

TYPES OF OPEN APICES SEEN IN IMMATURE PERMANENT TEETH IN PEDIATRIC PATIENTS VISITING DENTAL COLLEGE

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ABSTRACT:

An immature permanent tooth is a newly erupted tooth with incomplete root formation. Once the tooth erupts, it takes upto three years for root completion. Any trauma or pathology to the tooth during this tooth might cause the tooth to lose its vitality. This clinical scenario is a challenge to the clinician as root does not develop further and may fracture. The present study was undertaken to evaluate the types of open apices seen in immature non vital permanent teeth. Data was retrospectively collected from the clinical records of patients who visited the Department of Pedodontics and Preventive Dentistry, from June 2019 to March 2020. 34 patients who fulfilled the inclusion and exclusion criteria were included in the study. Data was analysed using chi square test. Results showed that 27 males (79.41%) had open apices compared to females (20.59%). Non blunderbuss (55.28%) canals were more common compared to blunderbuss canals (44.12%). Within the limitations of our study, we conclude that non blunderbuss canals were found to be more common. Male patients had higher prevalence of open apices compared to females.

KEYWORDS: Blunderbuss, non blunderbuss, open apex, pediatric patients, trauma

INTRODUCTION:

The apical foramen opens at the apex of the root of a tooth through which the nerves and blood vessels that supply the dental pulp of the tooth pass through (Berkovitz, Holland and Moxham, 2009). The anatomy of the apical foramen changes with the age as root elongates and the apical foramen begins to approximate and close. The completion of root development and closure of apex occurs up to three years after eruption. (Milas, 1968)

Teeth with immature apical foramen formation present as large open apices along with divergent and thin dentinal walls. Classically there are two types of open apices; the blunderbuss and the non blunderbuss apices. In blunderbuss apex, the walls are divergent and the flaring of the apex is funnel shaped. In non blunderbuss apex, the walls of the canals may be parallel to slightly convergent, therefore the apex can be broad shaped or convergent (Smyth and Ryan, 2017) (Somasundaram et al., 2015)

There are many reasons that lead to an open apex. Incomplete root development often arises secondary to pulpal necrosis arising as a result of trauma, which leads to open apex. Foramina resorption of the root end may also arise in the presence of periapical lesion which may alter the anatomy of a preexisting open apex further. (Vier and Figueiredo, 2002)(Govindaraju and Gurunathan, 2017)

The endodontic management of an open apex has always been a challenge for the clinician. ('Fluoride, Fluoridated Toothpaste Efficacy And Its Safety In Children - Review', 2018) Thin dentinal walls are susceptible to fracture during or after treatment. (Subramanyam *et al.*, 2018)(Gurunathan and Shanmugavel, 2016) Open apex also makes it difficult for the practitioner to obtain an apical seal. (Jeevanandan and Govindaraju, 2018) In recent years, there has been an increasing interest in the treatment of immature non vital permanent teeth. However, the prevalence of types of open apices associated with these teeth has not yet been explored. Hence this study was undertaken to understand the prevalence of the types of open apices in immature permanent teeth in the pediatric dental patients .

MATERIALS AND METHODS:

The present study was carried out in the Department of Pediatric and Preventive dentistry after receiving ethical clearance from the Institutional Review Board of the institution. Only pediatric dental patients who were younger than 18 years of age and had immature non vital permanent teeth were included in the study. Patients who were older than 18 years, mature non vital permanent teeth and those with systemic diseases were excluded from the study.

Data was retrospectively collected from the case records of patients who visited the Department of Pediatric and Preventive Dentistry from June 2019 to March 2020 at the Hospital. Out of the 55 patients whose data was obtained, only 34 who fulfilled the inclusion and exclusion criteria were included in the study. Data was statistically analysed using SPSS version 20.0. The chi square test values were used to compare data and distributions at 0.05 level of statistical significance

RESULTS AND DISCUSSION:

A total of 34 patients were included in the study which consisted of 27 males (79.41%) and 7 females (20.59%) (Figure1) (Figure 3). 15 males (44.12%) had non blunderbuss canals while remaining 12 (35.29%) males had blunderbuss canals. 4 females(11.76%) had non blunderbuss canals and remaining 3 had blunderbuss canals (8.82%) (Figure 4). 15 children (44.12) below the age of 10 had open apices (Figure 2) of which 8 were non blunderbuss(23.52) and 7 were blunderbuss (20.58%). According to figure 3 chi-square tests p value = 0.7 > 0.05 statistically not significant. And according to figure 2 chi-square tests p value = 0.9 > 0.05 statistically not significant.

Non Vital immature permanent teeth have always been an enigma for clinicians. Thin dentinal walls which have high susceptibility to fracture, difficulty in obtaining working length and achieving apical seal are few challenges that dentists face. Dental anxiety and the age of the patient also play a vital role in the success of treatment. (Ravikumar, Jeevanandan and Subramanian, 2017)(Jeevanandan, 2017)

Knowledge of root canal anatomy plays an important role in providing treatment for the patient. (Ajagannanavare *et al.*, 2017) Though research on immature non vital permanent teeth has been increasing in recent years, the data available is scarce. (Sharma *et al.*, 2016)(Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a). Also there are no studies which have explored the prevalence and types of open apices in such teeth. Hence this study was undertaken to fulfill this lacunae

The results of this study showed that non blunderbuss canals (55.89%) were more common compared to blunderbuss canals (44.11%). This could be due to the age of the patient when trauma would have

occurred along with delay in seeking treatment.(Nair *et al.*, 2018)(Christabel and Linda Christabel, 2015) Trauma occurring at a younger age in an immature tooth has a higher chance to develop into a blunderbuss canal as the root is still developing (Reddy, Bharadwaj and Sukumaran, 2011)(Panchal, Jeevanandan and Subramanian, 2019). From a clinical perspective, treatment of blunderbuss canals are more difficult due to wide divergent canals. (Ajagannanavaret *al.*, 2017)(Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017b). Open apices were more common in males (79.41%) and in the age group 11 to 17 years (55.88%). This could be due to active participation of the male patients in contact sports and physical activities which would eventually lead to an open apex as none of the patients would have sought any emergency dental treatment. (Packiri, Gurunathan and Selvarasu, 2017) Our results are in accordance with Topaloglu who found that children older than 10 years had higher chances to have an open apex than those younger than them.He stated that children of this age group were affected than younger children due to their aggressive behaviour. (Topaloglu, 2019)(Govindaraju, Jeevanandan and E. M. G. Subramanian, 2017a)

The etiology for open apex in the majority of children was trauma (94.1%) compared to pathological(2.9%) or idiopathic (2.9%) causes.This is similar to the results obtained by Baoziz et al who stated that trauma was the main cause of for open apices. (Bouazizet *al.*, 2017)(Saraswathi and Pradeep Kumar, 2018) Children spend the majority of their time in school and actively participate in games and sports in school and with friends at home which may result in dental trauma. (Azami-Aghdashet *al.*, 2015)(Govindaraju, Jeevanandan and E. Subramanian, 2017).

Our study had a few limitations. It was concluded in a single centre and the sample size was small. However the long term follow up of these cases will allow us to understand the clinical success of treatment done for these patients. Since no data is available on the prevalence of open apices till date, further studies should be undertaken to understand the prevalence and treatment options available for such teeth.

CONCLUSION:

Within the limitations of this study, we conclude that open apices were more common in males compared to females. Non blunderbuss canals were more prevalent compared to blunderbuss canals.

AUTHOR CONTRIBUTIONS:

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CONFLICT OF INTEREST:

Nil

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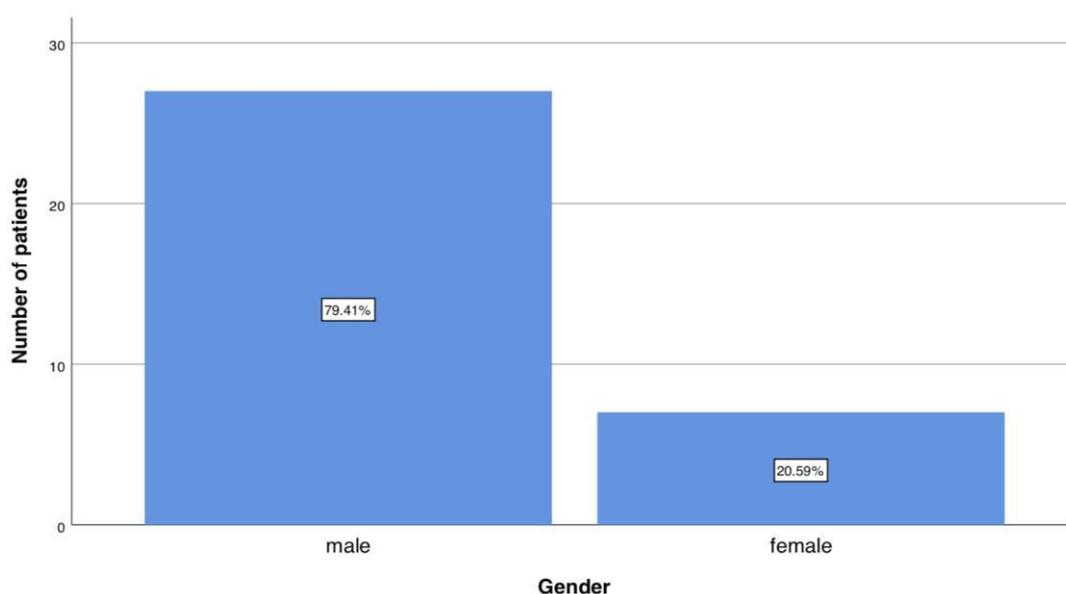


Figure1: Bar chart depicting the gender wise frequency distribution of open apex. X-axis represents the gender and Y axis represents the number of individuals with open apex. 79.41% of the participants were males and 20.59% participants were females.

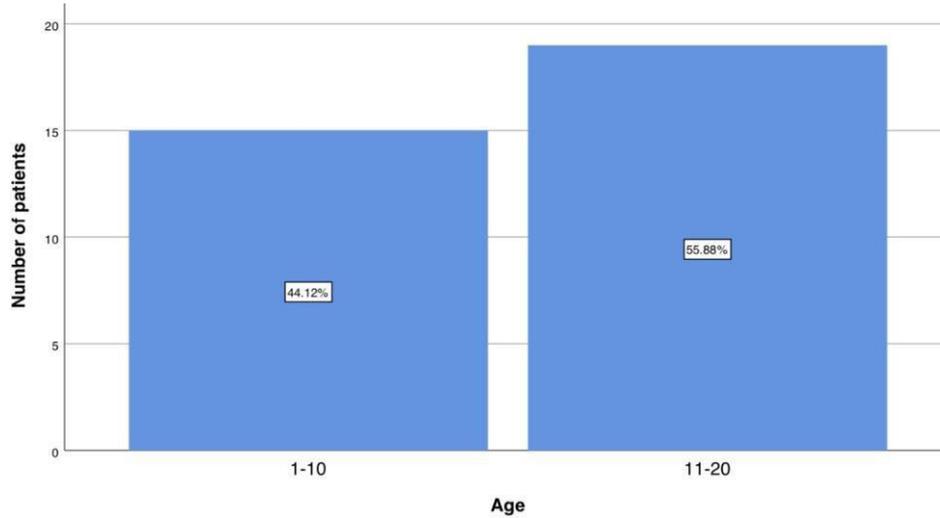


Figure 2: Bar chart depicting the age wise frequency distribution of open apex. X-axis represents the age and Y axis represents the number of individuals with open apex. Patients aged between 11-20 were more prevalent to open apex than the other age group. (55.88%).

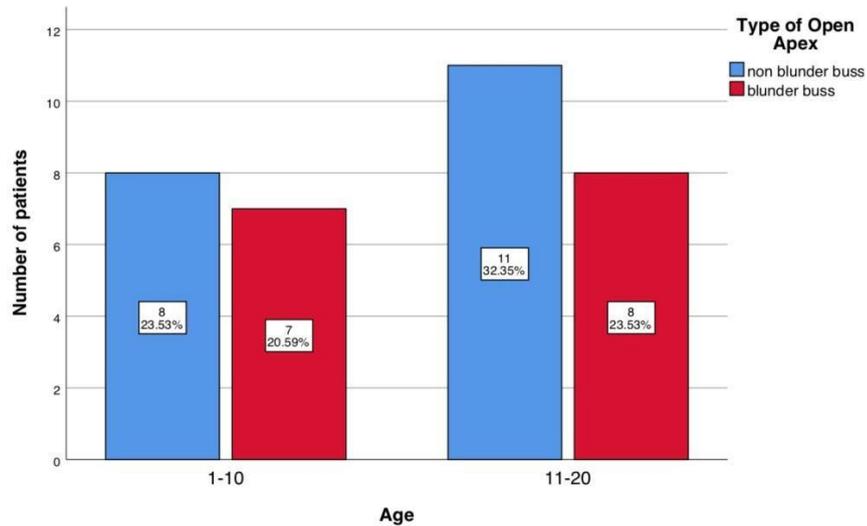


Figure 3 : Distribution of open apices based on age. The x-axis depicts the age and the Y-axis depicts the percentage of teeth with open apices. Blue represents non blunderbuss canals and red represents blunderbuss canals. Chi-square tests were done and the association was found to be statistically insignificant ; p value = 0.7 > 0.05 statistically not significant. Patients aged between 11-20 were more prone to open apex than the other age group. Non blunderbuss open apex were more prevalent than the blunderbuss open apex.

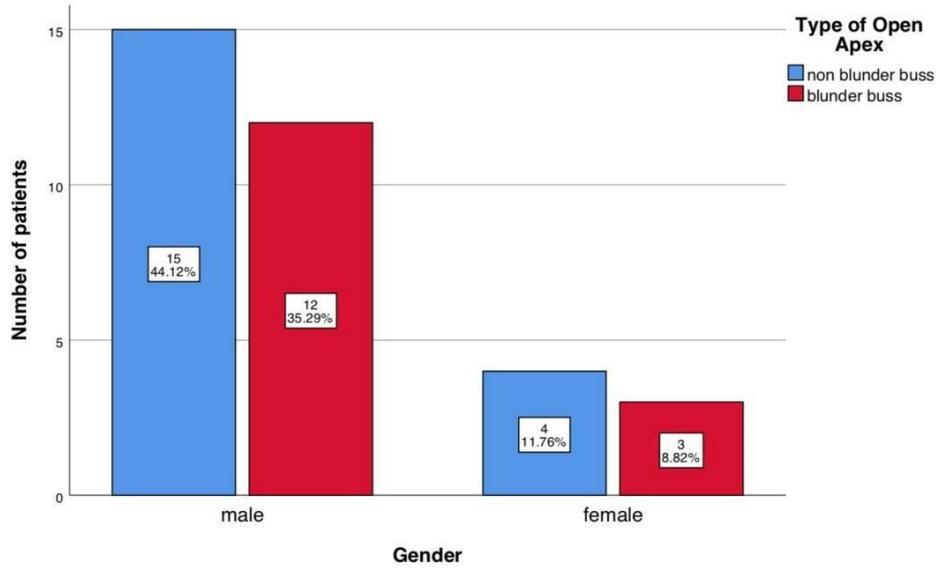


Figure 4: Distribution of open apices based on gender. The x-axis depicts the gender and Y-axis depicts the percentage of teeth with open apices. Chi-square tests were done and the association was found to be statistically insignificant ; p value = $0.9 > 0.05$ statistically not significant. Male patients were more prone to open apex than the female patients. Non-blunderbuss open apex were more prevalent than the blunderbuss open apex among the males and females.