

Cleft and Development of Teeth

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Abstract

Background: Pre-natal and post natal etiological events have been implicated in anomalies in tooth dimension, morphology, position, number and structure. Higher prevalence of these dental anomalies is seen in subjects with cleft lip and palate when compared with general population. In order to add more information the present study evaluated each anomaly and its relation with different types of clefts separately.

Aim: To determine the relationship of dental phenotypes to the clefts groups radiographically and clinically and compare the prevalence of anomalies.

Design: A retrospective analysis of all cleft patients admitted in the SDM craniofacial unit from 2014 to 2018 within the age group of 7-25 yrs was included in the study.

Results: The prevalence of dental anomaly was found to be 52% in our study. The most common dental anomaly was found to be tooth agenesis (48%) and the commonest tooth missing was maxillary lateral incisors followed by microdontia (14%), supernumerary teeth (0.1%), taurodontism, fusion respectively.

Conclusion: The severity of dental anomaly was found to be dependent on the severity of the cleft, thus suggesting that the effect of cleft disturbance is more local than general on the dentition. So identifying these common patterns of dental anomalies is important for accurate, timely orthodontic treatment planning.

Keywords: Cleft Lip, Cleft Palate, odontogenesis, dental anomaly.

Introduction

Dental anomalies are mostly caused by genetic or environmental factors. Pre-natal and post-natal events can lead to anomalies in tooth dimension, morphology, position, number, and structure¹. The prevalence of these anomalies is significantly higher in subjects with cleft lip and palate compared to the general population. These defects can be in tooth number, position and reduced tooth dimensions.^{3, 4, 5}

Previous studies investigating dental deformities among individuals with clefts have mostly focused on congenitally missing teeth. This resulted in the scarcity of information regarding the prevalence of various dental anomalies in different cleft groups. Lateral incisors are more prone to developmental defects as they are situated in the region of alveolar cleft but teeth apart from lateral incisors are also affected frequently². Genetic and environmental factors at different times of gestation, affects different parts of the craniofacial and dentofacial structure, thus it is possible that specific patterns of deformities may be related to different cleft types^{6,7,22}. Not only the knowledge of developmental disorders in the dentition of cleft affected children has scientific value for the researchers of cleft pathogenesis and dental development but knowing about different dental anomalies associated with cleft lip and cleft palate helps in orthodontic treatment planning².

Materials & methods

Standardized diagnostic records, i.e. panoramic and periapical radiographs, dental casts, intra-oral photographs and dental histories of 300 patients who reported to our craniofacial unit from 2014-2018 within the age group of 7-25 years were included in the study. The subjects who have undergone cleft lip and palate surgery before 3 years of age were in mixed dentition, had no syndromes, no history of teeth extraction, no trauma to any tooth and no

endodontic, prosthodontic or orthodontic treatment were included in the data.

The subjects were classified by cleft type into four groups: Unilateral cleft lip and palate, Bilateral cleft lip and palate, Cleft palate, Cleft lip. The anomalies investigated were agenesis, impaction, fusion, taurodontism, microdontia, enamel hyperplasia, supernumerary tooth, and ectopic eruption. The rates of occurrence of each anomaly were calculated as a percentage of the total sample in each group.

Due to the retrospective nature of the study it was exempted from college IRB approval.

Results

Among the 300 cleft patients included in study, 140 (46.67%) were without any dental anomaly and 160 (53.33%) with a dental anomaly. Graph 1 shows the distribution of patients with and without dental anomalies. The distribution of dental anomalies revealed tooth agenesis (68.8%) as the commonest problem followed by microdontia (16.9%), impaction (6.3%), supernumerary teeth (4.3%), taurodontism (2.5%), and others (1.25%). Graph 2 shows the distribution of dental anomalies in cleft patients.

Dental developmental disorders according to sex distribution revealed that females were more commonly affected than males and other than supernumerary teeth all other anomalies were more frequently seen in females (Graph 3).

Unilateral cleft lip and palate group was affected most severely, with tooth agenesis (73.2%) and microdontia(17.1%) being the frequent problem respectively. Bilateral cleft lip and palate is the second group to be affected with tooth agenesis (69.9%) and microdontia (17.8%) respectively. Isolated cleft palate was next followed by isolated cleft lip. Fusion was seen in only 2 cases and taurodontism in 4 which was equally

distributed among unilateral and bilateral cleft lip and palate. Supernumerary teeth were more common in bilateral cases whereas impacted teeth were seen more frequently in unilateral cases. Graph 4 shows a detailed distribution of dental anomaly distribution with respect to different cleft groups.

Figures 1, 2, 3 are panoramic radiographs showing tooth agenesis, microdontia, and supernumerary tooth respectively.

Discussion

The prevalence of dental anomalies varies according to different racial and ethnic groups²². The present study investigated the frequency of anomalies in a sample of Indian subjects having different types of cleft. Surprisingly dental anomalies were more common in females with unilateral cleft lip and palate followed by bilateral cleft lip and palate.

The mechanisms controlling dental development are independent of somatic and sexual maturity but are highly correlated to aetiological factors like cleft¹. As stated by Baek and Kim, 2007 epidemiological studies conducted on cleft subjects require classification by cleft types, so this study was subdivided into four groups⁸. Previous studies report that dental anomalies occur with a higher frequency on the cleft side in a patient with unilateral cleft lip and palate because etiological factors that lead to the cleft formation (poly- or monogenic inheritance and multiple exogenous factors) may also affect the development of the dentition^{9,10}.

In the present study, the rates of anterior teeth agenesis on the cleft side were commonest (68.8%) which was quite similar to the study done by Dewinter et al. (2003)¹¹. Previous studies also have reported congenital absence of the cleft side permanent lateral incisor to be the commonest finding in children with cleft lip, palate or both^{2,12,13, 22}. The high rates of agenesis near the cleft may

be due to a deficient blood supply, either congenital or secondary to surgery, or to a deficiency in mesenchymal mass (Jiroutova and Mullerova, 1994; Vichi and Franchi, 1995; Ribeiro et al, 2003)^{14,15,16}.

The rate of microdontia in our study has been reported to be 16.9% which is quite high when compared to previous studies done by Werner and Harris (1989) who reported the incidence of microdontia in cleft patients to be 2.3%¹⁷. Ackam et al, 2010 also reported an incidence of microdontia in their study that ranged from 1.9-4.2%¹. But our results were quite similar to studies done by Ranta, 1986; Vichi and Franchi, 1995; Uslu et al., 2009. All of these studies reported having a higher incidence of malformed, peg-shaped or microformed teeth on the cleft side and commented that compromised growth potential in these subjects may be the reason for microdontia^{2,16,18}. The findings of the current study showed a significantly higher rate of impaction in the anterior and premolar regions in the cleft patients (6.3%), with the highest rates in the anterior region on the cleft side. It has been reported that impacted maxillary canines often present in conjunction with other genetically linked abnormalities¹⁹.

Supernumerary teeth related to a cleft lip and palate patient may result from the fragmentation of dental lamina during cleft formation¹⁶. The present study showed a prevalence of 4.3% of supernumerary teeth in cleft lip and palate patients which were contrary to study done by Ribeiro et al., 2003 who stated supernumerary teeth to be the second most common dental anomaly after agenesis in cleft lip and palate patients¹⁵. The incidence of taurodontism in our study was 2.5% which was quite similar to the study done by Ackam et al., 2010¹.

Different patterns of deformities are co-related to different cleft types^{6,7}. The rate of overall dental anomalies has generally been found to be higher among cleft patients, with anomalies located most often in the area of cleft¹⁵.

The literature also suggests that associations between different tooth anomalies are 'clinically relevant' with individuals diagnosed with one anomaly at possible increased risk of others^{20,21}. Previous studies evaluated different types of clefts jointly but the present study evaluated each anomaly and its relation with different types of clefts separately.

Conclusion

We can conclude from the study that a significant portion of individuals with a cleft was found to have at least one dental anomaly. Agenesis was a most common anomaly and dental anomalies varied in different cleft groups. Timely detection of these dental anomalies also helps in proper orthodontic treatment and planning². The association of cleft type and dental abnormalities in number, size, shape, the timing of formation, and eruption and cause of the abnormalities will serve as a focus for review and discussion².

Disclosure Statement

The authors have nothing to disclose.

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Figure 2: Microdontia



Figure 3: Supernumerary tooth

Legend Figures

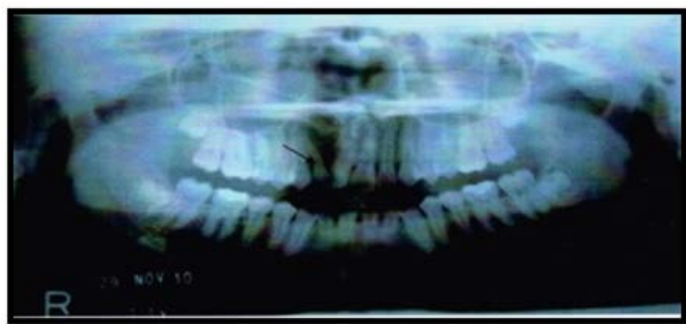


Figure 1: Tooth agenesis

