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DENTAL ANOMALIES IN CLEFT LIP AND PALATE

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ABSTRACT:
Cleft lip and palate is one of the most common congenital craniofacial anomalies affecting the head and neck region. In addition to craniofacial defects, various dental developmental anomalies are associated with the condition. Complete oral rehabilitation of cleft lip and palate patients is a challenge among dental surgeons and orthodontists. As dental anomalies contribute to additional complexity in treatment, early detection improves orthodontic and surgical planning to obtain adequate esthetic and functional results. A thorough examination and identification of the existing anomalies is required before the initiation of orthodontic treatment as it involves extractions, and treatment prognosis relies on remaining healthy tooth crowns and roots to accommodate force application.

Keywords: Cleft lip or palate (CL/P) ; developmental disturbance ; dentition

1. INTRODUCTION:

Orofacial cleft lip/palate is a common congenital anomaly present during birth. Incomplete fusion of the maxillary prominence and median nasal processes results in small niche or an indentation on the lip and the palate extending upto the nose. The orofacial cleft may appear in various combinations as isolated cleft lip, cleft lip with cleft palate, may be associated with syndromes or they may present unilaterally or bilaterally. Depending on the extent and severity of the anomalies various management modalities are recommended. Developmental disturbances in primary and permanent dentitions are often associated with Cleft lip or palate. It is important to address the associated dental anomalies to restore all the esthetic, functional, periodontal and restorative components. This review summarizes the reported dental anomalies in the literature.

2. DISCUSSION:

ETIOLOGY AND PATHOGENESIS

Korolenkova[1] in 2019 studied the external etiological factors in CL/P patients that influence dental developments. Absence of Early orthopaedic treatment, surgical trauma during perioplasty, tissue tension leading to reduction of blood supply, excessive scarring associated with palatal defects are some of the external factors that result in lateral incisor aplasia, hypoplasia, and developmental enamel defects in the frontal teeth. Central incisor agenesis was a typical finding in primary periosteoplasty cases. Hence it's well understood that CL/P patients have complex mixed genetic and environmental etiology.[1]

A remarkable potential for maxillary growth is present in non-operated cleft subjects with localized dentoalveolar defects.[2] Early surgical repair of cleft lip and palate invariably contributes to secondary growth disturbances in transverse, vertical and antero-posterior dimensions which poses a major challenge

for the orthodontists. Approximation of the cleft segments and lip repair results in maxillary arch narrowing and crossbite as the scar tissue inhibits widening of the maxillary arch. This in turn adversely results in crowding, crossbite and a V-shaped narrow maxillary arch. Palatal scar tissue formed in the tuberosity areas, restrain downward and forward translation of maxilla by binding maxilla to the spenoid bone at the pterygoid process. A resultant class III incisor relationship with maxillary retrusion is observed. With diminished nasopharyngeal airway due to maxillary retrusion secondary adaptations of mandibular position leads to increased lower anterior facial height with over eruption of posteriors. In severe cases there is lack of interincisal contact with excessive freeway space, with tongue impeding posterior eruption leading to over closure of the mandible worsening the class III[2].
The dentition of the CL/P patients is affected with greater number of anomalies than dentition of non-cleft population. The tooth bud in vicinity to the cleft region is most likely to be affected. Hypodontia, supernumerary teeth,hypoplasia, abnormalities in tooth size and shape, delayed dental development and eruption are some of the common dental anomalies associated with CL/P[3] .

DELAYED ERUPTION

Kramer et al[4], compared emergence time of primary maxillary incisors, including lateral incisor on the cleft side in the distal cleft segment and in the pre-maxilla. On comparing with control normal children he found an average delay of 8months for the lateral incisors on the cleft side in children with cleft lip and alveolus and a delay of 13 months in cleft lip and palate children..The proximate anatomy and the timing of orofacial cleft formation influences dental malformations. On studying patients with isolated cleft palate, Ranta[5] found that there is a delay in dental development for patients presenting hypodontia (0.7yr) than patients without hypodontia (0.4yr).More the severity of hypodontia, there was somewhat much longer delay in tooth development. The results were contradictory to the study done by Tan et al,[6] where he concluded that the extent of hypodontia does not influence dental development.

3. LATERAL INCISOR ANOMALIES

The lateral incisor bud is often disturbed as it proximates the region of dentoalveolar cleft, leading to alteration in size,shape(peg,conical teeth),time of formation and eruption[7].The lateral incisor tooth germ comprises of epithelium from both medial nasal and maxillary processes. The complexity in the development of deciduous upper lateral incisors can explain its vulnerability. Incomplete fusion of the facial processes in CL/P patient influences the non-fusion of lateral incisor components, resulting in two lateral incisors one on each side of the dentoalveolar cleft. Rare dental anomalies such as fused or T-shaped incisors may also develop as a resultant of incomplete fusion. Whenever the medial nasal and maxillary processes fuse except for their dental epithelia which remains separate a supernumerary lateral incisor if formed. Delay in fusion of epithelium is a part of critical period in clefting.The presence of a supernumerary lateral incisor in normal individuals could be considered as a possible cleft predisposition[8].
Tsai et al.[9] (1998) gave four distribution patterns of primary upper lateral incisor on the cleft side: a) one lateral incisor located distally to the alveolar cleft, (b) one lateral incisor located mesially to the alveolar cleft, (c) the absence of the lateral incisor, and (d) the presence of two lateral incisors one tooth on each side of the alveolar cleft. Congenitally missing maxillary lateral incisor is a common finding in CL/P. Specific genes such as IRF6, MSX1, PAX9 and TGFB3 mutations are proven to be the factors involved in selective hypodontia and orofacial clefting[10,11].

4. HYPODONTIA

Apart from lateral incisors the maxillary and mandibular second premolars often are absent with the most common being the upper second premolars.[12]Hypodontia outside the cleft region is positively associated with both TGFB3 and MSX1 genes.[13]In unilateral cleft's hypodontia is found on the same side of the cleft more frequently on the left side.[14]The missing pattern of the teeth simulated Butler's field hypothesis where he postulated that the distal most tooth in each morphological class was evolutionarily less stable.

5. **OTHER ABNORMALITIES**:

Ectopic eruption of canines in the cleft region has shown increased angulation, higher vertical position, and are located closer to the midline when compared to the non-cleft side.[15,16] Age for both hard palate closure and bone grafting, cleft lateral agenesis and transposition were some factors associated with abnormal canine position[17]. Any disturbance to the tooth bud during Lip repair and palate repair might result in enamel hypoplasia in deciduous incisors and tip of permanent incisor crowns. Maxillary incisor hypoplasia is more frequently observed in CL/P patients[18].Other dental anomalies include dilacerated maxillary centrals,altered cusp pattern in molars and bicuspids,fusion, germination , microdontia[19,20]. Interactive compensations with dental variations in size have been reported to occur within tooth classes[21.]Dilacerations,taurodauntism and dens evaginatus were common in Unilateral cleft lip patients.Different patterns of anomalies were related to different cleft types[22]

6. CONCLUSION:

A significant proportion of individuals with cleft(CL/P) had atleast one dental anomaly. Careful inspection of routine orthodontic diagnostic records is essential to identify the morphological anomalies and formulate a treatment plan accordingly to restore esthetics and functional stability. During secondary orthognathic surgeries it's important to analyse the dental status. More high quality studies and systematic reviews are required to evaluate the concurrence and pattern of distribution of dental anomalies in non syndromic cleft lip/ palate patients.

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