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Pathological Association of Mandibular Second Molar by Third Molar in the Specialized Dental Center of Bangladesh

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Abstract

Introduction: *Mandibular third molar can causes both localized and regional complications due to its frequently abnormal positioning. This pathological positioning combined with its problematic eruption, often leads to several pathologies affecting adjacent teeth—most notably, the second mandibular molar.* ***Materials & Methods:*** *This is a prospective study that was conducted in the Department of Oral and Maxillofacial Surgery, Military Dental Centre, Savar Cantonment, Dhaka, Bangladesh from July 2024 - June 2025. The study population comprised of consented consecutive subjects requiring third molar extraction during the study period. To ensure diagnostic validity in this study, radiographic findings were verified with clinical records, which were collected on standard forms as part of the routine examination process.* ***Results:*** *There were no statistically significant differences of prevalence of impaction/not impaction (p=0.726), angulations (p=0.308) and side (p=0.208) of impaction among the study population. Pathologic conditions of second molars were almost common in male vs female (p= 0.478). And no statistical significance differences of pathologic condition of second molar were due to angulations (0.084) and impactions (0.774) were seen. The grossly carious second molars that were restorable we restore them either by restoration (18%) or root canal treatment (RCT) (14%) according to pulp pathological condition. But the non restorable were extracted (13%).* ***Conclusion:*** *Impacted mandibular third molar may causes carious lesions and periodontal disease in the adjacent second molar. Early identification and appropriate surgical management of impacted third molars can play a crucial role in preventing damage to the second molars.*

Key words: *Mandibular third molar, Impaction, Pathology of second molar.*

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Introduction:

The mandibular third molar often encounters various developmental complications, with infectious conditions being the most common. Due to its frequently abnormal positioning, it can cause both localized and regional complications[1]. This pathological positioning, combined with its problematic eruption, often leads to several pathologies affecting adjacent teeth—most notably, the second mandibular molar. These conditions include distal caries, periodontal bone loss at the distal surface, and root resorption. The frequent occurrence of these pathologies in the second mandibular molar prompted us to conduct a study aimed at evaluating their prevalence, particularly in relation to partially erupted or impacted third molars. Numerous studies have already examined the development of such pathologies in connection with mandibular third molars across different populations[2-3]. One of the most commonly reported issues is distal caries of the second molar. In a study by Chen et al., the overall prevalence of distal caries was found to be 31.6% when linked to the positioning of the mandibular third molar. Notably, the severity of caries was greater when the third molar had a mesial angulation between 16° and 75° [4]. Similarly, a study by Syed et al., involving 979 patients with impacted third molars, revealed that 39% had distal cervical caries in the adjacent second molar, with mesioangular impaction being the most frequently observed type[5]. Dias et al. conducted a study to assess bone loss in second molars adjacent to impacted mandibular third molars. Their

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results showed a statistically significant association between bone loss and third molars with mesioangular or horizontal impactions ($p < 0.05$)[6]. Additionally, research by Smailienė et al. found that mesioangular and horizontal positions of third molars were most strongly associated with external root resorption of adjacent second molars, with prevalence rates of 50% and 84.2%, respectively. Impacted third molars in vertical and distoangular positions were also associated with external root resorption, albeit to a lesser extent (23.6% and 6.9%, respectively)[7]. Despite the extensive research globally, few studies have focused on the Bangladeshi population. Therefore, the aim of this radiographic study is to evaluate the prevalence of second molar pathologies and their association with the position of the mandibular third molar within a Bangladeshi population. Due to limited resources & logistic support our study has been conducted in a specialized single center.

Materials & Methods:

This is a prospective study that was conducted in the Department of Oral and Maxillofacial Surgery, Military Dental Centre, Savar Cantonment, Dhaka, Bangladesh. The study population comprised of consented consecutive subjects requiring third molar extraction during the study period. Pathologies associated with impacted teeth included as follows: (1) proximal caries of the adjacent second molar teeth; (2) periodontal pocket of the adjacent tooth of >5 mm below the cement-enamel junction; (3) root resorption/caries of the adjacent tooth; (4) Gross Caries and (5) Periodontal pocket with cervical caries (figure 1). Clinical condition of associated soft tissue with impacted third molar is difficult to record as there are no standardized criteria for its assessment. However, this study has defined chronic pericoronitis as mild inflammation of the pericoronal soft tissue related to the impacted third molar teeth. An orthopantomogram (OPG) was used to find out the pathologies associated with the impacted mandibular third molar. To ensure diagnostic validity in this study, radiographic findings were verified with clinical records, which were collected on standard forms as part of the routine examination process. Data were analyzed using Stata SE 13 (Stata Inc. USA) and result presented as simple frequencies and descriptive statistics. Pearson's Chi-square was used to assess the association and level of significance among categorical variables with $P \leq 0.05$ considered as statistically significant. Approval for the study was obtained from the Ethics Committee of Military Dental Centre, Savar.

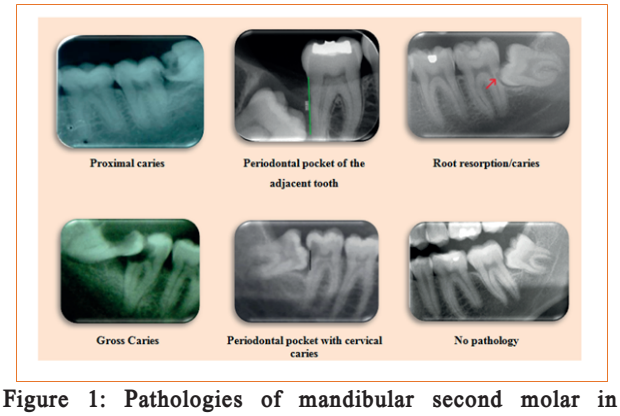

Figure 1: Pathologies of mandibular second molar in associated with impacted third molar.

Result:

Our study showed that out of 100 patient 46% were female and 54% were male. There were no statistically significant differences of prevalence of impaction/not impaction (p=0.726), angulations (p=0.308) and side (p=0.208) of impaction among the study population (table II). Pathologic conditions of second molars were almost common in male vs female (p= 0.478) (table I). And no statistical significance differences of pathologic condition of second molar were due to angulations (0.084) and impactions (0.774) were seen (table III). The second molars that were in healthy condition and had only associated periodontal pocket only doesn't required any treatment (55%). The grossly carious second molars that were restorable we restore them either by restoration (18%) or root canal treatment (RCT) (14%) according to pulp pathological condition. But the non restorable were extracted (13%) Table IV.

Table I: Gender distribution and pathological condition of affected second molars

Variable	Female	Male	Total
Gender	46 (46%)	54 (54%)	100 (100%)
Condition of 2nd molar			
Proximal caries	8 (8%)	10 (10%)	p (0.478)
Periodontal pocket of the adjacent tooth	4 (4%)	4 (4%)	
Root resorption/caries	4 (4%)	1 (1%)	
Gross Caries	6 (6%)	13 (13%)	
Periodontal pocket with cervical caries	2 (2%)	1 (1%)	
No pathology	22 (22%)	25 (25%)	
Total	46 (46%)	54 (54%)	

Pearson chi (χ)2

Table II: Comparison of impacted condition, angulations and side of impaction among the study population

Variables	Female	Male	P
Impacted	30 (30%)	37 (37%)	0.726
Not Impacted	16 (16%)	17 (17%)	
Angulations			
Mesio angular	26 (26%)	25 (25%)	0.308
Horizontal	20 (20%)	29 (29%)	
Side			
Left	21 (21%)	18 (18%)	0.208
Right	25 (25%)	36 (36%)	

Pearson chi (χ)2

Table III: Comparison of pathologic condition of 2nd molar with impaction and angulations

Condition of 2nd molar	Impacted	Not Impacted	p	Mesio angulations	Horizontal angulations	P
Proximal caries	12 (%)	6 (%)	0.774	11 (%)	7 (%)	0.084
Periodontal pocket of the adjacent tooth	7 (%)	1 (%)		2 (%)	6 (%)	
Root resorption/caries	4 (%)	1 (%)		0 (%)	5 (%)	
Gross Caries	13 (%)	6 (%)		12 (%)	7 (%)	
Periodontal pocket with cervical caries	2 (%)	1 (%)		1 (%)	2 (%)	
No pathology	29 (%)	18 (%)		25 (%)	22 (%)	
Total	67 (%)	33 (%)		51 (%)	49 (%)	

Pearson chi (χ)2

Table IV: Management of Second Molars According to Clinical Conditions

Management	Number of cases	Clinical Conditions (case no.)
No need of treatment	55 (55%)	No pathology (47) & Periodontal pocket only (8)
Restoration	18 (18%)	Proximal Caries (16) & Periodontal pocket with cervical caries (2)
RCT	14 (14%)	Gross caries (12) & Proximal Caries (2)
Extraction	13 (13%)	Gross caries (9 non restorable) & root caries (4)
Total	100 (100%)	

Discussion:

The presence of decay distal to the second molar has been significantly associated with the impaction of the mandibular third molar. In cases where the third molar was impacted, the second molar exhibited decay in nearly 50% of instances, a difference that was statistically significant ($p < 0.0000$)[8]. In our study, the overall prevalence of caries in the mandibular second molar was 42%, with proximal caries accounting for 18% of cases. Previous studies have reported the prevalence of distal caries in mandibular second molars adjacent to impacted third molars ranging from 6% to 55%[9-11]. Alhobail et al.[12] reported a prevalence of 48.6% among 1,252 cases of second molar caries adjacent to impacted third molars.

The angulation of the mandibular third molar also appears to be a contributing factor to second molar caries. In our study, 51% of cases involved mesioangular impactions and the remaining 49% had horizontal impactions; no cases of vertical or distoangular impaction were found. According to Srivastava et al.,[13] 37.5% of 150 patients with impacted mandibular third molars had caries on the distal surface of the adjacent second molars, with the incidence rising to 55% in the presence of mesioangular impactions. Altan et al.[9] reported a 31.7% prevalence of second molar caries in the presence of mesioangular third molars, compared to only 5% in cases with vertical impactions. In a study by Pepper et al.,[10] among 1,414 cases, only 4.2% of mandibular second molars had distal surface caries; however, this rate was higher when the adjacent third molar was impacted. Syed et al. observed a 39% prevalence of cervical caries on the distal side of second molars, often associated with mesioangular impactions.[11] McArdle et al.[14] noted that distal cervical caries of the second molar is often a late complication of an adjacent impacted third molar. Similarly, Glória et al.[15] emphasized that the presence of a third molar increases the risk of caries on the distal surface of the second molar, depending on the eruption status, angulation, and contact between the teeth[12].

The development of periodontal pockets, with or without associated caries, is also strongly linked to the presence of third molars, particularly when they are mesioangularly impacted. However, our study did not find a statistically significant difference in this regard. The presence of a third molar is a known risk factor for the formation of distal periodontal pockets, root caries, and bone loss in the mandibular second molar[8]. These findings are supported by several previous studies. Blakey et al.[16] reported that 25% of patients with asymptomatic impacted third molars exhibited periodontal pathology distal to the second molar. Similarly, Marciani et al.[17] found that the presence of third molars in young adults was significantly associated with inflammatory periodontal disease.

Importantly, the absence of clinical symptoms in patients with impacted third molars does not rule out underlying periodontal disease. According to Qu et al.,[18] the presence of a third molar—regardless of its clinical status—poses a risk for the development of periodontal disease in the adjacent second molar. Li et al.[19] support this conclusion and recommend that this risk be considered in clinical decisions regarding the retention or extraction of third molars, particularly when these teeth are non-functional or when extraction does not compromise oral function[20]. Studies have shown that removal of the mandibular third molar can improve overall periodontal health of the adjacent second molar[21]. Although the prophylactic extraction of asymptomatic third molars remains a subject of debate, clinical decisions should ideally be made as early as possible[18,22]. The clinical implications of these findings underscore the importance of regular clinical and radiographic examinations for patients who choose to retain their third molars, to detect disease before it becomes symptomatic[17,22]. Vandeplas et al.[23] also emphasized that distal pathology of the second molar is commonly associated with the presence of the third molar, with impacted third molars significantly increasing this risk.

Conclusion

Our findings reinforce the association between the impacted status of the mandibular third molar and the occurrence of carious lesions and periodontal disease in the adjacent second molar. Early identification and appropriate surgical management of impacted third molars can play a crucial role in preventing damage to the second molars.

Conflict of interest: None

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