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Association Of Maxillary Canine Impaction And Malocclusion In Children Aged 12 To 18 Years

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ABSTRACT

Introduction: Maxillary canines are the second most frequently impacted teeth in the oral cavity and may lead to serious malocclusion problems if left untreated. Maxillary canine impaction requires a complicated and long course of treatment planning in which diagnosing the type and pattern of malocclusion plays an important part.

Materials and Methods: In this retrospective study, a total of 154 patients comprising 101 females and 53 males aged between 12 -18 years who reported to Saveetha Dental College and Hospitals with a complaint of unilateral or bilateral maxillary canine impaction were included. The groups were divided based on age, gender, skeletal and dental classification. Data was gathered, tabulated, categorized, and imported into SPSS Version 23 for statistical analysis. Descriptive statistics were used to describe the data. A test for significance and chi square association was performed.

Results: Maxillary canine impaction was more common among children between ages 12-15 yrs (61.62%). There was a female predilection (59.60%) with most type of lip competency being competent lips (77.77%). Class I malocclusion was most prevalent (67.67%) with most frequent intra arch discrepancy being crowding (29.29%). The frequency of other malocclusions was 7.07% Class II Div I malocclusion, 6.06% Class II Div II malocclusion, 12.12% Class III malocclusion.

Conclusion: Maxillary canine impaction is more common in females than males. Class I malocclusion is more prominent. Majority of the patients have been diagnosed between ages 12 to 15 years. Crowding is the most common form of arch variation.

Keyword: Canine, Impaction, malocclusion, health, novel

INTRODUCTION

Impaction may be defined as the failure of a tooth to erupt beyond its chronological age. Maxillary canines are the second most common teeth to get impacted following third molars. Their impaction frequency incidence ranges from 1% to 3% (1). Canine displacement refers to the abnormal position of the canine beneath the bone before its eruption, while canine impaction denotes the canine's abnormal location beneath the bone, which prevents it from erupting even after root development is complete (2,3).

Interestingly, the maxillary jaw encounters permanent canine impaction at a rate twice that of the mandible (4). The maxillary canines undergo the lengthiest developmental period and are among the final teeth to emerge. Their journey from the lateral aspect of the piriform fossa to their ultimate position within the dental arch constitutes the longest and most intricate eruption pathway (5)(2).

Disruptions in tooth development and eruption can lead to various conditions such as canine impaction, ectopic canines, canine transposition, canine transmigration, and agenesis. Given that canines undergo the lengthiest eruption process in the oral cavity, their position and morphology are critical for proper occlusal guidance. Consequently, thorough examination of the canines is essential. Moreover, the prevalence of canine impaction may be associated with the pattern of facial growth (6).

Retrospective evaluation of bone microstructure surrounding unerupted/impacted canines can provide analytical information about treatment prognosis and anchorage considerations. It was found that impacted canine were surrounded by denser bone when compared to normal canines which could also be a reason for entrapment. (7)(4)

Maxillary canines are crucial for both cosmetic and functional reasons (2,3). In contrast to a similar malocclusion without an impacted tooth, the treatment of an impacted canine involves a complex multidisciplinary process that necessitates surgical exposure and orthodontic extrusion of the tooth (8). This requires accurate surgical and biomechanical planning and a longer course of treatment.

The aim of this study is to assess the prevalence of maxillary canine impaction and its association with malocclusion among Dravidian population who have reported for dental treatment to a private hospital under 18 years of age.

MATERIALS AND METHODS

Data Collection

This study was performed on a sample of 151 patients comprising 101 females and 50 males aged between 12 -18 years. The groups were divided based on age, gender, skeletal and dental classification, and sector classification.

It was conducted in Saveetha Dental College and Hospitals in Chennai, Tamil Nadu. Patients who presented to the dental facility with the complaint of unilateral or bilateral impacted maxillary canines between the ages of 12-18 met the inclusion criteria. Patients older than 18 years old or those with missing or transposed canines were excluded.

Adequate histories and dental records including photographs, panoramic radiographs, study casts and models were considered. This data was collected from the Dental Information Archiving System (DIAS) data from 2019

Statistical Analysis

Data was gathered, tabulated, categorized, and imported into SPSS Version 23 for statistical analysis. Descriptive statistics were used to describe the data. A test for significance and chi square association was performed.

RESULTS

Out of a total of 154 patients , 59.60% of them were female while the rest, i.e, 40.40% were males [Fig 1]. 62.63% of the sample were between 12-15 years while 37.37% were between 16-18 years. When looking at lip competency 77.77% had competent lips, 8.08% had incompetent lips and 14.14% had potentially competent lips. This tells us that lip competency is not much affected by maxillary canine impaction.

When examining the sagittal relationship, 67.67% had Angle's Class I malocclusion, 7.07% Class II Div I malocclusion, 6.06% Class II Div II malocclusion, 12.12% Class III malocclusion, the most common type of malocclusion to accompany maxillary canine impaction being Class I malocclusion.

Among intra-arch discrepancies, crowding (29.29%) was most commonly associated with canine impaction.

In vertical relationship, bite was found to be normal in most patients (56.56%). The other bite abnormalities included Cross bite (18.18%), deep bite (4.04%), open bite (8.08%) and scissor bite (13.13%)

The data collected was statistically analyzed and graphs were plotted as follows:

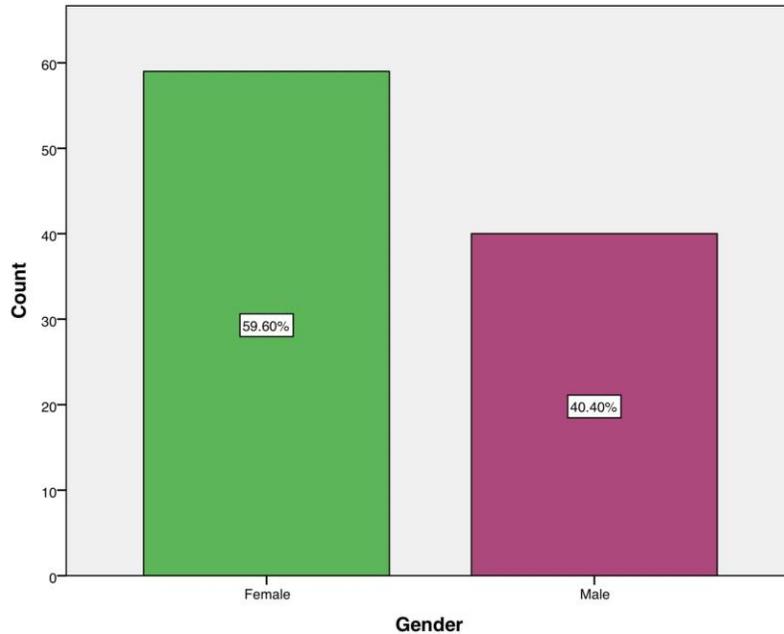


Fig 1 : The bar graph depicts the gender distribution of all patients below 18 years of age who were diagnosed with maxillary canine impaction. Green represents the percentage of females (59.60%) and purple represents the number of males (40.40%).

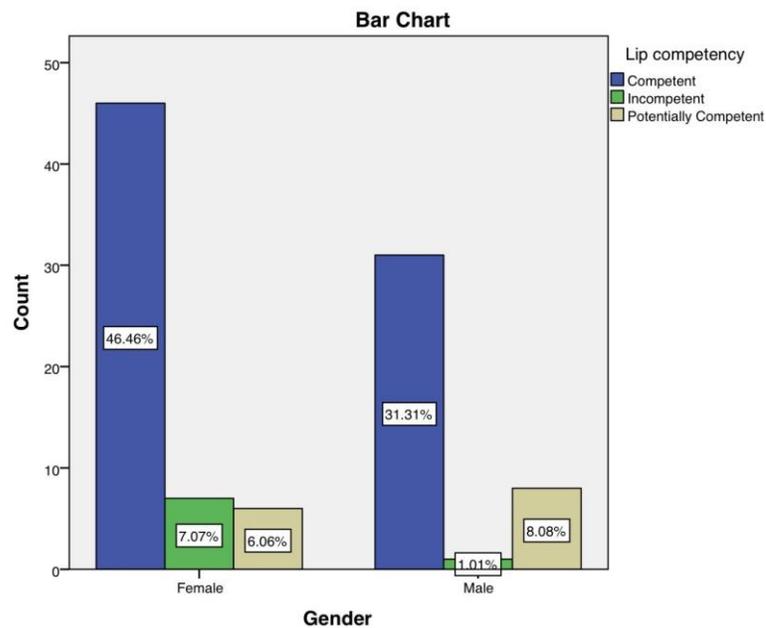


Fig 2 : The bar graph represents the association between gender and lip competency of the patient with maxillary canine impaction. Blue represents competent lips (77.77%), green represents incompetent lips (8.08%) and beige represents potentially lips (14.14%) .

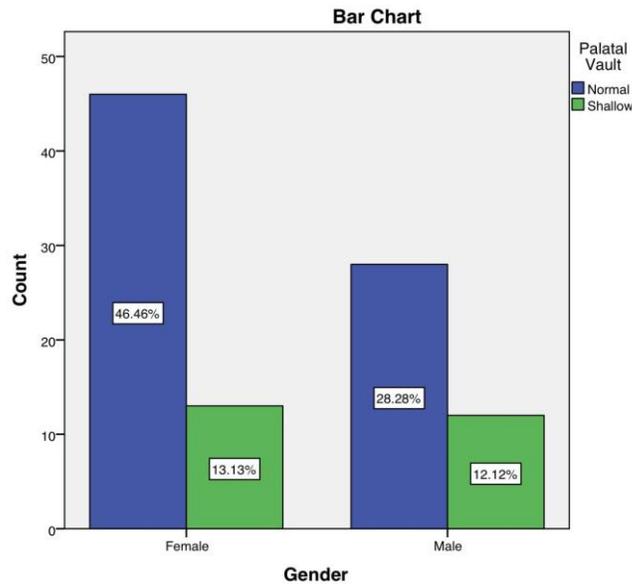


Fig 3: The bar graph represents the association between gender and palatal vault form. Blue represents normal palatal vault (74.74%) and green represents shallow palatal vault (25.25%)

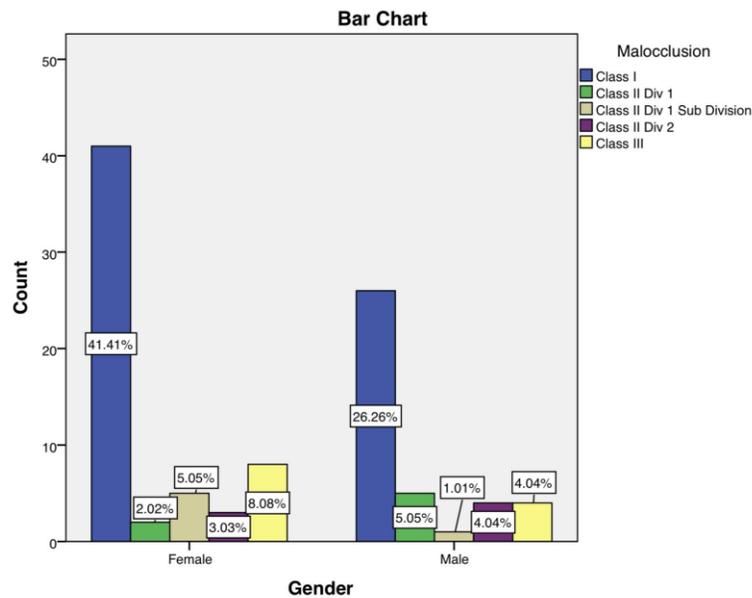


Fig 4: The bar graph represents the association between gender and malocclusion class. Blue represents Class I (67.67%), green represents Class II Div I (7.07%), beige represents Class II Div II subdivision (6.06%), purple represents Class II Div 2 (7.07%) and yellow represents Class III malocclusion (12.12%). The highest observation was Class I malocclusion.

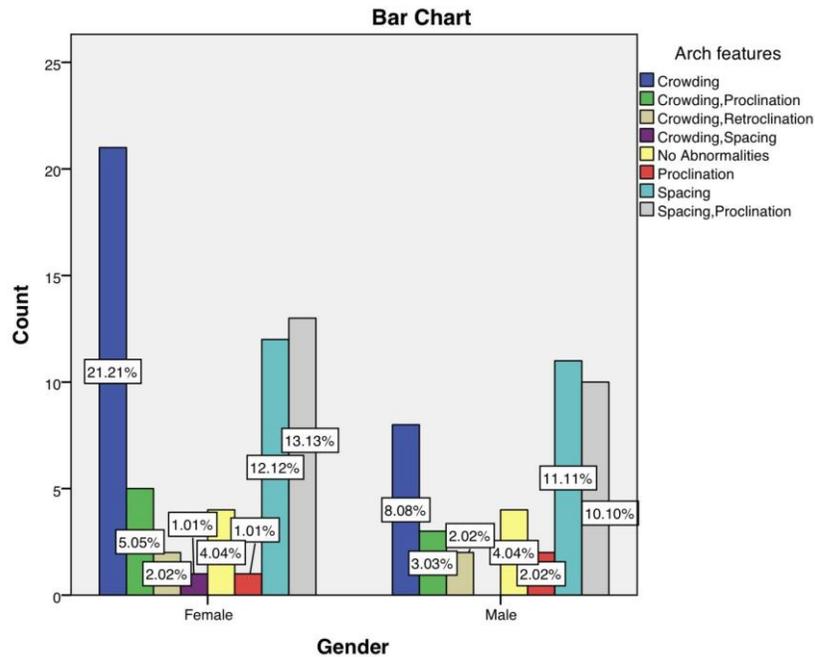


Fig 5: The bar graph represents the association between gender and arch features of malocclusion. Dark blue represents crowding (29.29%), Green represents crowding with proclination (8.08%), Beige represents crowding with retroclination (4.04%), Purple represents crowding with spacing (1.01%), Yellow represents no abnormalities (8.08%), Red represents proclination (3.03%), light blue represents spacing (23.23%) and Grey represents spacing with proclination (23.23)%.

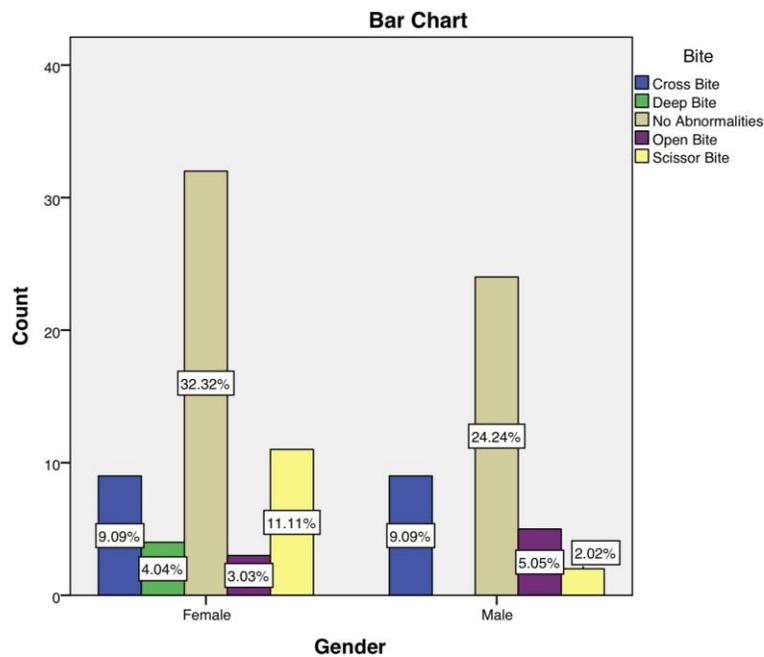


Fig 6: The bar graph represents the association between gender and interarch bite. Blue represents Cross bite (18.18%), green represents deep bite (4.04%), beige represents no bite abnormalities (56.56%), purple represents open bite (8.08%) and yellow represents scissor bite (13.13%).

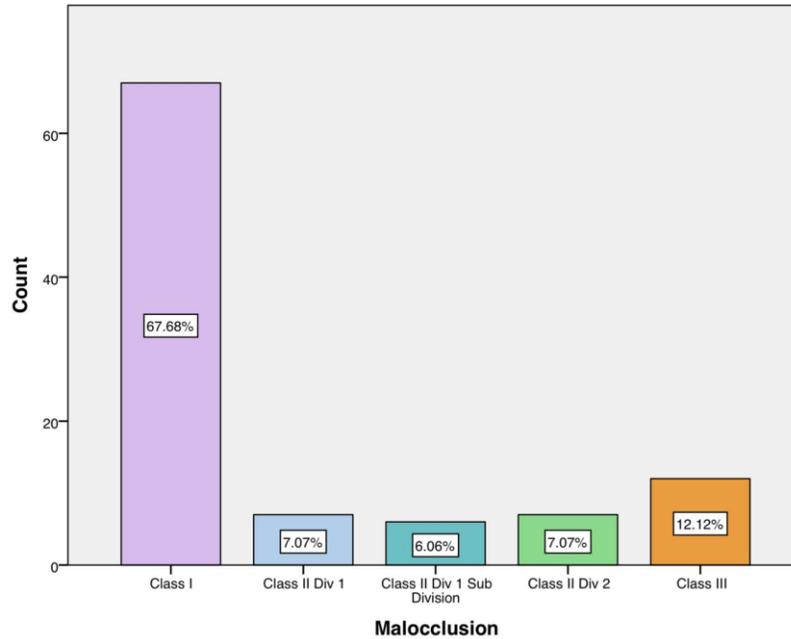


Fig 7: The bar graph represents the distribution of different classes of malocclusion in patients with maxillary canine impaction. Pink represents Class I (67.68%), Blue represents Class II div 1 (7.07%), Teal represents Class II div 1 subdivision (6.06%), Green represents Class II div 2 (7.07%) and orange represents Class III (12.12%).

DISCUSSION

Both males and females exhibited a higher likelihood of maxillary canine impaction compared to their mandibular canines, with males displaying a higher prevalence of palatal canine impaction (64.7%) than females (9).

Comparing this to our study, females (59.60%) had a higher percentage of canine impaction when compared to males. This was due to more females reporting for orthodontic treatment at the dental facility.

A study conducted in Jordan also gives reason for the gender bias in the case sample. The gender differences in the occurrence of palatal canine impaction could be explained by the greater demand for orthodontic treatment among females. (10)

In another study conducted in Ramadi, it was found that girls were more susceptible to impacted canines compared to males, with a ratio of 1:2 between the genders. Unilateral impactions were more prevalent than bilateral ones. Additionally, canines impacted on the palatal side were observed more frequently (61%) than those with buccal impacts. Furthermore, a clear association was identified between an impacted canine and the absence of a lateral incisor on the same side. (2,3)

Regarding sagittal relationships, patients with Class III skeletal discrepancies had the highest incidence of impacted canines (44.4%), followed by Class I (28.9%) and Class II division 1 (15.6%), while Class II division 2 recorded the lowest frequency (11.1%). An alternative framework for analyzing different malocclusion groups concerning race and ethnicity could be through examining canine impaction rates (5)(9).

In this study, 67.67% of the population had Class I malocclusion, 7.07% had Class II Div I malocclusion, 6.06% of the population had Class II Div I subdivision, 7.07% had Class II Div 2 malocclusion and 12.12% had Class III malocclusion. The highest sagittal relationship was Class I malocclusion.

In another study conducted among the Dravidian population, Peg laterals were the most commonly present anomaly associated with the impacted maxillary canine (61.8%). Other dental anomalies associated with impacted maxillary canine in the present study are 23% of buccocclusion and 7.6% of torsion (11)(7)(6)

Another research endeavor explored the potential of using panoramic radiographs to forecast maxillary canine impaction. Results indicated a noteworthy clinical distinction of 4 mm between the mean distances from the occlusal plane to the antimere and the impacted canine in individuals aged 8 years and older ($P < 0.05$). This suggests that at the age of eight, geometric measurements on panoramic radiographs can serve as diagnostic tools for identifying maxillary canine impaction (12).(13)

In our study panoramic radiographs were used to study and diagnose maxillary canine impactions which already existed.

Due to the complexity of treating this eruptive anomaly, it is crucial for clinicians to be able to predict the risk of maxillary canine impaction (14). Facilitating the eruption of an impacted canine demands meticulous biomechanical strategy, employing orthodontic force levels within a physiological range to mitigate the potential for root resorption and loss of vitality. Additionally, ensuring effective anchorage is essential for successful treatment (15)(16).

The limitations of the study include smaller sample size and age category.

CONCLUSION

The prevalence of maxillary canine impaction was more in females and between the age groups of 12 to 15 years. It was most commonly associated with Angle's Class I malocclusion with crowding.

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