

Endodontics in Cleft Lip and Palate¹Dr. Runal Sarkar, A.J. Institute of Dental Sciences, Mangalore, Karnataka²Dr. Shruti Bhandary, A.J. Institute of Dental Sciences, Mangalore, Karnataka**Corresponding Author:** Dr. Runal Sarkar, A.J. Institute of Dental Sciences, Mangalore, Karnataka**Citation of this Article:** Dr. Runal Sarkar, Dr. Shruti Bhandary, “Endodontics in Cleft Lip and Palate”, IJDSIR- January - 2024, Volume –7, Issue - 1, P. No.118– 123.**Copyright:** © 2024, Dr. Runal Sarkar, et al. This is an open access journal and article distributed under the terms of the creative common’s attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.**Type of Publication:** Review Article**Conflicts of Interest:** Nil**Abstract**

Cleft lip and palate is one of the most common anomaly associated with head and neck region. There are a lot of dental and orofacial changes seen in these cases. Hence, as dentists and especially as Endodontics it is essential to know about the possible anomalies and its management thereby helping us to successfully treat the patients and provide a quality care. This review article thus focuses on the variation and its management.

Keywords: Endodontics, Periodontium Cleft lip, Morphologically.**Introduction**

Restoration of tooth in patients with unilateral or bilateral cleft lip and palate with missing anterior teeth presents a challenging task for the dentist. Even though patients with cleft lip and palate are rare presentations in general dental practice, it is considered to be one of the most common congenital deformities of the orofacial complex with a prevalence rate of one in 600–1000 live births. In India the prevalence of cleft lip and palate is between 27,000 to 33,000 ^[1] Morphologically, they are classified into four major types: cleft lip, cleft palate,

unilateral cleft lip and palate, and bilateral cleft lip and palate. Besides affecting esthetics, cleft lip and palate also result in a severe functional deficiency of mastication, swallowing, and speech. These defects usually present with anomalies such as variations in tooth number, tooth shapes, and their positions. Endodontic intervention is required in patients with cleft lip and palate due to the high caries incidence seen in these patients.

Etiological factors commonly related to the need of endodontic treatment in individuals with orofacial clefts

Several factors are involved in the etiology of orofacial clefts, since any cause of physical, chemical or biological nature that can affect the differentiation, migration and proliferation of neural crest cells has the potential to determine the occurrence of clefts during embryonic development. Since this cleft presents the greatest esthetic and functional impairment of the dental arches, impairing from breastfeeding to changes in maxillary growth, including dental anomalies and speech

disorders. In addition to this CLAP has shown to mainly affect the left side ^[2]

The most common etiology for endodontic treatment in patients with cleft lip and palate was found due to caries the incidence being 56.1% this high incidence of dental caries might be related to presence of tooth abnormalities in number, position, shape and absence of buccal sulcus. Next due to orofacial malformations, orthodontic movement of tooth, dental trauma leading to pulp necrosis.

Dental Anomalies Associated With Cleft Lip and Palate

Agensis of tooth ^[3]: most commonly seen on the cleft line especially with left lateral and central incisors. Following alveolar bone grafting in that region and after creating space by orthodontic treatment, dentures or bridges can be given to the patients.

Presence of congenital and ectopic teeth: should be either extracted or esthetically corrected.

Rotated and impacted teeth: Orthodontic treatment or esthetic corrections of rotated tooth can be done using crowns. ^[4]

Dense invaginatus: A 4.2% to 8.3% prevalence of dens invaginatus in patients with unilateral complete CL/P, compared to 2% to 2.95% in the general population. Treatment of dens invaginatus depends on the depth of the lesion. Treatment of Oehler's type I lesions includes prophylactic sealant to protect the infolding from the oral cavity or excavation of bacteria within the infolding and surrounding dentin, followed by restoration reported that 90% of teeth treated prophylactically never develop symptoms. Treatment of Oehler's type II includes restoration or endodontic therapy if pulpal involvement has already occurred. Treatment of Oehler's type III lesions includes endodontic therapy, apical surgery, or replantation with retrograde surgery if aberrant tooth

morphology precludes endodontic therapy. Extraction can be performed in cases where endodontic treatment cannot be performed successfully or if aberrant crown morphology precludes an esthetically or functionally acceptable result. In cases of young patients, an orthodontist should be involved in the decision of extraction or maintenance of the tooth since occlusion plays a role in the ultimate treatment plan ^[5]

Supernumerary tooth: Can be extracted or if possible treated endodontically followed by crown in the esthetic zone.

Microdontia: can be treated using crowns or by direct composite veneer restorations. ^[6]

Fusion of tooth: Fusion is an uncommon anomaly of the hard dental tissues, potentially causing clinical problems related to esthetics, tooth spacing, and other periodontal difficulties. The most important challenges in fixing fused teeth are the mid-root connections between the root canals and the impact of fusion. Peyrano and Zmener have reported that endodontic treatment is necessary when there are connections between root canals. The prognosis of maintaining pulp vitality, without root treatment, is declared to be poor in such cases. In cases like this, there is a risk of pulpal infection, which might develop from the Periodontium or the connections between the root canals, because of poor oral hygiene. Because of this, the tooth was treated endodontically, and the mesial part of the tooth was sectioned and extracted. In addition, MTA was used to seal the window in the mesial surface after the extraction. ^[7]

Orthodontic, periodontal, aesthetic, and functional problems may require extraction of one tooth half provided there are two completely separated tooth. The separation of the fused tooth into two single incisors could have been a possible treatment method or

extraction of tooth can also be done based on the case present. In some of the cases presented in the dental literature on this anomaly, endodontic treatment had to be performed as the pulp systems of both tooth halves were connected in a common pulp chamber or communication existed between the two root canals, followed only by recontouring of the crowns.^{[8] [9]}

Taurodontism and macrodontia: Pulp enlargement was more frequently found among individuals born with cleft lip with or without cleft palate ($p = 0.0005$) with a higher prevalence in the maxilla.

Hence, care should be taken while doing conservative restorative procedures on such tooth to avoid any pulpal exposure and to have a better understanding while performing a root canal treatment.^{[10] [11]}

Pulp stone: a calcified mass in the dental pulp of a healthy, diseased, or unerupted tooth are frequently seen in patients with cleft lip and palate. The use of proper diagnostic radiographs and management should be done as it might complicate the endodontic procedures.

Dilaceration: is a deviation or bend in the linear relationship between tooth crown and root; an angulation or sharp curve of 90 degrees or more in the root or crown of a developed tooth are also seen commonly in patients with cleft lip and palate. Use of tactile control activation technique might be beneficial in such cases.

Enamel hypoplasia: A hereditary condition in which the dental enamel shows either a break in continuity or surface loss, often because of insufficient calcification^[12]

In such cases composite veneers, restorations or crowns may be recommended.

Short or blunt roots: defined as developmentally very short blunt dental roots. Roots as long as or shorter than the crowns of the incisors and visually evaluated as very

short blunt roots bilaterally in the posterior teeth were recorded as short or blunt roots.

Incomplete root formation

As patients with cleft lip and palate usually show incomplete formation of the tooth, especially lateral incisors, procedure like apexogenesis and apexification can be done. Non vital therapy is one of the common endodontic treatments done regardless of the type of cleft. These patients have highest treatment needs maybe because of the lack of dental care, extensive carious lesions, infections and inflammation of the pulp and periodontal tissues.

How Does Cleft Lip and Palate Affect Dental Treatment

Interdisciplinary Approach

The management of patients with cleft lip and palate requires a multidisciplinary approach to provide comprehensive care for patients.

Maxillary deficiency requires maxillary arch expansion and also the crowding of teeth can be managed by an orthodontist, the esthetic management and multiple carious teeth seen in patients with cleft lip and palate can be managed by an endodontist. In addition to that a paediatric dentist helps in guiding the patient and providing basic care to the child. Alveolar bone grafting which is to be done following arch expansion involves the help from an oral surgeon^[13]. A prosthodontics is required for giving temporary obturators if required. Speech therapist plays a very pivotal role in training the child.

Radiographic Analysis

The morphology of fused and other malformed tooth varies, and complex tooth forms with separated or fused coronal pulp chambers may be present. Even separated chambers can meet in the radicular area or can remain separate. Radiographic examination is thus an essential

component of the management of endodontic problems. As a result of superimposition, periapical radiographs reveal limited aspects of 3D anatomy. There might also be geometric distortion of the anatomic structures being imaged.

This problem can be overcome using SCT which can produce 3D images of the individual teeth and aid in better understanding of the root canal morphology. This new CT technique is developed called as SCT or volume acquisition CT which has inherent advantages^[14]. SCT can get a large volume of data in seconds and offer more rapid examination time, with an effective dose of 1-30mSv, which is much less than the conventional CT. Also, ALADAIP (as low as diagnostically acceptable being indication oriented and patient specific) concept should be applied. CBCT imaging can also be done wherever required.

Different Anaesthetic Procedure

Patients with CLP have a higher prevalence of anomalies in number or shape of teeth adjacent to the alveolar cleft. In some cases, these teeth need to be extracted due to mispositioning or malformation or prior to endodontic treatment, local anaesthesia is an important step for a successful treatment for avoiding distress to patients and professional anxiety. In face of anatomic variations in the cleft maxilla, it seems obvious that adjustments to conventional aesthetic techniques should be considered to perform surgical, endodontic or restorative procedures properly in teeth located along the cleft.

Following 4 recommendations are given for a correct anaesthetic technique in the cleft area: 1) use of topical anaesthetics: it is important that professionals always use a topical anaesthetic in the surgical reconstruction of the lip is performed in early childhood (around 3 months of age) can leave scars that stretch during the anaesthetic procedure leading to excessive pain from the cleft area

2) first puncture far from the cleft area: the first puncture should be at the area of canine or premolars away from the cleft area to avoid pain, second puncture should be at the bottom of the vestibule of the tooth to be treated. 3) Slow administration of anaesthetic: anaesthetic injection must be delivered as slow as possible avoiding the painful sensation caused by distension of fibrotic scar tissue. 4) Infiltration of local anaesthetic in cleft margin: gingiva serves as a complement to anesthesia and promote increased local vasoconstriction, allowing a procedure free of pain and bleeding.^[15]

Impact of Endodontic Treatment on the Quality of Life of Individuals with Cleft Lip and Palate

The quality of life (QoL) may be measured in a subjective and preconceived manner and may be related to oral health, either in endodontic treatment, removal of carious tissue, or oral rehabilitation. The dental clinical examination should not focus on the mouth, but rather on the individual; the oral and general health should not be separated, since the oral health affects the general health, welfare, and QoL. If the oral health is affected, both the general health and QoL may be impaired. The endodontist has great responsibility and the planning of root canal treatment should be careful, requiring manual skill, tactile sensitivity, and care in the handling of instruments, which are important for good evolution of an effective endodontic treatment. Evaluations of the QoL and satisfaction of individuals provide information on their respective expectations and needs, evidencing possible failures and searching for improvements in the services provided.

The main instruments that evaluate the QoL is important because they measure the perception on the impact of oral diseases on the population welfare. They indicate seven concepts of oral health: pain, functional limitation, psychological deficiency, physical discomfort,

psychological incapacity, social incapacity, and deficiency. Retrospective analysis of the QoL of endodontically treated individuals showed that endodontic treatment interfered with the QoL of patients since it promoted the welfare, with psychological, physical and social changes, and the individuals were satisfied. All effects should be directed to preservation of teeth and a well done endodontic treatment may contribute to the rehabilitation of patients with cleft lip and palate [16].

Conclusion

Patients with cleft lip and palate suffer from psychological, functional and esthetic problems. Hence a multidisciplinary approach should be made to help give confidence to the patient and provide a reason for the child to smile again. The endodontic treatment should be directed to preservation of teeth whenever possible with vital pulp therapy. Endodontic treatment with all the recent diagnostic tools and recent techniques should be adopted for a successful treatment. Identification and addressing emotional challenges followed by successful rehabilitation must be our prior commitment in treating such cases.

Reference

1. Geethu R, Anilkumar S. Esthetic and Functional Rehabilitation of an Adult Cleft Lip and Palate Patient Using Combined Fixed and Removable Prosthesis. *J Interdiscip Dentistry*. 2018;8(1):35.
2. Siqueira V, Mateo-Castillo J, Pinto L, Garib D, Pinheiro C. Etiological factors commonly related to the need of endodontic treatment in individuals with orofacial clefts. *J ClinExp Dent*. 2021:e580-e585
3. Tortora C, Meazzini MC, Garattini G, Brusati R. Prevalence of Abnormalities in Dental Structure, Position, and Eruption Pattern in a Population of Unilateral and Bilateral Cleft Lip and Palate

- Patients. *The Cleft Palate-Craniofacial Journal*. 2008 Mar;45(2):154-62.
4. Antunes CL, Aranha AM, Bandeca MC, Lima SL, Tonetto MR, Pedro FL, et al. Eruption of Impacted Teeth in Cleft Lip and Palate Patients following Alveolar Bone Graft. *J Contemp Dent Pract*. 2018 Sep 1;19(9):1072-5.
5. Ickow IM, Zinn S, Stacy JM, Martin B, Losee JE, D'Alesio A, et al. Dens Invaginatus in Patients With Cleft Lip and Palate: A Case Series. *The Cleft Palate-Craniofacial Journal*. 2021 Nov;58(11):1452-8.
6. Chang C, Chang C, Lai J, Lin S, Chang Y. Prevalence of Dental Anomalies in Taiwanese Children with Cleft Lip and Cleft Palate. *JPM*. 2022 Oct 13;12(10):1708
7. CONSOLARO A, MEDEIROS MCM, MIRANDA DAO, OLIVEIRA IAd. Supernumerary teeth in patients with cleft lip and palate: the tooth germs do not separate. *Dental Press J Orthod*. 2021;26(4)
8. Peyrano A, Zmener O. Endodontic management of mandibular lateral incisor fused with supernumerary tooth. *Dental Traumatology*. 1995 Aug;11(4):196-8.
9. Rani A K, Metgud S, Yakub SS, Pai U, Toshniwal N, Bawaskar N. Endodontic and Esthetic Management of Maxillary Lateral Incisor Fused to a Supernumerary Tooth Associated with a Talon Cusp by Using Spiral Computed Tomography as a Diagnostic Aid: A Case Report. *Journal of Endodontics*. 2010 Feb;36(2):345-9
10. Laatikainen T, Ranta R. Taurodontism in twins with cleft lip and/or palate. *European J Oral Sciences*. 1996 Apr;104(2):82-6.
11. Weckwerth GM, Santos CF, Brozoski DT, Centurion BS, Pagan O, Lauris JRP, et al. Taurodontism, Root Dilaceration, and Tooth

- Transposition: A Radiographic Study of a Population with Nonsyndromic Cleft Lip and/or Palate. *The Cleft Palate-Craniofacial Journal*. 2016 Jul;53(4):404-12.
12. Mary BaacliniGalante J, Costa B, Felício de CarvalhoCarrara C, RibeiroGomide M. Prevalence of Enamel Hypoplasia in Deciduous Canines of Patients with Complete Cleft Lip and Palate. *The Cleft Palate-Craniofacial Journal*. 2005 Nov;42(6):675-8.
13. Yagci A, Cantekin K, Buyuk SK, Pala K. The Multidisciplinary Management of Fused Maxillary Lateral Incisor with a Supernumerary Tooth in Cleft Lip Adolescence. *Case Reports in Dentistry*. 2014;2014:1-5.
14. Rani A K, Metgud S, Yakub SS, Pai U, Toshniwal N, Bawaskar N. Endodontic and Esthetic Management of Maxillary Lateral Incisor Fused to a Supernumerary Tooth Associated with a Talon Cusp by Using Spiral Computed Tomography as a Diagnostic Aid: A Case Report. *Journal of Endodontics*. 2010 Feb;36(2):345-9.
15. Trindade-Suedam IK, Gaia BF, Cheng CK, Trindade PAK, BastosJCdC, Mattos BSC. Cleft lip and palate: recommendations for dental anesthetic procedure based on anatomic evidences. *J Appl Oral Sci*. 2012 Feb;20(1):122-7.
16. Impact of Endodontic Treatment on the Quality of Life of Individuals with Cleft Lip and Palate de Carvalho Santos, MárciaMiroldeMagno; Junior, SávioBrandelero; Cusicanqui Méndez, Daniela Alejandra; Silva Dalben, Gisele da¹; Nishiyama, Celso Kenji; Castro Pinto, Lidiane *journal of dental researchand review* 9(3):p 238-238, jul-sep 2022. DOI: 10.4103/jdrr.jdrr_131_22.