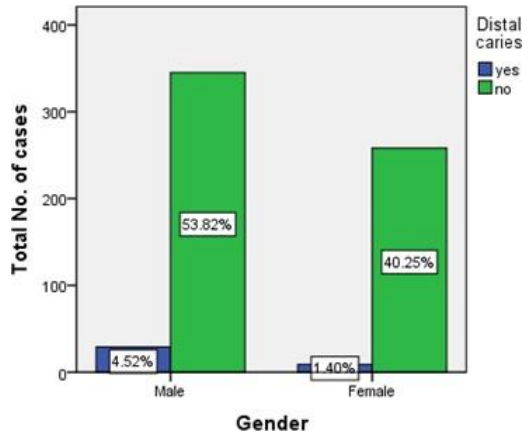

Figure 2: Bar graph showing association between gender distribution of patients with impacted mandibular third molar and presence/absence of distal caries in the adjacent second molar. X-axis: Gender and Y-axis: Total number of cases. Majority of male (53.82%) and female populations (40.25%) did not have distal dental caries on the mandibular second molar adjacent to the impacted mandibular molar (chi-square test, p-0.021, p<0.05, significant). Prevalence of distal dental caries was significantly higher among male population.

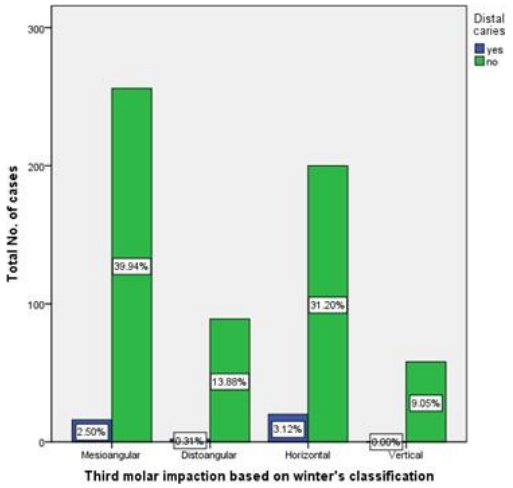

Figure 3: Bar graph showing association between the type of mandibular third molar impaction and presence/absence of distal caries on the adjacent second molar. X-axis: Type of mandibular third molar impaction based on winter's classification; Y-axis: Total number of patients with and without distal caries on adjacent second molar. Totally, 5.9% of the cases were associated with presence of distal dental caries on adjacent second molars. The most common type of impaction associated was horizontal impaction (chi-square value-9.873, p-value-0.020, p<0.05, statistically significant). The association was statistically significant.

Similar study done by Marques *et al.* showed that distal caries were significantly more frequent when the third molar was in a horizontal position and CEJ was 7-12 mm apart. [25] Another study done by Syed *et al.* shows mesioangular impaction was the most prominent type and closely followed by horizontal impaction. In their study, age group 21-28 years and males had the higher prevalence of distal caries in the second molar due to impacted third molar. [26]

However in the present study, distal deep caries due impacted teeth was more commonly seen among the elder age groups. The deep distal caries would have occurred due to the presence of the impacted tooth over a longer period of time. With the increase in age their risk for systemic conditions is higher which would invite the need for additional care. Proper diagnosis and treatment planning at an earlier stage will help in prevention of distal caries prior to its occurrence which can preserve the tooth structure and prevent its loss.

Diagnosis of distal caries can be done by using instruments like explorer using tactile sense, by using pulp vitality tests such as electric pulp testing, heat test etc, [27] subjective signs where patient presents with moderate/severe pain in the region of second molar can be seen. Early detection of distal caries can be done by CT scans and periapical images of the teeth. Cone-beam computed tomography can render cross-sectional (cut plane) and 3 Dimensional (3D) images that are highly accurate and quantifiable. [28] RMGIC has been found to be the effective material for the restoration in terms of marginal adaptation. [29]

Caries in the second molar could be prevented by prophylactic mandibular third molar extraction that has an angulation of 40°-80° with a contact point on cementoenamel junction to improve the prognosis of mandibular second molars and thus benefit the masticatory function and improve the quality of life. [30] The distal caries can be restored with a biocompatible restorative material depending on the extent of caries. When the caries extends into the pulp, the decision on retaining the tooth depends upon the gingival extent of the caries. If the caries extends below the CEJ, the prognosis is compromised. At times hemisection of the affected second molar is performed to retain the tooth structure and the surrounding alveolar bone. This procedure is done, in case the caries extends only to the distal root of the 2nd molar. This method would facilitate the placement of fixed prosthesis, after extraction of the impacted third molar. [31]

The final line of treatment to prevent complications due to 3rd molar is extraction of the severely affected tooth. Extraction of the impacted third molar has an impact on the adjacent second molar which can compromise the strength of it. Advanced local anesthesia techniques like CCLAD can be used for a painless tooth removal. [32-39] Replacement such as single unit fixed dental prosthesis or implant can be placed to prevent masticatory complications such as the supra eruption of the opposing tooth. Our institution is passionate about high quality evidence based research and has excelled in various fields.

The results of this study can be used as baseline data for future studies involving impacted third molars. Previously our team had conducted numerous clinical trials [40-45] and *in vitro* studies [46-50] over the past 5 years. Now we are focusing on epidemiological studies. [51-53] The idea for this study stemmed from current interest in our community. Many times, patients do not come with a complaint of impaction, in these cases patients can be informed regarding the possibility of caries in

the mandibular second molar due to the impacted mandibular third molar. There is a lack of consideration towards hygiene procedures in patients with impacted teeth, so the patient's motivation and oral hygiene instructions need to be given to the patient to maintain a self-cleansing area and periodic recall, and a follow-up visit to the dentist for caries detection is essential.

Conclusion

Within the limitations of the study, it was concluded that 5.93% of patients with impacted mandibular third molar had distal dental caries on the mandibular second molar. This association was more often identified in the age group of 36-65 years, with relatively higher predilection in the male population. Considering the type of impaction, distal caries on the mandibular second molar was commonly seen in the cases of horizontally impacted third molars.

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