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Correlation between the Impacted Mandibular Third Molar and Caries in the Distal Surface of the Mandibular Second Molar

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Abstract

Aim & Objectives: The aim and objective of this clinical & radiographic study were to estimate the prevalence of distal caries in mandibular second permanent molars in the presence of partially/ completely impacted mandibular third molars.

Materials & Methods: The present study was done in 520 patients with an impacted lower third at the Department of OMFS at JSSDC&H, Mysuru. The participants were clinically & radiographically assessed by using IOPA. The angulations of impacted lower third molar and the extent of caries on the distal surface of the lower second molar were recorded and evaluated by using the chi-square test. The value of $P < .05$.

Results: 32.3% of males had distal caries of the second molar as compared to females with only 13.8%. There was no significant association between age groups and caries presence. The mesioangular type of impacted LTM was associated with distal caries in 69% of cases. The horizontal type of impacted LTM had caries of the second molar in 24.5% of cases. The distal and vertical type of impacted lower third molars were associated within 5.5% and 1% respectively. In 76% the caries of the second molar did not involve the pulp compared to 24% of cases having deep caries with pulpal involvement.

Conclusion: The mesioangular followed by horizontal type, then disto-angular and vertical of impaction of lower third molars showed caries in the lower second molar. A study involving correlation of the oral hygiene and early caries detection tools shall be more valid in this regard**.**

Keywords: Impacted lower third molar, distal caries.

Introduction

The third molar teeth will start erupting in the oral cavity usually between the ages of 17 or 18 to 24 years of an individual. We can also find an extensive variance in the eruption times of these upper and lower third molars. The lower third molars sometimes erupt into the correct position in the dental arch and start being functional. But on in some people, the mandibular third molar erupts into a partly functional or non-functional position in the arch i.e partially/ completely erupting into the oral cavity and are known as impacted third molars. These teeth may be completely or partially covered by bone or mucosa. In the literature, many authors have described a variable prevalence rate of mandibular third molar impaction, ranging from 16.7% to 68.6%.[1],[2],[3],[4],[5]

These impacted teeth being in an abnormal position, non-functional and non-cleansing area in the

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oral cavity will act as a potential reason for initiation of dental caries. There is a connection between dental caries and the impacted lower third molars usually occur in the region of their contact areas with adjacent teeth like the lower second molar. [6],[7]

Literature Review

The most commonly seen dental caries of the lower second molar is the disto-cervical area of the mandibular second molar. This is due to the distal surface of the second molar is the contact area between the mandibular second molar and the partially/completely impacted mandibular third molar. [8], [9],[10] This contact area acts as a potential area for plaque and food impaction leading to caries formation. The literature suggests that the main etiologic factor for caries in the distal surface of the second molar is due to the partially or completely impacted mandibular third molar.[11],[12] Hence, we are aiming for this clinical & radiographic study was to estimate the prevalence of distal caries in mandibular second permanent molars in the presence of partially/ completely impacted mandibular third molars among patients visiting the outpatient section in the Department of Oral & Maxillofacial Surgery. The study results will give us very valuable information on whether prophylactic removal of the impacted lower third molar is justified in preventing caries of the lower second molar.

Materials and Methods

The present study was done at the Department of Oral & Maxillofacial surgery at JSS Dental College & Hospital, Mysuru. The patients were selected randomly from the OPD of Oral Medicine and Radiology for this study. The ethical certificate was obtained from the Institutional Ethical clearance board for the present study. The study included around 520 participants of age between 18 to 60 years of both genders, who had complaints of pain/ discomfort in the impacted third molar region. The duly signed consent was obtained in the consent form from all the participants of this study.

The case records of the patients who have come for their third molar extraction were evaluated for the presence of distal surface caries on the lower second molar. The participants of the study were selected had at least one impacted lower third molar tooth which was partially or completely covered by the alveolar bone or mucosa and the patient with the distal caries of the lower second molar.

Based on the IOPA (intraoral periapical radiograph), the classification, position & angulations of impacted lower third molar and the location of caries, and the extent of caries on the distal surface of the lower second molar were recorded. The participants were excluded from the study if the second molar was absent if they had any cyst or tumor with respect to the lower second/third molar. And, If the patient has undergone any other dental treatment on the lower second/third molar.

The collected data was entered in an excel sheet using the Package for Social Science (SPSS) software.22. The process included coding, typing, and editing. Frequency analysis was carried, and the variables were subjected to a Chi-square test to verify the association between variables.

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Table:1 shows the distribution of distal cervical caries in second molar teeth according to age group, gender, and type of impaction of the third molar.

Demographic Variables	Caries Present	Caries Absent
Gender		
Male	168 (32.3%)	146 (28.1%)
Female	72 (13.8%)	134 (25.7%)
Age group in Years		
21-30	171 (71.2%)	210 (75%)
31-40	51 (21.2%)	42 (15%)
41-50	18 (7.5%)	28 (10%)
Side of the jaw		
Right side	144 (60%)	126 (45%)
Left side	96 (40%)	154 (55%)
Type of Impacted lower 3rd molar		
Mesioangular	166 (69%)	158 (56.4%)
Distoangular	13 (5.5%)	58 (20.7%)
Vertical	2 (1%)	40 (14.3%)
Horizontal	59 (24.5%)	24 (8.6%)
Extent of Caries		
Caries not involving the pulp	182 (76%)	--
Deep caries involving the pulp	58 (24%)	--

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Figures:

Fig 1: IOPA showing Mesioangular Impacted lower third molar with the caries on the distal surface of lower second molar.

Results

The intraoral periapical radiograph of the 520 participants was used to assess the location and extent of distal surface caries on the lower second molar in relation to the type of impacted lower third molar. (Table-1) The variables were subjected to a Chi-square test to verify the association between variables. A chi-square test of independence was performed to examine the relationship between gender and the presence of caries on the distal surface of the lower second molar.

In the present study, the number of male patients treated for the extraction of impacted lower third molar was more than the female group. There was a significant difference in the gender of patients with caries of the distal surface of the lower second molar. Nearly 32.3% of males with impacted lower third molar had distal caries of the second molar as compared to female patients who had caries of the second molar in only 13.8%, which was statistically significant with a value of $P<0.05$. The relation between these variables was significant, the chi-square statistic is 17.2266, with a p-value of .000033. The result is significant at $p < .05$.

In the age group, we noted that nearly 71.2% of the patients suffered from distal caries of their second molar in the age group of 21 to 30 years, whereas the age group of 31-40 years and 41-50 years had caries of the second molar in 21.2% and 7.5% respectively. The chi-square statistic was 3.9837 with a p-value was 0.136, which showed that there was no significant association between age group and caries presence. Concerning the side of the jaw, the second molars on the right side of the mandible developed caries more than the left side. The chi-square statistic was 11.648, with a p-value of .0006. The result was significant at $p < .05$.

In the case of the type of impacted lower third molar impaction, the mesio-angular type of impacted lower third molar was associated with distal caries of lower second molar in 69% of cases (Fig 1). The horizontal type of impaction was associated with caries of second molar teeth in 24.5% of cases. The distal and vertical type of impacted lower third molars were associated with decayed second molar in 5.5% and 1% respectively. The chi-square statistic was 75.2269, with a p-value < 0.00001. These results indicate that carries on the distal surface of lower second molars were most when the second molar was associated with mesioangular impaction of the lower third molar followed by horizontally impacted lower third molar. The occurrence of caries on the second molar was very less in presence of distoangular and vertically impacted lower

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third molar. Concerning the extent of caries of the lower second molar, 76% of cases showed the caries of the second molar did not involve the pulp, and only in 24% of cases had the caries was deep with pulpal involvement.

Discussion

The surgical removal of impacted or partially impacted lower third molars has been studied regularly in scientific literature and remains debatable till today. The impacted mandibular third molar is a typical finding affected in the oral cavity [13]. Completely/partially impacted lower third molar leads to distal caries of mandibular second molar is noted complication [4, 5, 6]. Many studies done earlier have suggested that the non-removal of impacted lower third molars can result in complication or risk like caries to the second molar, but these studies have not been able to adequately describe the exact and various variables that increase the risk of arising distal caries on lower second molars [14, 15, 16, 17].

Several clinicians in their study have recommended prophylactic extraction of the impacted mandibular third molar may prevent the development of caries [6, 7, 13, 18], whereas other clinicians suggest that there is no concrete evidence in favorable benefit to the patient by remove of these impacted teeth [19, 20].

The present study aimed to determine which features of impacted mandibular third molar act as the main element for the development of caries on the distal surface of the mandibular second molar. V. Toedtlinga, et al,[17] in their metanalysis study on "Prevalence of distal surface caries in the second molar among referrals for assessment of third molars", have shown varied results, they were unable to declare the exact cause of distal caries in relation to lower second molars, but significant associations were established with mesio-angular and horizontally impacted third molars. They concluded that the rate of distal caries of the lower second molar association was almost six times higher in mesio-angular and horizontally impacted lower third molar than it was among a combination of distally and vertically inclined third molars. Similarly, S. G. M. Falci et al [6], Jose´ Cristiano Ramos Glo´ria et al [15], in their meta-analysis study "Third Molar and Their Relationship with Caries on the Distal Surface of Second Molar" and concluded the same. The finding was similar to the results of our present study.

P Coulthard and V. Toedtling et al [17], did a study regarding prevention guidelines for distal caries of the second molar in the presence of an impacted mandibular third molar. The results of their study showed that the eruption status, type of angulation, and the nature of tooth contact between both impacted lower third and second molars which are useful caries predictors on the distal aspect of the second mandibular molar. To prevent dental caries and regular monitoring of the oral health status of an individual is required if the lower third molar teeth are not removed. Similarly, Andreescu Claudia et al [22], José Marques et al [21], conducted a study to justify the prophylactic therapy, removal of the impacted lower third molar to reduce the presence of distal caries in the mandibular second molar. Their study showed that the horizontal angulation of the impacted lower third molars where the contact points at or below the CEJ is more likely to develop distal caries in the mandibular second molars. They recommended a prophylactic removal of lower third molars due to the high prevalence of caries in the lower second molar observed. Otherwise, they recommended that close monitoring and regular IOPA radiographs of the second molar should be done. Louis W McArdle et al [23], in their study about the incidence of distal cervical caries in the mandibular second molar and its consequences due to the presence

of mesially impacted mandibular third molar. They have suggested that the management of caries of lower second molar will be challenging for the dentist and its consequences will also be expensive for the patients. This can be avoided if patients who are at risk, can undergo prophylactic therapy like removal of impacted lower third molars. Based on the present study, we would like to conclude that continuous monitoring and follow up of patients is required in these cases. If mesio- angular or horizontal impaction of lower third molar was observed with the patient complaint, it is better to advise for extraction of the lower third molar.

Conclusion

The present study indicates that the male participants showed a higher predilection for caries of the lower second molar when compared to females. In the age group criteria, caries on the distal surface of the lower second molar adjacent to the impacted lower third molar showed no correlation to the age group studied. The mesioangular followed by horizontal type, then disto-angular and vertical of impaction of lower third molars showed caries in the lower second molar. We hereby recommend early detection and removal of mesioangular and horizontal type of impacted lower third molars to prevent caries on the distal surface of the second molar. Regular follow-up and maintenance of good oral hygiene in case of the non-symptomatic and vertical and disto-angular type of impacted lower molar tooth. However, a study involving the correlation of the oral hygiene status and early caries detection tools shall be more valid in this regard.

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