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Original Research Paper

Impacted Third Molar Induced Distal Caries in Mandibular Second Molars: A Retrospective Study

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ABSTRACT:
Introduction: Impaction refers to a pathological condition in which a tooth is unable to achieve its usualand functional position. The aetiology of impaction is diverse and influenced by multiple factors. Notable challenges linked to impacted teeth encompass issues like trismus, infection, as well as involving cervical caries in second molars. **Aim**: The primary objective of this study was to evaluate the incidence of distal caries insecond molar teeth due to impacted third molars, while also undertaking a comparative analysis with analogous research conducted in different geographical locations. **Materials and Methods**: This study included an evaluation of individuals who sought dental treatment at the Government Dental College & Hospital, Hyderabad during the period spanning from July 2021 to June 2023. Employing a retrospective cross-sectional approach, the study includes an extensive dataset of 2245 Orthopantomograms (OPGs). The collected information was meticulously transcribed and recorded within an Excel spreadsheet. A comprehensive descriptive analysis was conducted and the outcomes were figuratively presented through frequency tables and graphical representations. **Results**: Out of the included patient pool of 2245 impacted third molars, 23.25% of patients withimpacted third molars exhibited instances of distal cervical caries affecting the adjacent second molars. Among the various types of impactions, mesioangular impaction emerged as the most prevalent, closely trailed by horizontal impaction, both contributing to the development of distal caries in second molars. Notably, the age bracket of 20 to 30 years andthe male gender exhibited a higher prevalence of distal caries in second molar teeth attributed to the presence of impacted third molars.**Conclusion**: Among patients who presented with impacted mandibular third molars, a substantial proportion, accounting for 23.25%, exhibited occurrences of distal cervical caries affecting their adjacent second molars. Noteworthy determinants linked to the development of distalcaries in second molar teeth due to impacted third molars included the prevalence of the mesioangular impaction type, the male gender, and individuals within the age group of 20 to30 years.

Keywords: Distal caries, Impaction, Radiographic study

INTRODUCTION:

The eruptive age of 3rd molars is generally between 17 and 24 years[1,2]. The wisdom teeth becomes functional only if it erupts into correct dental position. On the contrary, they may become nonfunctional or partly functional, if they get impacted. Mandibular 3rd molars are the teeth with highest impaction rate followed by maxillary 3rd molars and its prevalence is influenced by various factors like age, gender, ethnicity, type offacial skeleton, etc [3]. It is widely reported in many studies that there is increased incidence of dental decay in 2nd molars adjacent to impacted wisdom teeth[4-6]. Distocervical area of 2nd molars is most commonly affected by caries, especially in mesioangular impactions of 3rd molars[7-9]. Most of the times, the caries remains unnoticed in early stages due to difficulty encountered via visual examination. Recent studies which have reported cervical distal caries affecting 2nd molars in presence ofimpacted 3rd molars was between 38- 50% [10,11] So, there is a need to determine the extent and severity of caries in 2nd molars for making appropriate timely decision for extraction of impacted 3rd molars, thereby preventing permanent loss of permanent 2nd molars.

AIM:

Hence, the objectives of this retrospective study were to assess the prevalence of distocervical caries in mandibular 2nd molars in presence of impacted mandibular 3rd molars, to predict the most common

type of 3rd molar impaction associated with caries in relation to 2nd molar and to predict the most common age group and gender with highest prevalence among the patients reported to the Department of Oral and Maxillofacial Surgery, Government Dental College & Hospital, Hyderabad.

MATERIALS AND METHODS:

This is a retrospective study which encompassed a comprehensive examination of 2245 Orthopantomograms (OPGs) derived from patients receiving dental care at the Government Dental College & Hospital, Hyderabad. The dataset was sourced from the institution's OPG- acquiring software, systematically decoded, and subsequently recorded within an Excel spreadsheet for meticulous analysis. Employing a descriptive approach, the accumulated data underwent thorough scrutiny, with the findings elegantly portrayed through frequency tables and graphical representations. Within the subset of OPGs which comprised of impacted third molar teeth, an assessment was conducted to ascertain the prevalence of distal cervical caries in mandibular second molars. To facilitate this, a dedicated Excel spreadsheet was designed for data entry. Pertinent variables including age group, gender, and the specific type of impacted third molar responsible for inducing distal caries in the second molar were meticulously identified and recorded. Notably, impacted mandibular third molars were categorized according to the established Pell GJ and Gregory GT classification schema, which encompassed vertical, mesioangular, distoangular, and horizontal orientations[12].

Inclusion criteria was stringent, comprising patients aged 20 to 50 years, who sought dental care between July 2021 and June 2023, and exhibited a standard eruption pattern of second molar teeth.

To maintain the rigor of the study, individuals with pre-existing third molar extractions, pathologies such as cysts and tumors, developmental anomalies like microdontia, presence of fourth molars, impacted second molars, supernumerary teeth, odontomes, and those with dental implants were systematically excluded from this study.

Statistical Analysis:

The dataset underwent a rigorous validation process to ensure accuracy and consistency before proceeding to the subsequent analysis. The outcomes of the analysis were elegantly presented, showcasing the prevalence of distal cervical caries in second molar teeth attributed to impacted third molars, with a nuanced consideration of variables such as age, gender, and the specific type of impaction involved.

RESULTS:

A comprehensive evaluation was conducted on a dataset comprising 2245 Orthopantomograms (OPGs), encompassing patients over a span of 2 years (mid-2021 to mid-2023). Notably, among this cohort, a total of 2245 patients presented with impacted third molars. The distribution patterns of distal cervical caries in second molar teeth were succinctly illustrated in [Table/Fig-1], with a meticulous breakdown considering factors such as age group, gender, and the specific type of third molar impaction.

Table: 1. Distribution of distal cervical caries in second molar teeth.

Gender	Number	Caries in second molar	Percentage (divided by 522)
Male	1236 (55%)	298	57%
Female	1009(45%)	224	43%

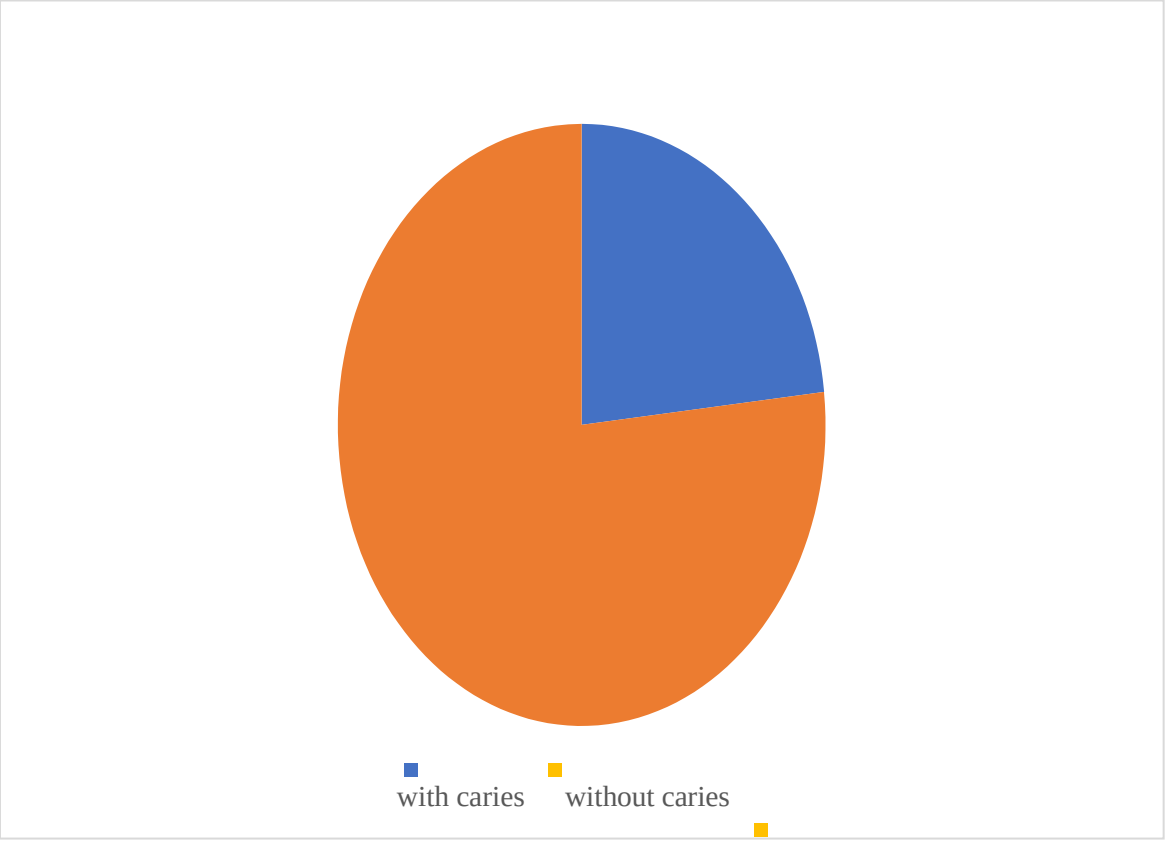
Table: 2.

Age(years)	Number	Percentage	Caries in second molar	Percentage (divided by 522)
20-30	1357	60.43%	313	60%
31-40	691	30.77%	151	29%
41-50	197	8.77%	58	11%

Table: 3.

Type of impaction	Number	Percentage	Caries in second molar	Percentage (divided by 522)
Horizontal	404	17.9 %	145	27.7%
Distoangular	808	35.9 %	65	12.4%
Mesioangular	600	26.7 %	284	54.4%
Vertical	433	19.27%	28	5.3%

A total of 522 (23.25%) of the 2245 patients with impacted third molars had distal cervicalcaries in second molar.
Prevalence of distal caries in mandibular second molar due to impacted third molar teeth:



Out of the total of 522 patients with distal caries, a notable subset of 284 individuals exhibited mesioangular impaction, which was associated with the occurrence of distal cariesin second molars. Following closely, horizontal impaction contributed to distal caries in second molars for 145 patients. Conversely, distoangular and vertical impactions presentedthe least incidence of caries in the second molars, affecting only 65 and 28 patients respectively. Remarkably, within the age group of 20-30 years, the prevalence of distal caries in second molar teeth due to impacted third molars was observed to be at its peak, with 313 out of the 522 impacted patients falling within this category. Notably, the prevalence of distal caries in second molars demonstrated a relatively higher occurrence in males, encompassing 298 patients, compared to females (224 patients), the percentages being 43% for females and 57% for males.

DISCUSSION:

The occurrence of mandibular third molar impaction is widely recognized within the literature. [13] A frequently observed complication attributed to impacted third molars is the development of distal caries in mandibular second molars. [14] In a study conducted among the Jordanian population, radiographically discernible pathological conditions related to impacted mandibular third molars encompassed caries in

adjacent second molars and external resorption of the roots of these neighbouring molars. [15] The interplay between the depth of impaction of the third molar and the angulation it formswith the second molar's occlusal surface have been noted as influential factors in the development of distal caries in the second molar. [13,16,17] Evidently, approximately 5% of mandibular third molars necessitate extraction due to the presence of distal cervical caries affecting the mandibular second molars. [18] This observation aligns with the findings from Nunn ME et al.'s study involving 416 subjects, which indicated that second molars adjacent to absent third molars exhibited the lowest risk of pathology, whereas those neighbouring soft tissue-impacted third molars faced the highest risk. [19] In the assessment of radiolucency on the distal surface of second molars, a recurring challenge arises: distinguishing between caries and root resorption. [20,21] Even with the application of high-resolution imaging and thorough cross-examination by multiple investigators, the issue remains intricate and unresolved. Ozec I et al. conducted an investigation among the Turkish population to explore the prevalence and determinants influencing the development of distal caries in second molars.[8] Within their cohort, they observed a 20% prevalence of distal caries in second molars, attributing significant influence to the contact point at the cementoenamel junction of the second molar and advancing age. Similarly, Falci SG et al. examined 246 high-quality periapical radiographs to ascertain the correlation between partially erupted mandibular. third molars and the presence of caries on the distal aspect of second molars. [22] Their study revealed a prevalence rate of 13.4% for caries on the distal surface of second molars. Comparatively, in the present study, the prevalence of distal caries in mandibular second molars caused by impacted third molars was notably higher. Among a total of 2245 patients with impacted teeth, 522 presented with distal caries in the second molars, yielding a prevalence rate of 23.25%. This prevalence rate stands significantly higher in contrast to findings from other studies. In a study conducted by Raheem AA et al, panoramic radiographs from 148 subjects were taken to assess the effect of mandibular third molar positioning on distal caries in mandibular second molars. [14] Their research indicated that the majority of distal caries in second molars (38.9%) resulted from horizontally impacted third molars. This contradicts our study's findings, where mesioangular impactions were primarily responsible for a majority (54.4%) of distal cervical caries in second molars. Notably, within our study, the age group of20-30 years exhibited the highest prevalence of distal caries in second molars (60%). Silva HO et al. embarked on a study aimed at analysing dental caries on the distal surface of mandibular second molars. [23] Interestingly, akin to our current investigation, their study also revealed a higher prevalence of distal caries among males than females. However, they observed an elevated prevalence of distal caries in patients beyond the age of thirty-five, as opposed to our study, where the 20-30 years age group exhibited a higher prevalence. On considering the major causes of distal caries, our study emphasizes mesioangular impaction as the primary reason whereas Silva HO et al.'s study identified vertical impaction as the primary reason. Allen RT et al., in their study, similarly concurred that the mesioangular position of impacted third molars predominantly contributed to distal caries on the second molar's surface. [24] Contrary to our findings, Bruce RA et al. suggested that the prevalence of caries on the distal surface indicates the need for third molar removal, a need that escalates with age. [25] Interestingly, our study diverges from this viewpoint, as we found that higher age groups exhibited a lower prevalence of distal caries. This can be attributed to the hypothesis that patients may have neglected care, leading to symptomatic pain and infection prompting second molar extractions as they age. Consequently, our study indicates that the prevalenceof distal caries is higher among younger individuals. Furthermore, it's worth noting that a considerable number of patients in this region present with missing or grossly decayed second molar teeth, potentially contributing to the findings. A prospective study design with long-term follow-up could better assess the extraction rates of second molar teeth due to cervical caries. Proper counselling and awareness initiatives could significantly aid in conserving second molars. Additionally, early prophylactic removal of impacted third molars could play a pivotal role in preserving second molars, with particular emphasis on the immediate extraction of mesioangularly inclined impacted third molars. Given the limited functional contributions of impacted third molar teeth in terms of mastication, occlusal load distribution, and occlusion maintenance, we advocate for the early prophylactic extraction of impacted third molars. The considerable percentage of crown structure loss in second molars due to cervical caries, the financial resources allocated for rehabilitation, and the potential loss of natural teeth through late-stage extraction of second molars underscore the rationale for prophylactic third molar removal. This study underscores the crucial collaboration between various dental specialties, including operative dentistry, endodontics, oral diagnosis, and oral surgery. During the initial oral diagnosis visit, patients can be enlightened about the significance of third molar removal, effectively halting the progression of decay affecting the adjacent second molar. When patients are already under the care of an operative dentist or endodontist for second molar

restoration, these specialists should actively engage in counselling and advising patients regarding the prophylactic removal of third molars. It's important to acknowledge that many patients might harbour apprehensions regarding surgical procedures due to concerns about pain,swelling, and related factors.

While this study rigorously screened 2245 Orthopantomograms (OPGs) spanning a 2-year duration, its retrospective design represents a notable limitation. To provide a more comprehensive evaluation of the impact of impacted third molars on distal cervical caries in second molar teeth, it is recommended to pursue a prospective study design featuring a prolonged follow-up period. The integration of advanced diagnostic tools, including clinical diagnostic aids and the availability of Cone Beam Computed Tomography (CBCT), offers the potential for more sophisticated analyses to be conducted.

CONCLUSION:

Out of the cohort featuring impacted mandibular third molars, a substantial proportion— equivalent to 23.25%—were associated with the occurrence of distal cervical caries in the adjacent second molars. Among the various impaction types, mesioangular impaction emerged as the predominant cause of caries. The age group spanning from 20 to 30 years and the male gender demonstrated a notably elevated incidence of cervical caries, signifying a statistically significant trend.

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