

## Comprehensive care of children with cleft lip and palate

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International Journal of Science and Research Archive, 2023, 09(02), 171–177

Publication history: Received on 29 March 2023; revised on 09 July 2023; accepted on 11 July 2023

Article DOI: <https://doi.org/10.30574/ijrsra.2023.9.2.0361>

### Abstract

Cleft lip and palate (CLP) is a common congenital abnormality that demands multidisciplinary treatment. It affects 1 in 1,000 live births on average, and isolated cleft palate affects 1 in 2,000 live births. According to several epidemiological studies, if one parent has a cleft, their kid has a 3.2% probability of developing CLP and a 6.8% chance of developing an isolated cleft palate. A child born with a cleft lip or palate, or other craniofacial anomaly has several challenges, such as early feeding and nutritional issues, middle ear illness, hearing loss, speech and resonance irregularities, etc. This article gives an overview of interdisciplinary approach in management of cleft lip and palate and explains the significant role of a Pediatric dentist in management of CLP.

**Keywords:** Cleft lip; cleft palate; Multidisciplinary approach; Pediatric dentist

### 1. Introduction

Cleft lip and palate (CLP) are a common congenital abnormality that demands multidisciplinary treatment. Many challenges arise as a result of this abnormality, including improper suckling, speech impairment, deafness, malocclusion, grave facial deformity, and major psychological issues. This condition occurs in a prime and crucial moment in the development of dento-facial region giving rise to a complex congenital deformity.<sup>[1]</sup>

According to Indian Academy of Pediatrics (IAP) 2023, CLP affects 1 in 1,000 live births on average, and isolated cleft palate affects 1 in 2,000 live births **Fig 1**.

The distribution of cleft types typically seen:

Cleft palate alone: 40%;  
Cleft lip and palate: 45%;  
Cleft lip alone: 15%

Numerous epidemiological studies have found that if one parent has a cleft, their child has a 3.2% chance of having CLP and a 6.8% chance of having an isolated cleft palate (Grosen et al., 2010).<sup>[2]</sup>

The causative factors of CLP are classified as:

#### 1.1. Non-genetic (environmental factors)

Maternal smoking  
Maternal consumption of alcohol

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Others: Maternal disease, maternal hypoxia, stress during pregnancy, chemical exposure, decreased blood supply in nasomaxillary region, folic acid deficiency, increased parental age and exposed to retinoid drugs.<sup>[2]</sup>

## 1.2. Genetic

### 1.2.1. Syndromic

CLP has been linked to over 300 syndromes, many of which have a classic Mendelian inheritance pattern (single gene disorder): -Waardenburg syndrome (type II A), DiGeorge syndrome, Treacher-Collins mandibulofacial dysostosis, Van der Woude syndrome, CLP-Ectodermal dysplasia syndrome, Zollinger syndrome-3, Gorlin syndrome (Basal cell nevus syndrome), etc.<sup>[2]</sup>

### 1.2.2. Non-syndromic

It accounts for 70% of CLP cases. Many genes are identified for clefting whose mutation may lead to non-syndromic CLP like - Transforming growth factor-alpha, growth factor-133, Methylenetetrahydrofolate reductase, Blood clotting factor XIII gene, etc.,<sup>[2]</sup>

Having a cleft lip and palate can cause issues with eating, ear infections, speech, cognition, and social interaction.

Cosmetic deformity; dental conditions- microdontia, taurodontism, ectopic eruption, enamel hypoplasia, and delayed tooth maturation are seen in natal teeth. The severity of CLP can be inversely correlated with delay in tooth development. The majority of issues start to appear after permanent teeth erupt. Other issues include extra teeth erupting behind healthy teeth, fused teeth, and missing teeth; However, these issues can occasionally occur naturally. Dental caries and malocclusion are more common in CLP, which can lead to an open bite or cross bite.<sup>[2]</sup>

The patient's speech may then also be impaired by this. Speech and language problems: Phonation is impacted by levator veli palatini muscle dysfunction. The most frequent finding is consonant sound retardation (p, b, t, d, k, and g). There is abnormal nasal resonance and pronunciation difficulty. Since pronunciation requires the use of both the lips and the palate, language problems arise. Both receptive and expressive language acquisition will present challenges for them. Tentative evidence indicates that people with clefts struggle more with language.<sup>[2]</sup>

Feeding issues: CLP patients have difficulty sucking on their breasts due to the opening in their mouth's roof and hence lack of suction. They may also have middle ear problems eventually resulting in hearing loss due to tortuous or angled external ear canals with eustachian tubes, leading to food or contaminants to cause a middle obstruction. Speech problems brought on by hearing loss; Psychosocial problems are primarily caused by cosmetic issues brought on by visible deformities and language impairments:

### 1.2.3. Social anxiety

Effect on social behavior, skills, and self-esteem

Feelings of hostility, fear, sadness, and exclusion from peers.<sup>[2]</sup>

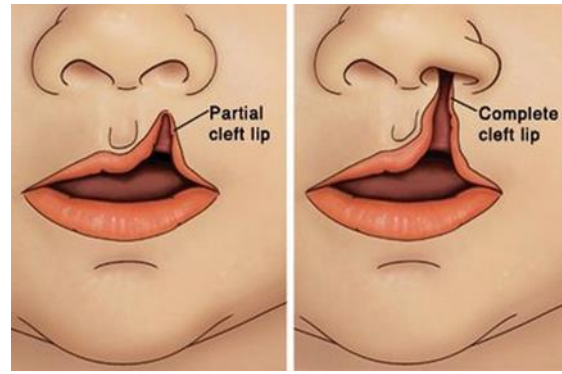
## 1.3. Prenatal Diagnosis

The 4<sup>th</sup> to 12<sup>th</sup> embryonic week is when cleft development is most crucial. When an ultrasound scan is done during pregnancy, it is typically possible to accurately assess and inform the parents about diagnosis. This enhances the child's quality of life and the effectiveness of their care.

Patients with cleft deformity should be treated at the proper period and age to ensure functional and cosmetic well-being. <sup>[2]</sup>

The youngest age limit for cleft lip correction is after the third month and after the ninth month. Hemoglobin levels of 10 g/dL and a weight of 10 lbs are the minimum requirements for surgery readiness (5 kg).<sup>[2]</sup>

The surgical production of a face, the creation of understandable speech, the creation of an ideal dentition, and aesthetic appearance are all required for the correction of cleft lip and palate **Fig 2**. It is best to necessitate multidisciplinary clinical experts at different stages of the child's development to achieve this.<sup>[2]</sup>



**Figure 1** Partial and complete cleft lip



**Figure 2** Surgical correction of cleft lip and palate

The various medical specialties (pediatric surgery, plastic surgery, pediatrics, genetics, otolaryngology, and psychiatry) [2] **Fig 3.** Orthodontics, Oral surgery, Paediatric dentistry, and Prosthodontics) are among the dental specialties.[2]

Allied health professions (audiology, nursing, psychology, social work, and speech pathology) also play a major role.

Repair of cleft palate is much more operational in character than cleft lip repair, which features an artistic closure. A team approach will reduce morbidity and secondary deformities while primarily concentrating on speech quality.[2]

#### 1.4. Technique

Techniques for soft palate repair can be used alone or in conjunction with hard palate procedures. To achieve levator muscular repositioning, the majority of surgeons either perform intravelar veloplasty or two flap palatoplasty with double opposing Z-plasty.

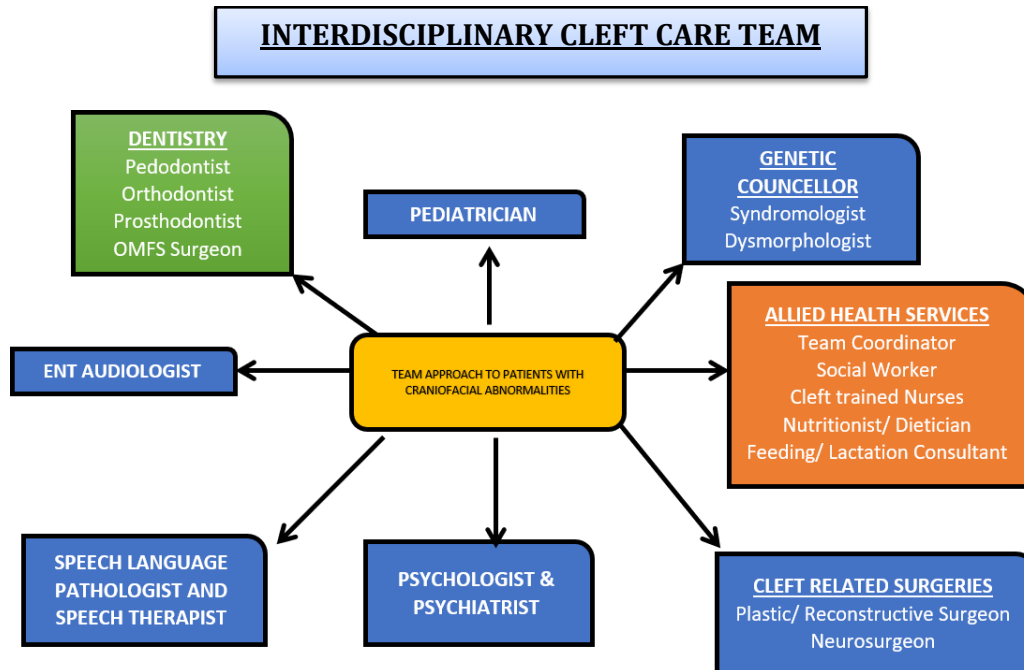
Maxillary distraction is also used to treat patients with CLP who have severe maxillary retrusion.

There are six procedures in repair of CLP:

- Cleft lip repair—3rd month.
- Cleft palate repair—9th month.
- Palatal shelf expansion—5-7 years.
- Alveolar bone grafting (ABG)—9th year.
- Cleft lip Rhinoplasty—after 13 years.
- Scar revision over lip—14-16 years.[2]

It is best to feed your baby more upright because gravity aids in preventing the milk from entering the infant's nose. Gravity feeding is made possible by specialized equipment like the Haberman Feeder and custom bottles with a mix of nipples and bottle inserts. The milk flow can be regulated by a large hole or slit in the nipple, a protruding nipple, and rhythmic bottle squeezing.[2]

The mental health of CLP patients should be taken into consideration, supported by psychological rehabilitation, and constant encouragement. Due to the long-term nature of a cleft case and the complexity of managing it, it is very challenging to gauge the child's response to treatment.<sup>[2]</sup>



**Figure 3** Interdisciplinary cleft care team

However, the International Consortium for Health Outcome Measurement evaluates outcomes using a standard set of measures in critical areas like hearing, breathing, eating and drinking, speaking, oral health, appearance, and psychosocial well-being.<sup>[2]</sup>

The American Academy of Paediatric Dentistry (AAPD) endorses the American Cleft Palate-Craniofacial Association's (ACPA) most recent statements in its mission to promote the best possible health for kids with cleft lip/palate and other craniofacial defects.<sup>[6]</sup>

A child with cleft lip and palate or other craniofacial discrepancies faces a number of challenges, such as issues with early feeding and nutrition, middle ear disease, hearing loss, speech and resonance alterations, dentofacial and orthodontic defects, along with psychosocial difficulties with adjustment.<sup>[6]</sup>

In the reports on children with special needs from 1987 and 2005, the US Surgeon General underlined the importance of providing these children with care that is thorough, coordinated, sensitive to cultural differences, individualised, and simple to access. The Maternal and Child Health Bureau supported ACPA in 1991 to establish standards of treatment for patients with clefts and other craniofacial defects through an array of consensus conferences among a diverse group of doctors in recognition of the unique requirements of these individuals.<sup>[6]</sup>

Additionally, the ACPA and the Cleft Palate Foundation worked together to create team approval standards to guarantee coordination and consistency of care, as well as a suitable order of assessments and treatments for the patient's general developmental, medical, and psychological requirements.<sup>[6]</sup>

As part of the guidelines and standards, a number of core concepts were recognized as essential to the delivery of the best cleft/craniofacial care. These are the principles:

- Patients with craniofacial malformations should be managed by a multidisciplinary team of specialists. These teams of professionals are made up of certified healthcare workers from the professions of medicine, surgery, dentistry, and allied health who collaborate. The team should have a healthcare coordinator to assist with coordinating care for patients, their families, and carers.

- Clinicians that see a sufficient percentage of patients with craniofacial defects yearly to maintain clinical skill in diagnosis and treatment provide the best care for patients.
- If possible, the initial assessment needs to happen within the initial few days or weeks of life. However, patients of all ages ought to be addressed for team management and evaluation.
- Beginning with the initial contact with the child and family, every effort must be made to assist the family in adjusting to the birth of a child with a craniofacial anomaly and the resulting demands and stress placed on that family.
- It is necessary to inform parents and carers of the suggested course of therapy, available options, risk factors, advantages, and expenses in order to:
  - Make knowledgeable decisions on their child's behalf,
  - Prepare both themselves and their child for all advised procedures.

Family input and cooperation in treatment planning should be aggressively sought by the team. The child should participate in treatment decisions whenever he or she is old enough.

- Based on team recommendations, treatment programmes must be designed and carried out.
- When possible, care should be delivered locally while being coordinated by the team; however, major hospitals with adequate treatment facilities and skilled medical staff should only be used for challenging diagnostic or surgical procedures.
- Each team must be aware of the language, cultural, ethnic, psychosocial, financial, and physical elements that affect the dynamic interaction among the members of the team, the patient, and his or her family.
- The team is in charge of keeping an eye on both immediate and long-term results. Long-term patient follow-up is therefore essential, as is proper documentation and record-keeping.
- Evaluation of treatment outcomes must take into account effects on growth, function, and appearance as well as patient satisfaction and psychosocial well-being.<sup>[6]</sup>

Due to their condition and as a component of their treatment, people with craniofacial anomalies need dental care for the remainder of their lives.

No later than twelve months following the emergence of the very first tooth, a dental home need to be formed. It includes oral health examinations, caries prevention, preventive, restorative, and prosthetic dental care.<sup>[6]</sup>

Periodontal disease, as well as anomalies in dentition and eruption, should be closely monitored in patients. The state of the tissues supporting the developing teeth and dentition, as well as counselling on early oral hygiene and caries prevention in children, is critical.<sup>[6]</sup> Prosthetic devices, such as an obturator, can help to close the abnormal connection and improve speech.<sup>[6]</sup>

Orthodontic care is frequently administered in stages and is a crucial component of the rehabilitation process. Regular evaluations of the skeletal plus dental aspects are necessary. When necessary, orthodontic treatment prepares a kid for malocclusion correction, jaw surgery, and alveolar bone graft of the cleft maxilla.<sup>[6]</sup>

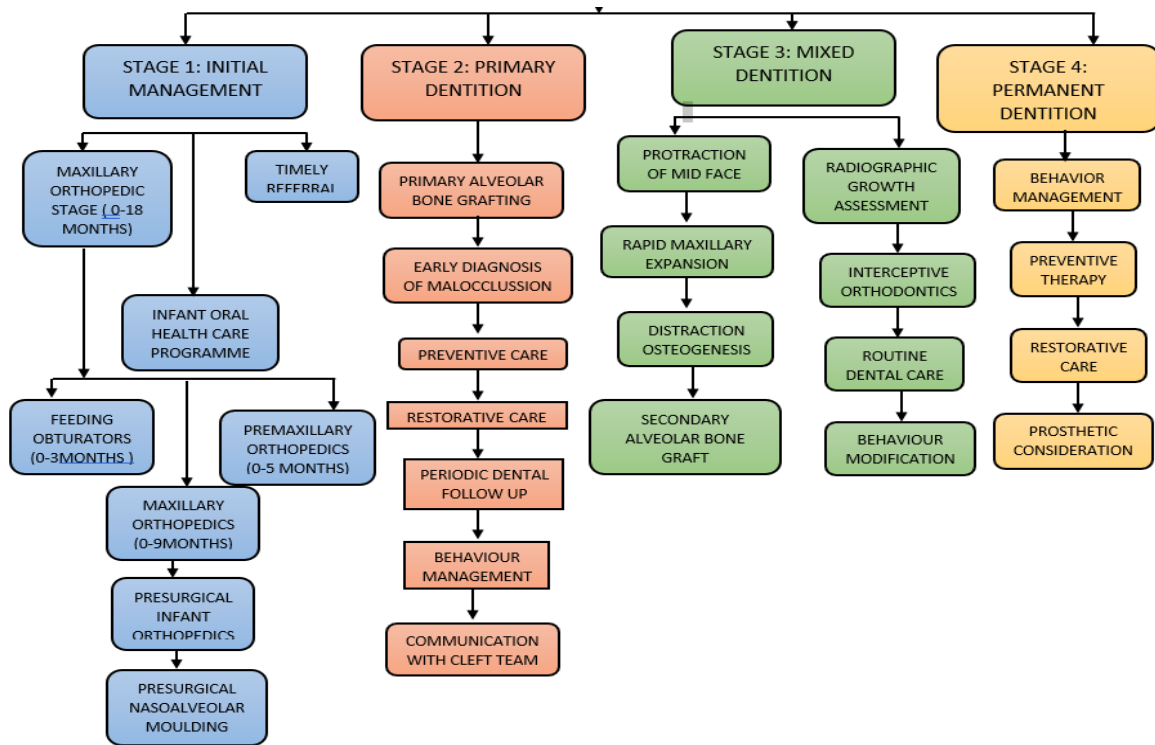
Paediatric dentists should work closely with colleagues in orthodontics, oral and maxillofacial surgery, and prosthodontics as members of an interdisciplinary team of doctors, dentists, speech-language pathologists, and other allied health professionals.<sup>[6]</sup>

#### **1.5. Sequence of Pediatric dental treatment Fig 4.**

The four stages of paediatric dental treatment for kids with cleft palates match to the stages of dental development and craniofacial growth for ease of usage.

- Stage I: Initial management (birth to 21/2 years of age)
- Stage II: Primary dentition (21/2 to 6 years of age)
- Stage III: Mixed dentition (6 to 12 years of age)
- Stage IV Permanent dentition (12 years of age to the late teen years) <sup>[5]</sup>

### 1.6. Role of Pediatric dentist



**Figure 3** Role of Pediatric dentist

All dental specialists should make certain that:

- Consult a qualified dental specialist for cleft lip taping and/or pre-surgical orthopaedics, such as but not limited to nasal alveolar moulding. It is necessary to consult with a craniofacial orthodontist (or other adequately qualified clinician) who can go through the different newborn orthopaedic treatments that are offered as well as the justification for using infant orthopaedics prior to the initial cleft lip repair.
- Dental radiographs, cephalometric radiographs, and other forms of imaging as needed should be used to assess and track dental and face growth and development.
- At the appropriate intervals, diagnostic records, including adequately occluded dental study models, should be gathered from individuals who are at risk of developing malocclusion or maxillo-mandibular discrepancies.
- At the appropriate intervals, diagnostic records, including adequately occluded dental study models, ought to be gathered from individuals who are at susceptible to developing malocclusion or maxillo-mandibular discrepancies.
- The skeletal and dental components must be examined to determine whether a malocclusion already exists or is developing prior to the primary dentition is completed erupted.
- Depending on the precise objectives to be accomplished and the age at which the patient is initially evaluated, orthodontic therapy of the malocclusion may be carried out in the primary, mixed, or permanent dentition. In rare circumstances, orthodontic treatment might be needed at all three stages.
- Every stage of orthodontic therapy may be complemented by retention and periodic observation, even if it is preferable to avoid ongoing active orthodontic treatment from the early mixed dentition through the permanent dentition. The permanent dentition of adults could benefit from orthodontic retention.
- Certain individuals with craniofacial abnormalities may benefit from functional orthodontic equipment.
- In patients with craniofacial anomalies, orthodontic treatment may be necessary in addition to surgical repair (and/or distraction osteogenesis) of the defect.
- Osseo integrated implants, fixed restorative bridgework, or detachable appliances can all be used to restore missing teeth that were missing since birth.

- Dental and periodontal disease ought to be closely monitored in patients.
- In some cases, prosthetic obturation of palatal abnormal connections may be required.
- In some people, velo-pharyngeal insufficiency may be treated using a prosthetic speaking device.<sup>[6]</sup>

### 1.7. Take Home Instructions:

- In cleft care, a healthy dentition is necessary for orthodontics, which enhances surgical results.
- Include oral health examinations in primary cleft care, early detection of tooth decay, and prompt treatment to avert related issues.
- All cleft care professionals must provide ongoing, anticipatory advice on brushing techniques, the use of fluoridated toothpaste, and limiting dietary intake of free sugars as part of a preventive oral health care regimen.<sup>[7]</sup>

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## 2. Conclusion

To conclude, the pediatric dentist plays a dual role in enhancing both the patient's experience and the surgical result. The priority group includes patients with CLCP. The provision of ongoing, excellent, preventive dental care requires the expertise of Pediatric dentist. This multifaceted care includes careful treatment planning, patient support, and expert behavior management. It is possible to achieve the patient's ideal oral health outcome with the help of regular, effective communication between the Pediatric dentist and pertinent representatives of the cleft team. Basic dental services provided by a cleft team significantly enhance patient-centered outcomes. Every child has a fundamental right to a lifetime of good oral wellness, and every paediatric dentist has a responsibility to preserve this concept. As a result, it is essential that all paediatric dentists get involved and actively participate in the full rehabilitation of the child.

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## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflict of interest to disclosed.

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