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Clinical and radiographic evaluation of impacted third molar on the periodontal status of adjacent tooth- A cross sectional study

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Abstract

Introduction: Impacted third molars most frequently predispose the adjacent second molar to an array of detrimental effects such as caries, periodontitis and cervical resorption. Few studies have been conducted where the impact of third molar is seen on the adjacent molar but no studies have been conducted in the Belagavi district of Karnataka.

Aim: To evaluate clinically and radiographically the impact of third molar on the periodontal status of adjacent tooth.

Methods: A cross-sectional study was done on patients who reported with complaint of pain or without pain in impacted third molar region from June 2023 to November 2023. Data including the age, gender, type of impaction, bone loss, pocket probing depth, mobility and recession were evaluated by statistical tests.

Results: A total of 206 subjects (82 male, 124 female) who reported with complaint of pain (Group A) or without pain (Group B) in impacted third molar region were enrolled in this study. The periodontal conditions, i.e., PPD and bone loss were significantly greater in Group A. Pain and caries were more significant in mesioangular type of impaction. Tooth resorption, crowding and reduced mouth opening was significant in mesioangular type of impaction.

Conclusion: The presence of impacted third molar is a risk factor for adjacent molar pathologies. Although the pathologies were statistically significant in cases of patients having pain but the pathologies were present in asymptomatic patients also. Hence, this data can be used for patient education and oral health promotion, where we should educate the patient about the consequences of retaining the impacted third molar.

Keywords: Dental Caries, Periodontitis, Impacted Molars.

Introduction

Third molar impaction can result in a variety of conditions, including caries of adjacent teeth, pericoronitis, periodontitis, root resorption, orthodontic challenges and disorders of the temporomandibular joint.[1] Teeth adjacent to third molars are more susceptible to periodontal infection as it is difficult to maintain proper oral hygiene in the posterior regions of the arch, and second molar pathologies can be brought upon by accumulation of plaque.[2]

The increase of anaerobic bacteria, under the pericoronal follicle during tooth eruption leads to pericoronitis which is an inflammatory condition. Signs and symptoms of this condition include pain, swelling, trismus, and discomfort. The primary reasons of seeking dental care in this stage are these acute signs and symptoms, which have an immense impact on the patient's quality of life.[3] Recent research indicates that impacted third molars may be related to periodontal diseases in other teeth, particularly adjacent second molars. Impacted third molars can cause an array of oral pathologies, such as caries, cysts, mandibular incisors crowding and pericoronitis. The diagnosis of pericoronitis is based on clinical history, oral, and radiographic examinations of the patient. Radiographs are used to establish the position of tooth, as well as to demonstrate the involvement of surrounding bony structures. This information contributes in the treatment planning.[4] The association between adjacent second molar pathology and the impacted third molars has garnered more attention in recent years.[4] According to recent research, third molars that are impacted or that have normally erupted may have a detrimental impact on the periodontal condition of second molars. According to Elter et al., there was a higher probability of bleeding during probing and a probing pocket depth of at least 5 mm in second molars located adjacent to visible third molars.[5,2] According to Falci et al., the distal side of second molar caries rates were 13.4% on average among patients with a mean age of 24.17 years.[2] A number of studies have evaluated the impact of the third molar on the second molars; however, none of them have been conducted in the Belagavi district of Karnataka. Therefore, the objective of this study was to assess the periodontal status of second molars that are located adjacent to third molars using clinical and radiographic examinations in the population of Belagavi, Karnataka.

Materials and Methods

This cross-sectional study was performed in the Department of Periodontics at KAHER'S K.L.E V. K Institute of Dental Sciences, Belagavi, Karnataka, India. The research protocol was approved by the Institutional Ethical Review Board of KAHER KLE VK Institute of Dental Sciences, Belagavi (IEC NO. 1371). The sample size estimated was 206, according to the mean values obtained from the study done by Li ZB et al.[4] Prior to the assessment, all individuals provided written informed consent. Subjects who visited the out-patient Department of Periodontics for regular dental care from June 2023 to November 2023 were asked to take part in the study. The following were the inclusion criteria- (i) subjects aged > 18 years; (ii) subjects with at least one quadrant having visible, impacted or missing third molar and intact first and second molars; and (iii) subjects who consented for taking part in study. Exclusion criteria included: (i) subjects who are undergoing or have previously undergone orthodontic therapy; or (ii) subjects who received periodontal surgery in the investigated quadrants. A certified periodontist

performed thorough oral examinations on the patients and clinical and radiographical evaluations were done.

Sociodemographic Survey

The sociodemographic data of the individuals, including sex, age, and educational attainment were collected.

Clinical Examinations

Clinical examinations were conducted in the quadrants where the first and second molars were intact but the third molar was either visible, impacted, or missing. Thorough oral examination was done on each patient. There were two groups of patients: one with symptoms (Group A) and the other without symptoms (Group B). Clinical and radiographical evaluations were done. Pain, pocket probing depth (PPD), impaction type, caries, and crowding were the clinical measures; bone loss and second molar resorption were the radiographic parameters. Mesioangular, distoangular, vertical, and horizontal type of impactions were identified. To measure PPD, a manual periodontal probe was utilized. Using SPSS, Version 25, the gathered data were entered and arranged in a database. To compare categorical data between groups, the Chi-square test was applied. The level of significance was set at 0.05.

Results

The current study comprised 206 subjects in total, age ranging from 18 to 68 years with a mean age of 31 years. Table 1 provides an overview of the study population's demographic profile.

Table 1: Demographic details of the participants	
Demographics variables	Frequency (%), N = 206 (100%)
Gender	
Male	82(39.8%)
Female	124(60.2%)
Age Group	
18-30	131(63.6%)
31-40	39(18.9%)
41-50	24(11.7%)
>50	12(5.8%)
Age (Mean ± SD)	30.41 ± 10.40

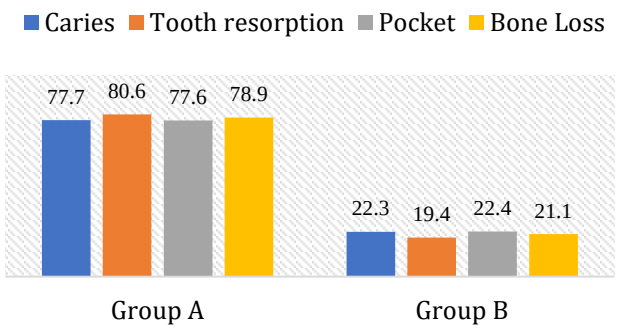
Of the participants, 115 were symptomatic and were assigned to Group A and 91 were asymptomatic and were assigned to Group B. Table 2 summarizes the prevalence of pain among participants with different age groups, gender, arches and different types of impactions. Mesioangular type of impaction was more common in symptomatic patients followed by vertical impaction.

Table 2: Prevalence of pain among participants with different age groups, gender, arches and among participants with different types of impactions

Variables	Group A (with pain) n (%)	Group B (without pain) n (%)	*P*-value
Age group(years)			
18-30	80(61.1%)	51(38.9%)	<.001*
31-40	26(66.7%)	13(33.3%)	
41-50	4(16.7%)	20(83.3%)	
>50	5(41.7%)	7(58.3%)	
Gender			
Male	46(56.1%)	36(43.9%)	0.04*
Female	69(55.6%)	55(44.4%)	
Arch			
Maxillary	21(29.6%)	50(70.4%)	<.001*
Mandibular	94(69.6%)	41(30.4%)	
Impactions			
Mesio angular	64(64.0%)	36(36.0%)	0.002*
Vertical	29(38.7%)	46(61.3%)	
Horizontal	10(66.7%)	5(33.3%)	
Distoangular	12(75.0%)	4(25.0%)	

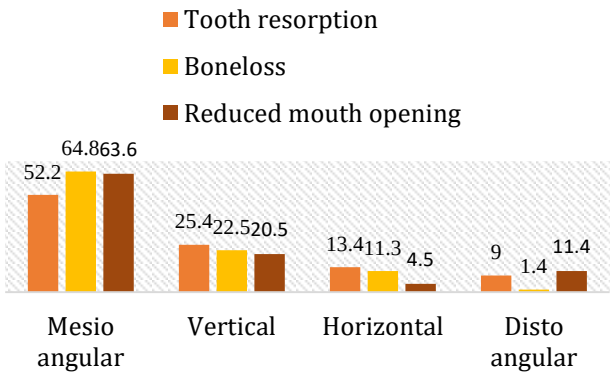
On the distal portion of the mandibular second molar, Group A had a prevalence of 77.6% periodontitis and 77.7% caries, while Group B had a prevalence of 22.4% periodontitis and 22.3% caries (Fig 1). In Group A, bone loss was more prevalent.

Fig. 1: Prevalence of caries and periodontal conditions



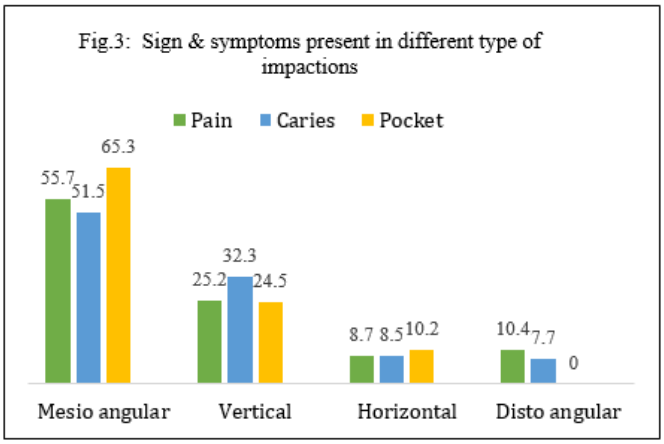
Mesioangular impacted teeth were more common than vertically impacted teeth in terms of periodontal characteristics (Fig 4). With mesioangular type, bone loss was more prevalent (64.8%) (Fig 2). Reduced mouth opening was seen more in mesioangular type of impaction (63.6%) followed by vertical type of impaction (20.5%) (Fig 2).

Fig.2: Sign & symptoms present in different type of impactions



Caries on distal aspect of mandibular second molar was highest with mesioangular impacted third molar (51.5%) followed by vertical type (33%). (Fig 3) The rate of caries progression was more significant with age.

Fig.3: Sign & symptoms present in different type of impactions



In this study we evaluated fully embedded, partially erupted and completely erupted third molars and mesioangular impacted molars were found to be completely embedded the most. (Table 3)

Type of impaction	Fully embedded	Partially erupted	Completely erupted
Mesioangular	39	57	4
Vertical	12	37	26
Horizontal	7	8	0
Distoangular	6	7	3

Table 3: Distribution of different degrees of impaction and angular positions.

Pathologies such as caries was found most in partially embedded molars and absent in completely embedded molars. Cervical resorption of adjacent tooth was seen most in completely embedded molars followed by partially erupted third molars whereas periodontal pockets was seen most commonly in partially erupted molars. (Fig 4)

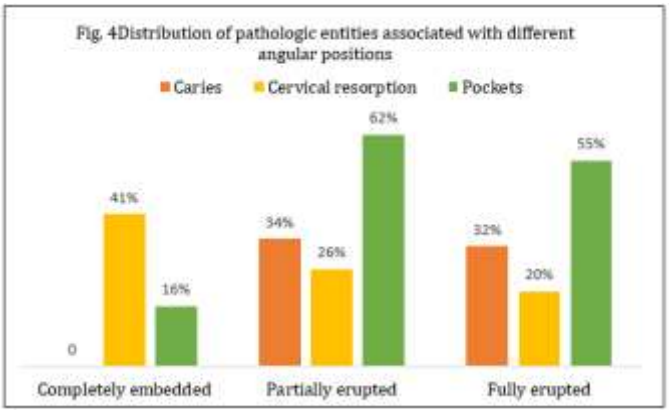


Fig. 4Distribution of pathologic entities associated with different angular positions

Discussion

The current study highlights the prevalence of impacted third molar and the signs and symptoms experienced by patients in the Belagavi district of Karnataka. It was found that mesioangular type (48.5%) of impaction was more prevalent. In studies conducted by Bataineh AB et al. among the Arab population, vertical type of impaction was more prevalent (61.4%) and Almendros et al reported that vertically impacted molars (47.9%) were more prevalent in the population of Spain.[6,7]

Similar to the findings of present study, some research [1,8] indicates that infection is more likely to develop in a mesioangular tilt and less likely to happen in a vertical or distoangular type of impaction. This is due to a V-shaped gap that exists above the contact point between the distal surface of the second molar and the occlusal surface of the mesioangular third molars. This V shape gap often interacts with the oral microenvironment and leads to high incidence of the periodontal disease.[1]

The most common findings in the current study were pockets on the distal aspect of the mandibular second molar, followed by bone loss. These pathologies are the result of poor cleaning methods, oral hygiene neglect, and recurrent food lodgement. In the oral cavity, malaligned teeth are harder to clean and are more likely to accumulate dental plaque and debris.[8] In a study assessing the degree of incidence of pathologies associated with impacted teeth, Ravikumar et al. found that dental caries was found most frequently[8] which is in contrast with the current study. Sejfija et al. additionally examined the conditions brought on by impacted teeth using radiography. They found 5.5% of periodontal bone loss, which was the second most common pathology associated with impacted teeth.[8] This result was consistent with our investigation, where the second most prevalent pathology was bone loss (64.8%).

In this study, the pathologies were seen associated mostly with mesioangular and vertically impacted third molars. In contrast to the above findings, the study conducted by Belam A et al reported that the majority of diseases on second molars were due to mesioangular followed by horizontally impacted third molars.[8]

This study confirmed the findings of a research done by Daware et al., which indicated that resorption of the neighboring teeth has been recorded as a result of mandibular third molars in mesioangular impactions.[9] The impacted third molar which was in direct tooth-to-tooth contact with the second molars caused cervical resorption in them. This shows that resorption could be the result of the third molar's anticipated eruptive movements, similar to how primary teeth resorb during their typical eruption sequence.

Reduced mouth opening was also noted in this study, which has not been recorded in other investigations. Reduced mouth opening was primarily caused by mesioangularly impacted third molars, followed by vertically impacted.

It was also noted that totally embedded third molars that remains within the gingiva is not as risky as a partially erupted tooth. A slightly impacted third molar has a 22–34% higher chance of developing pathology than a fully embedded molar, according to Knutson K et al.[10] In this study, we observed fully erupted, partially erupted, and completely embedded third molars. It was discovered

that while cervical resorption of neighbouring teeth was apparent, completely embedded third molars did not exhibit caries. This suggests that the tissue covering could work as a strong barrier to stop bacteria from entering and causing caries. Additionally, in this study prevalence of caries was seen in second molars next to partially erupted molars indicating the food lodgement and inefficiency of oral hygiene.

Previous research has shown that the depth of distal periodontal pockets and the range of bone defects in second molars can be effectively reduced by prophylactic extraction of third molars in conjunction with treatments like complete periodontal clearing of distal periodontal pockets in second molars and regular assessment of plaque control.[11,12] The present study was taken up to screen as well as advice the early preventive measures that can be taken in order to preserve the neighbouring second molar.

Conclusion

In the present study mesioangular type of impaction was most prevalent followed by vertical impaction. The pathologies were more prevalent with mesioangular type of impaction. Among the periodontal problems pockets were more commonly noted followed by bone loss. Although the pathologies were statistically significant in cases of symptomatic individuals having pain but the pathologies were present in asymptomatic individuals also. Therefore, we should inform the patient about the risks of keeping the impacted third molar and use this data for patient appraisal and oral health promotion.

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