Multifaceted approach for treatment of Cleft Lip and Palate

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Abstract

Cleft lip and palate represent a major public health problem due to the possible associated life-long morbidity, complex etiology, and the extensive multidisciplinary commitment required for intervention. It affects about 1.5 per 1000 live births (250,000 new cases per year) worldwide, with tremendous variations across geographic areas and ethnic groups. It is considered a debilitating condition that is associated with significant feeding, hearing, speech, and psychological impairments. In this review, the epidemiology, and varied treatment protocols of cleft lip are discussed. The primary goals of surgical repair are to restore normal function, speech development, and facial esthetics. Different techniques are employed based on surgeon expertise and the unique patient presentations. Pre-surgical orthopedics are frequently employed prior to definitive repair to improve outcomes. The wide surgical, dental, speech, social, and medical involvement emphasize the importance of understanding the underlying determinants of these defects to allow optimizing the treatment options and predicting the long-term course of the affected individuals development. Optimal and early surgical intervention is necessary and folic acid supplementation proved to be a highly efficient preventive strategy. However, there are still many challenges to be addressed for cleft care especially in the developing parts of the world.

Introduction

The aesthetics of facial structure are used by humans to measure one's beauty, character, and overall "goodness." Individuals born with cleft lip and/or palate are often stigmatized and face much psychosocial adversity. Social attitudes and beliefs have a direct impact upon the psychological development of these individuals. Orofacial clefts include a range of congenital deformities most commonly presenting as cleft lip with or without cleft palate (CLP) or isolated cleft palate. Cleft lip (cheiloschisis) and cleft palate (palatoschisis), which can also occur together as cleft lip and palate, are variations of a type of clefting congenital deformity caused by abnormal facial development during gestation. Cleft lip and cleft palate are among the most common congenital malformations. Immediately after birth, individuals with cleft lip and palate (CLP) have facial deformation, feeding problems, and recurrent middle ear infection. The broad categories into which the presentations of CLP may be placed are incomplete cleft lip, cleft lip alone, cleft lip and alveolus, cleft lip and palate,isolated cleft palate, and minimal expressions of the defect such as bifid uvula and submucous cleft. The midline cleft is an extremely rare presentation. No single system of classification of CLP has been universally accepted, and thus, none is universally used. Clinicians often resort to descriptive terms and drawings to provide the specificity required in individual cases. Various efforts have been made to understand the etiology of CLP so as to predict its occurrence and to prevent it. In recent years, advances in genetics and molecular biology have begun to reveal the basis of craniofacial development, and a number of genes associated with CLP have been identified. An increasing number of studies are being done on the combined genetic and environmental causes of CLP. Treatment requires interventions from multiple disciplines. At the age of speech acquisition, speech therapy is often needed to correct problems resulting from muscular defects of the cleft. As the individual continues to grow, defects in tooth development and malocclusion require dental and sometimes surgical treatment. The lengthy series of treatments from birth to adulthood is a heavy burden for the patient, family, and society. This article provides an update on the multidisciplinary treatment approach for orofacial clefts.

Incidence and Epidemiology

Cleft lip and palate are among the most common of all congenital deformities, and the incidence appears to be slowly rising. The best data comes from Denmark, where the incidence rose from 1.45/1000 live births in 1942 to 1.89/1000 live births in 1981. This increasing incidence may in part be due to better reporting, but there is likely to be true increase, perhaps because of an increase in environmental teratogens, lower neonatal mortality and increased marriage and child bearing among cleft patients, due to better care.

Nevertheless, information is available which shows that there are significant racial differences in incidence. Clefts of the lip and palate are most common in American Indians (3.7/1000 live births), then, in decreasing order of frequency, Japanese (2.7/1000), Maoris and Chinese (2.0/1000), Caucasians (1.7/1000) and blacks (0.4/1000)[1].

Although organized epidemiological surveys to evaluate the incidence of cleft lip and palate in India are yet to be carried out, more than two dozen studies have been done on new borns in the past 3 decades for

evaluating the incidence/prevalence of congenital malformations in them (including cleft lip and palate). According to roughest estimates, about 30,000 children afflicted with cleft lip and palate anomaly are born every year in India.

Much of the data from India come from relatively small local hospital-based studies recording the prevalence of birth defects including Oral clefts. While the majority of these studies record figures for CL/P, many do no record isolated CP. Of those that do, the lowest figure, 0.32/1000, comes from a study by Singh and Sharma (1980)[2] in New Delhi. The highest figure, 0.48/1000, comes from a small study in Kanpur by Mital and Grewal (1969)[2]. While a meta-analysis was carried out by Verma and Mathews (1983)[2], this was methodologically flawed and included various prospective and retrospective studies of live births and stillbirths throughout India. However, the figures of 1.20/1000 for CL/P and 0.44/1000 for CP appear to be the best available estimates for Oral Cleft prevalence in the Indian subcontinent.

Management of Cleft Lip and Palate[3]

Management of the cleft lip and/or cleft palate (CL/CP) patient is a process that starts in infancy and continues on into adulthood. Problems encountered in the CL/CP patient are complex and therefore best managed through a team of experts.

The approach of the patient with cleft lip and palate is multidisciplinary, and the cleft team should be ideally composed by craniofacial surgeons, otolaryngologists, geneticists, anesthesiologists, speech-language pathologists, nutritionists, orthodontists, prosthodontists, and psychologists, and to be capable of treating even rare facial clefts with excellence, neurosurgeons, and ophthalmologists (Table 1). In this manner, it is possible to provide long-term follow up through the entire child's development and achieve all of the following treatment goals: normalized facial aesthetic, integrity of the primary and secondary palate, normal speech and hearing, airway patency, class I occlusion with normal masticatory function, good dental and periodontal health, and normal psychosocial development.

Table 1: Multi-Disciplinary Team for Cleft Lip and Palate Patients

S. No.	Experts Involved	Role
1	Obstetrician	Refers to plastic surgeon and pediatrician counseling the parents
2	Pediatrician or neonatologist plastic surgeon	Refers to the plastic surgeon
3	Plastic Surgeon	Leads the team of CLP cases discusses the case with members of the team phayngoplasty reversionary lip
4	Oral maxillofacial surgeon	Bone grafting
5	Neurosurgeon	Craniogacial syndrome is associated
6	Orthodontist	Provides presurgical dental orthopedic consultation definitive orthodontic treatment once the full permanent dentition is erupted
7	Speech pathologist	Monitors the speech development to normal
8	Audiologist	Hearing in the young child
9	Otolaryngologist	Nasopharyngeal tissues, including tonsils, adenoids and middle ear blockage
10	Psychologist	Plays an important role under stress

Cleft surgery

Various surgical techniques are followed by different surgeons around the world for the primary repair of the cleft lip and palate. It is important to keep in mind that no one procedure is clearly superior over the other and outcomes depend on the individual situation, severity of the cleft, rendition of the surgical technique, experience of any particular technique in the hands of the surgeon and personal preferences. However, all surgeries must be done safely, with utmost respect for the handling of the tissues, and with careful dissection as required because these signatures will have a permanent lasting effect on the patient's future facial growth and development, appearance and function.

General management protocol for the cleft patient

1. Immediately after the birth-pediatric consultation, counselling, feeding instructions, evaluation by geneticist to decide whether it is an isolated cleft or if the cleft is part of the syndrome, diagnosis of life expectancy of a child and diagnostic tests.
2. Within first few weeks of life – team evaluation, including hearing testing.
3. At 10 to 12 weeks –surgical repair of the lip, 3-6 months in India.
4. Before age 1 year to 18 months – team evaluation and surgical repair of cleft palate and placement of pressure equalization tubes.
5. Three months after plate repair – team evaluation for speech and language assessment.

6. Three to six years – team evaluation- Medial, behavioural intervention as needed. Speech therapy, treatment for middle year infection, fistula repair, soft palate lengthening, psychological evaluation.
7. Five to six years – lip, nose revision if necessary. Pharyngeal surgery.
8. At seven years – Orthodontic treatment phase I.
9. Nine to eleven years – pre alveolar bone grafting.
10. Twelve year or later – full Orthodontic treatment phase II.
11. Fifteen to eighteen years – at the end of orthodontic treatment, placement of implants, fix bridge, etc. for missing teeth.
12. Eighteen to twenty-one years–when most of growth is completed. Surgical advancement of maxilla, if required.
13. Final nose and lip revision–Rhinoplasty 16-18 years.

Interdisciplinary treatment fosters the evolution of a treatment protocol which works best in the functioning style and local conditions in which the team is active. The famous Eurocleft study, which involved a blinded retrospective assessment of consecutively treated patients from six well known cleft centers in north-western Europe, found that outcomes in centers where fewer operators provided care to larger number of patients with fewer interventions based on simple but time tested protocols, were consistently better than those in centers where many operators, each treating small numbers of patients per year, provided many interceptive procedures, with great procedure variation. The interdisciplinary cleft team's protocol can and should be periodically tested by internal or external audit and updated according to such scrutiny and to adapt to concurrent advances in the art and science. Interdisciplinary management by its nature also provides a failsafe for the protocol of care on a routine basis in that the close involvement of different professionals with independent assessment keeps a check on any undesirable effects of one discipline's intervention on another.

The "Team Apporoach" a Cleft Palate team May be defined as a team of professionals who provide Co-ordinated and interdisciplinary evaluation and treatment to patients with cleft lip and/or cleft palate

Timing and protocols for repair of the lip vary by institution and surgeon. In the United States, most surgeons follow the "rule of tens" and repair the lip when the baby is 10 weeks old, weighs 10 pounds and has a hemoglobin of 10. A lip adhesion may be performed prior to definitive lip repair in order to turn a complete cleft lip into an incomplete cleft, thereby placing the palate into a more favorable position and lessening the tension of the final repair. Final lip repair is delayed 4 months in order to allow maturation of the scar. Most surgeons in the United States do not perform lip adhesion, believing it leads to undo scarring and is less efficient than presurgical nasoalveolar molding. A challenge that always persists in the surgical rehabilitation of a face with a cleft is the creation of an esthetically acceptable correction of the deformed nasal cartilages and deficient columella. Principles of cartilage molding have been integrated extensively with infant orthopedics in a technique called presurgical nasoalveolar molding (NAM). The objectives of this technique are to actively mold and reposition the deformed nasal cartilages and alveolar processes, and to lengthen the deficient columella in the neonatal period, prior to the primary lip and nasal surgery. Actively relined plates with a elastic force of 100 g (Grayson et al)[4] or passive plates which utilize the incomplete musculature (Suri and Tompson)[5] can achieve NAM objectives. Palatal repair is performed anywhere from 6 months onward. The timing of the repair is controversial, with traditional belief being delay in palatal repair results in improved midfacial growth whereas earlier repair results in better speech. Recent studies refute these claims, finding timing of palatal repair does not affect midfacial growth. In the United States and Europe, most repair the palate between 8 and 12 months.

Otolaryngologic Needs of Individuals with Oral Clefts[6,7,8]

Cleft palate puts the child at high risk for a speech disorder known as velopharyngeal insufficiency (VPI), the cause of classic cleft palate speech. Even after surgery, the velum (soft palate) and pharyngeal walls may be unable to create a velopharyngeal port that regulates the correct amount of airflow through the nose. Excess airflow through the nose results in hypernasality. Children with CL/P are at increased risk for otitis media and hearing loss. Most children with CL/P experience some degree of middle ear inflammation, Otitis Media, or recurrent middle ear pathology during their early childhood years (Table no.2).[6,9]

Table 2: Most Common Otolaryngological Issues in Individuals with Oral Clefts

Ear	Nose	Throat
Acute otitis media	Nasal obstruction	Tonsilitis and tonsillar hypertrophy
Otitis media with effusion	Rhinosinusitis	Airway obstruction
Hearing loss and developmental sequelae		
Eustachian tube dysfunction		
Chronic suppurative otitis media		

Orthodontic and Dentofacial Orthopedic Management[10]

Over the years the role of the orthodontist has been multiple because it is synergistic with other treatment needs of the patient. Treatment rendered by the orthodontist is based on the developmental and functional needs of the patient. It influences the position of teeth (orthodontic effect), their supporting bones (orthopedic effect), or both. These effects are possible during all stages of care for the cleft patient from childhood to adulthood. In presence of cleft palate or cleft lip and palate, an acrylic palatal plate is inserted by the orthodontist immediately after birth for spatial growth control of the maxilla. The artificial palatal roof enables separation of the nose and the oral cavity which normalizes the tongue position and facilitates swallowing.

Developmental disorders of maxillary growth can be reduced to a minimum continuing orthodontic care provided. With tooth alignment in the cleft area, orthodontic treatment develops when using plates or fixed appliances.

In Infancy, intervention by orthodontists can be required to facilitate surgery by aligning displaced maxillary segments with presurgical orthopedics.

Presurgical Orthopedics

Since Hofman's use of orthopedic traction in 1686 and Desault's detailed application of these methods prior to surgical repair in 1760, the role of presurgical orthopedics in cleft lip and palate management has remained a volatile and contentious issue. In the twentieth century, Mc Neil in 1950 popularized the use of presurgical infant orthopedic approaches with a view to restore the maxilla and the oral and nasal cavities to a more functional relationship. The proposed benefits of presurgical orthopedics are: control and modification of post-natal maxillary and orofacial development, stimulation of palatal shelf growth, aid in nursing, prevention of tongue distortion and nasal septum irritation, decrease in the number of ear infections, expansion of the collapsed maxillary segments, constriction of the expanded anterior part of the maxilla, repositioning of the premaxilla to aid the plastic surgeon prior to lip repair or primary bone grafting, and psychological upliftment of the mother. However, most cleft teams are disinclined towards primary bone grafting due to concerns for long term growth impairment. With a little special effort, satisfactory feeding is possible, without the use of feeding plates, which have associated hygiene concerns and need frequent replacement. It is our opinion that aggressive and active pre-surgical orthopedics may even well be a growth deterrent. In this regard, we have serious concerns about systems that involve surgically placing the appliances (Latham appliance), with the additional potential to cause iatrogenic damage to the developing tooth buds. Patients with bilateral cleft lip with a severely protrusive premaxilla present a different and difficult challenge. Various appliances and designs have been presented to control the protrusive premaxilla. Some are invasive (pin- retained), whereas others are cumbersome (tape, bonnet). After the palate is repaired, orthodontic intervention is usually not required until the child is in the transitional dentition stage. The most important role of the dental specialist during this early stage is to inform the parents about the differences in dental development that are likely to occur and to emphasize the importance of a healthy dentition in the cleft child. Appropriate referrals to a general or pediatric dentist are done for routine preventive and necessary dental restorative procedures.

Primary dentition

In our experience the indications for Orthodontic treatment at this stage are rare and usually limited to correction of posterior and anterior crossbites.

Mixed Dentition

Eruption of the permanent dentition during the elementary school years must be carefully observed. In boys with unilateral cleft lip and palate, eruption of the permanent maxillary lateral incisors and the permanent maxillary second molar is retarded on the cleft side. In boys with bilateral cleft lip and palate, the highest retardation of eruption was found in the permanent maxillary lateral incisor and the permanent maxillary first molar. Ectopic eruption of both primary and permanent incisors is common. Lateral incisors may erupt in the cleft defect without periodontal support (Table 3 & 4). These teeth are usually very unstable, are lost prematurely, or have to be extracted.

Table 3: Treatment modalities in the management of unilateral cleft lip and palate which are often based on chronological age

Timing	Procedure
After 16 weeks of Pregnancy	Cleft lip diagnosis by ultrasound images (palate is more difficult to acquire)[9]
Prenatal	Discussion with a craniofacial surgeon[10]
Neonatal	If the child has cleft palate, specialized nipples and bottles are necessary to improve feeding after birth[11]
12 weeks of age	Cleft lip repair[12]
6-12 months of age	Cleft palate one-stage repair with intravelar veoplasty[13]
5 year	Secondary rhinoplasty[14]

Table 4: Treatment modalities in the management of unilateral cleft lip and palate which are often based on dentofacial development

Timing	Procedure
Prior to cleft lip repair	Presurgical infant orthopedics[15]
Primary dentition	Orthodontic treatment for maxillary expansion[16]
Mixed dentition	Orthodontic treatment for maxillary expansion and maxillary protraction[16]
Before eruption of permanent dentition	Secondary alveolar bone graft with cancellous bone from iliac crest[10,17]
Permanent dentition	Orthodontic treatment for dental arches alignment[18]
After full eruption of permanent dentition, dental arches alignment, and end of the maxillofacial growth	Orthognathic surgery for maxillary advancement[16]
After orthognathic surgery	Postsurgical orthodontics for closure of residual spaces and occlusion final adjustments[19], replacement of missing truth by a prosthodontist[20]

Anterior crossbite

Cleft patients presenting at a young age with severe anteroposterior and transverse maxillomandibular discrepancies are monitored with serial cephalometric studies and should be treated with extreme caution. Treatment for these patients is usually deferred until a combined orthodontic and orthognathic surgery approach can be instituted at a later age.

If the discrepancy is mild, the orthodontist can attempt to correct it by means of an orthopedic facemask. This appliance is designed to apply an orthopedic force to the under developed maxilla anchored on the forehead and chin. From studies in non-cleft and cleft maxillary deficient patients, it is known that this treatment modality can yield relatively fast results and is effective during the early childhood and prepubertal years.

After the age of 8-10 years, increases in maxillary growth are small. Therefore, deferring secondary surgery to the maxilla after these ages is a sensible approach. The purpose of orthodontic treatment at this particular stageis to remove the mechanical interferences created by displaced teeth and segments, for adequate surgical access.

Initiating orthodontic treatment based on the stage of dental development of the permanent teeth, rather than chronologic age, is particularly appropriate for children with orofacial cleft. These individuals frequently present with delay in the development and eruption of the permanent teeth. Orthodontic treatment should not be initiated until root development of the incisors on which brackets will be placed is almost complete. Failure to adhere to this developmental threshold can result in incomplete root formation, root resorption, and an unfavorable crown –root ratio for proper attachment of the tooth to its supporting bone.

Orthodontic treatment during the transitional dentition stage usually requires orthopedic and orthodontic effects. They can be obtained simultaneously or in continuity to address the following conditions: collapse of the maxillary arch, dental malpositions on other side of the cleft.

To prepare the maxillary arch for the bone graft at this stage, it is necessary only to address the first two conditions. Treatment of the last condition, if present, is usually deferred to the final phase of orthodontic treatment in the adolescent years.

When indicated, this phase of orthodontic treatment is accomplished by means of a fixed segmental labial orthodontic appliance. The erupted maxillary incisors, primary cuspids, and first permanent molars are bonded/banded. A sequence of orthodontic wires from highly flexible to rigid are progressively used. This permits correction of dental malpositions and restores arch form. Occasionally in the patient in whom the maxillary arch collapse is severe or the palate is markedly scarred, an initial maxillary expander can be used. If much resistance is expected, a stonger

appliance, such as a screw expander, may be used. In cleft patients the maxilla should not be overexpanded and the premaxilla over advanced, because the alveolar defects will be widened, making adequate gingival coverage of the bone graft a difficult or impossible surgical task.

If no Orthodontic treatment is necessary until the full permanent dentition, the orthodontic appliances are removed and the new position of the incisors is retained with a bonded lingual wire or a maxillary removable retainer. Prosthetic teeth can be incorporated into the plate as space maintainers and for cosmetic purposes while awaiting dental eruption.

Most patients treated with this protocol complete the preparatory phase of orthodontics in the pre-teen or early-teen years. The retention phase is simple but important. Patients have to be followed periodically with cephalometric and dental radiographs to monitor craniofacial growth and relations, as well, as dental development, especially the eruption of the maxillary lateral incisor, canine or both through the grafted alveolus.

Permanent Dentition

In most patients the final stage of orthodontic intervention can be accomplished without much difficulty, especially if the previously outlined guidelines and procedures are followed. Treatment time varies but is usually not different from that for noncleft patients. The goal at this stage is to provide the patient with ideal occlusal relations for proper function, aesthetics, and long term stability.

The orthodontic treatment usually involves a full banded/bonded fixed appliance, alone or complemented with other orthodontic intraoral (expander, elastics) or extraoral auxiliaries (facemask, headgear).

There are different treatment protocols for the treatment of orofacial clefts as discussed below:-

Bergen treatment protocol:

Two CLP teams have been established in Norway since 1950s: one in Osloand one in Bergen, serving a population of 4.2 million.

The orthopedic/orthodontic treatment program of the Bergen CLP team has been based on periods of active focused treatment followed by intervals of observation and fixed retention, as recommended by the American cleft palate-cranio facila association (ACPA). Because of the wide range of severity of malocclusion in CLP patients, it is very important to determine the treatment objectives for each individual case. The following treatment options may be regarded as an individual check list:

1. Presurgical neonatal maxillary orthopedics.
2. Orthodontic considerations in growth developments.
3. Interceptive orthopedics in the late primary/early mixed dentition: transverse expansion and protraction.
4. Alignment of maxillary incisors.
5. Secondary bone grafting of the cleft alveolar process.
6. Conventional orthodontics in the permanent dentition.
7. Adjunctive orthodontics related to prosthdontics or orthognathic surgery (17 to 19 years)

AIIMS undergo the following treatment protocol:

- Primary surgery performed during childhood (lip repair after 3 months of age and palate repair after 12 months of age)
- No early pre and post-surgical maxillary orthopedics
- Orthodontic treatment during the mixed dentition
- Secondary bone grafting at the end of mixed dentition

The American Cleft Palate-Craniofacial Association (ACPA) (1993)[11] responded by developing parameters of care designed to facilitate the rehabilitation of patients with CLP. The parameters developed by the ACPA support the concept of interdisciplinary care for the CLP patient, encouraging the use of treatment protocols that emphasize the thoughtful timing of interventions (surgery, speech and language therapy, dental and psychosocial treatment) to coincide with the child's physical, cognitive, dental, and psychosocial development. The parameters of care emphasize the need for the team of cleft specialists to organize for maximum long-term patient benefit, taking into account the child's growth intervals and levels of need in the individual's life.

PGIMER, Chandigarh Cleft Palate Protocol

It has been well established that an interdisciplinary team approach to provide integrated cleft care is mandatory. This approach led to the development of a CLP team at PGIMER, Chandigarh, in 1976, and the team's protocol has been routinely followed and continuously evolved over the last 30 years. The CLP team at PGIMER, Chandigarh consists of cleft surgeons, orthodontists, speech therapists, pediatric dentists, oral and maxillofacial surgeons, and prosthodontists. This team meets in the clinic once a week to review cases at various stages of treatment, as well as fresh cases. On an average 150 new cases are seen every year in the Cleft Palate Clinic, and at any one time, there are at least 70-80 cases under active Orthodontic/ Dentofacial orthopaedic care. The protocol of cleft care, which is followed at the PGIMER, Chandigarh consists of the following interventions: Presurgical nasoalveolar molding in infants with significant nasoalveolar distortion (under scrutiny) followed by lip repair at 3-5 months is

undertaken, with palate repair between 12-18 months. Pediatric dental supervision and care commences with the eruption of deciduous teeth at 6 months and speech therapy at 2 years[12]. Early interceptive orthodontics for incisor derotation and alignment using anterior sectional twin bracket appliances, anterior crossbite correction and dentofacial orthopedics for maxillary protraction, and preparation for alveolar bone grafting as indicated are undertaken during the mixed dentition stage. Adjunctive orthodontic treatment to support sulcular deepening may also be undertaken if indicated during the mixed dentition stage. Comprehensive orthodontic treatment is conducted after the eruption of the permanent dentition. Surgical orthodontic treatment leading to orthognathic surgery and with or without maxillary distraction as indicated is undertaken after the patient has attained skeletal maturity. Lip and nasal revision surgeries and rhinoplasty when required are usually carried out after the completion of the other aspects of Dentofacial treatment.

Unique orthodontic problems of patients with clefts
The child with a cleft has dentoalveolar and maxillo-mandibular problems, which are quite uniquely different from the routine orthodontic patient. The growth related facial skeletal dysmorphology has been well reported in the literature. There is often a severe maxilla- mandibular discordance of the basilar bones. The maxilla more often than not is quite retruded and this effect is further accentuated by the surgical scars. Furthermore, there is a progressive decline of the maxillary prominence in both UCLP and BCLP (Fig 1) as the child grows through adolescence.

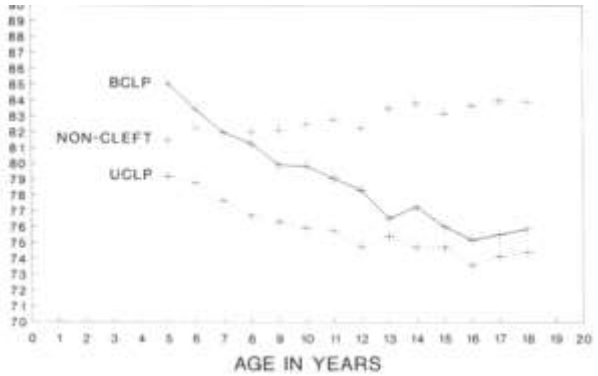

Fig. 1:

There are postural adaptations to the dentoalveolar and basilar discrepancies, and a mandible in over closure is a common feature. However, a postural backward rotation of the mandible is also frequently seen. In addition to the sagittal discrepancies getting accentuated by the surgery, transverse relations are also severely compromised. Two common types of maxillary transverse collapse patterns mostly related to the palatal repair surgery are seen. The unilateral collapse frequently seen in UCLP presents with the lesser segment caught behind under the greater segment. The bilateral collapse, typically seen in BCLP has almost equal transverse constriction of the maxillae. Other legacies of surgery in the form of a recalcitrant palatal scar and tight scarred upper lip pose serious limitations on the boundaries within which the orthodontist can hope to move the teeth, in addition to the severe restricting effect they have on the maxillary growth potential. The arch deficiency and dentoalveolar mutilation is further complicated by congenitally missing lateral incisors, supernumerary and fissural teeth adjoining the cleft site, ectopically erupting maxillary canines, and hypoplasia of the maxillary incisors. Anchorage planning and management of tooth movement is thus complicated. The difficulties are compounded by the incompletely understood true nature of dysmorphology. The patient with a cleft often has an asymmetric growth problem, and two-dimensional radiography with projection and superimposition errors is inappropriate to adequately describe the dysmorphologic state. Three dimensional imaging through CT and MRI scans have revolutionized the understanding of the craniofacial complex and are especially useful in severe craniofacial conditions. However, there is a price to pay in terms of money and radiation exposure, and hence the recommendations for these should be made judiciously.

Conclusion

The congenital cleft lip is a deformity that arises from a genetic or environmental insult during formation of the maxilla and palate in the first trimester of gestation. The etiology of the non-syndromic form is multifactorial and likely involves maternal exposures to teratogens such as tobacco. Cleft lip causes varying degrees of oral sphincter dysfunction, difficulty with speech, and abnormal appearance of the upper lip and nose. The main objectives of surgical repair are to rest or enormal feeding capacity, speech development, and facial esthetics at an early age before problems arise.

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