CLEFT LIP AND PALATE

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CLEFT LIP AND PALATE

Clefts involving the lip and palate are the most commonly seen congenital deformities that occur at the time of birth. They are not usually life threatening unless associated with some syndrome having other systemic complications.

Incidence: The incidence of cleft lip palate is found be different among different races. Studies reveal at incidence of every 600-1000 births. The Negroid has the least incidence where the Mongoloid have the highest incidence.

Cleft lip is common among males where cleft palate is common among females.

Embryological Background: Embryologically, the cleft of lip and palate are due to failure of maxillary and nasal processes to unite. In the development of normal embryo, the first arch grows down from the neural crest. During the course of growth of the maxillary processes, it fuses with the lateral nasal processes and the medial nasal processes, before meeting with its fellow of opposite side to form primary palate, from which develops the upper lip and palate anterior to the incisive foramen. These processes are essentially the mesodermal tissues covered by ectoderm. During the
fusion, the covering epithelium of these processes at the site of union disintegrates and mesodermal tissues and mesodermal tissues come in contact with each other and unite. Failure of this union due to any other cause will produce total cleft of primary palate, while partial fusion will produce sub-total cleft.

The secondary palate develops from a pair of palatal shelves arising from the inner and side of maxillary process, which unite with the nasal septum from before backwards any arrest of union thus result in a defect that varies from a bifid uvula to a complete cleft of a secondary palate.

Cleft involving the lip and palate are the most commonly seen congenital deformities that occur at the time of birth.

**Aetiology:**

**Heredity:** 25% cases produce family history of cleft. When an individual & a cleft of a primary palate marriage a normal partner then there 2% risk of cleft in offspring. If an affected parent has a cleft child then incidence in further children is 15%.

(2) Maternal environment:

a) Administration of cortisone or ACTH at a particular time of pregnancy may produce cleft.
b) Emotional influences occurring to the mother may cause endocrine imbalance producing cleft.

c) Malnutrition & deficiencies may also produce cleft.

d) German measeles & other acute viral infection may be responsible.

(3) **Teratogens:** Are certain drug or agents that cause disturbed growth & development in the fetus. Some of the known teratogens are:

- Rubella virus.
- cortisone
- mercaptopurine
- methotrexate.
- Valium
- Dilantin

(4) **Intermarriage:** Marriage between close relatives.

(5) **Radiation:** Exposure to radiation at an early age.

(6) **Tongue position:** Inter position of tongue b/w to palatal shelves & thus prevent fusion.

(7) Multifactorial etiology.

**Predisposing factors.**

(a) Increased maternal age:
Women who conceive late are at an increased risk of having an offspring with some form of clefting. [Idiopathic]

(b) Racial:

Some races are more susceptible to clefts than other. Common in Japanese.

(c) Blood supply

Any factor that reduces blood supply to the nasomaxillary area during embryological development predisposes to clefts.

How cleft palate occurs:

1. Interference with the intrinsic shelf force.
2. Excessive head width or diminutive palatal shelves.
3. Excess tongue resistance.
4. Non fusion of shelves.
5. Fusion of the shelves with subsequent break down.
6. Abnormal position in the fetus.
7. Fusion of the shelve and subsequent break down by infection.

Classifications

(A) Kernahan and stark’s classification: This is based on embryological principle.
(a) Cleft of the primary palate: This may involve only the lip or the lip with alveolus, often as far back as the incisive foramen. Therefore, it may be subtotal or total. It may also be unilateral or bilateral.

(b) Cleft of the secondary palate: This may involve the soft palate only or the soft and hard plate as forward as the incisive foramen i.e. subtotal & total.

(c) Cleft of both the primary & secondary palate: It may be unilateral or bilateral.

(B) Kernahan Stripped Y classification:

Block 1 & 4 → represents the lip.

Block 2 & 5 → represents the alveoli.

Block 3 & 6 → represent the hard palate and to the incisive foramen.

Block 7 & 8 → Hard palate posterior to incisive foramen.

Block 9 → Soft palate.

The boxes are shaded in areas where the cleft – has recurred.

LAHSHAL CLASSIFICATION:

This is a simple classification presented by Okriens in 1987.

LAHSHAL is a paraphrase of the anatomic areas affected by the cleft.

L ---- Lip.

A --- Alveolus.
H ------ Hard plate.
S ----- Soft Palate.
H ------ Hard palate.
A ------ Alveolus.
L ------- Lip.

Veau’s classification

<table>
<thead>
<tr>
<th>class</th>
<th>Affected site</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Only soft palate is affected.</td>
</tr>
<tr>
<td></td>
<td>Cleft of soft plate extending on the hard plate.</td>
</tr>
<tr>
<td>II</td>
<td>complete unite cleft of primary and 2ndary palate- clefts</td>
</tr>
<tr>
<td></td>
<td>Complete unilateral cleft of primary and secondary palate –cleft extends from the uvula to the incisive foramen and deviates to one side, dividing the alveolus about the position of late incisor &amp; become continuous &amp; lip.</td>
</tr>
<tr>
<td>III</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Complete bilateral cleft, resembling class III.</td>
</tr>
<tr>
<td></td>
<td>Portion of the lip and palate b/w two clefts in known as prolabium.</td>
</tr>
</tbody>
</table>
Davis and Ritchie classification;

Group I- Pre alveolar clefts: They are clefts involving the lip and are sub classified as:

Unilateral

Bilateral

Median

Group II- post alveolar clefts: This group comprises of different degrees of hard and soft palate clefts that extend up to alveolar ridge.

Group III- Alveolar clefts: They are complete clefts involving the palate, alveolar ridge and lip. They can be sub divided into:

Unilateral

Bilateral

Median

Classification by Fogh Anderson:

Group 1; they are clefts of lip. It can be subdivided into:

Single: Unilateral or median clefts

Double: Bilateral clefts.

Group 2: Clefts of lip and palate, sub-divided into:

Single: Unilateral clefts

Double: Bilateral
Group 3: Cleft of palate extending into incisive foramen.

**Pre-surgical orthopedics or Pre-dental treatment**

**Aim**

To achieve an upper arch form that conforms to the lower arch.

**Pre-surgical orthopedic appliance.**

Used to manage during the pre dental stages are:

1. Passive feeding appliance.
2. The feeding appliance is fabricated after repositioning the segment.
3. Feeding appliance using acrylic wings, to help prevent it’s aspiration into the throat.
4. Intra-oral feeding appliance with an extra oral strap is used to manage cases of bilateral cleft palate with minimal forward displacement of maxilla.
5. An appliance made up of hard acrylic with two soft wedges or expansion screws which rotate the ant ends of the maxillary element out words is used to manage cases & bilateral cleft lip and cleft palate where maxillary protraction is more than 3-7mms. The individual segments are rotated around. The amount of outward rotation of maxillary segments is based on clinical appraisal.
(6) Duyzing’s plate is used for patients with clefts of hard and soft palate. Here hard palate cleft is blocked and soft acrylic extension is used to cover the soft palate defect.

Advantages of pre-dental treatment:

1. To facilitate feeding.
2. To establish normal tongue posture.
3. To guide the tooth eruption.
4. To assist the surgeon in the initial repair.
5. To expand or to prevent collapse of segment.
6. To allow soft tissues to grow before surgery.
7. To establish proper sutural growth patterns early when the sutures are most responsive.
8. To provide psychological boost to the patients.
9. To stimulate palatal growth.
10. To reposition the premaxilla.
11. To restore or facial functional matrix.
12. To reduce the need for late orthodontic treatment.
13. To help decrease the number of ear infection.
14. To improve the aesthetics.
PROBLEMS ASSOCIATED WITH CLEFTS:

A cleft lip and palate a patient is affected by a number of problems. They can be classified as:

1. Dental
2. Esthetic
3. Speech and hearing
4. Psychological

Dental problems:

1. Congenitally missing teeth.
2. Presence of natal or neonatal teeth.
3. Presence of supernumerary teeth.
4. Ectopically erupting teeth.
5. Anomalies of tooth morphology.
7. Microdontia
8. Macrodontia
9. Fused teeth.
10. Post and ant cross bite.

Esthetic problems:

1. The orofacial structure may be malformed and congenitally missing.
2. Deformities of the nose can also occur.

**Hearing and speech**

Cleft lip and palate are sometimes associated with disorders of the middle ear which may affect hearing. Presence of hearing problems can cause difficulties in language uptake and speech.

**Psychological problems:**

Cleft lip and palate patients are under a lot of psychological stress. Due to their abnormal facial appearance they have to put up with straining, curiosity, pity etc.

**ROLE OF ORTHODONTIST IN THE TREATMENT OF CLEFT LIP AND PALATE:**

The role of orthodontist can be discussed in the following stages:

1. **AT The neonatal stage:**

Pre-surgical reposition of the segments: McNeil and Burtons method of reposition of the can be carried out at the stage as it:

   a. Facilitate feeding.

   b. Provide early reassurance of the parents.

   c. Allow improved occlusal development.

   d. Repositioning of lip and jaw facilitate surgical repair.
Repair of lip and palate with or without bone grafting:

Operation of lip is usually undertaken at about 3-6 months and palate at about 1 to 2 years.

e. At deciduous and mixed dentition stage:

A. Expansion of the arch:

Expansion of the arch in deciduous dentition (at 3-4 years): Expand the arches with fixed palatal expansion arches to correct the post cross bite and align the arches. The expansion is maintained by fixed retention appliance which may also serve as obturator.

Rapid expansion of arch followed by bone grafting (at about 8 years). Instead of expansion of arch in early deciduous dentition stage as above, Mathews and Grossman described a technique where the arch is expanded rapidly with fixed expansion appliance and the expansion is maintained by bone grafting to fill the gap.

B. Routine orthodontic Rx:

Usually normal orthodontic treatment begins at mixed dentition stage when following work can be undertaken:

1. Correction of any ant cross bite, and alignment of any rotated and malposed teeth.

2. Correction of molar relation.
3. Extraction of any deformed or supernumerary tooth.

   f. AT PERMANENT DENTITION STAGE:

   **Routine orthodontic treatment:** Final correction of permanent teeth with fixed or removable appliance may be undertaken at this stage. Usually this does not differ from routine orthodontic treatment.

   **Bone grafting:** Subtelney suggested that at a late stage of development, during adolescent, a bony implant in to the ant maxillary alveolar process may be advisable or desirable to improve facial appearance and to help stabilize the segments and to maintain orthodontic results.

   **Permanent retainer:**
   In most of cases, especially where bone grafting has not been done, a permanent retainer in the form of partial denture or bridge will be necessary. Mathews and Grossan reported that cases treated with rapid expansion and bone grafting, does not need any permanent retainer.

   **Maxillary obturator**
   The maxillary obturator is an intra-oral prosthetic device that fills the palatal cleft and thus provides false roofing against which the child can suck. It thus reduces the incidence of feeding difficulties such as insufficient suction, excessive air intake and choking. It also provides maxillary cross arch stability preventing the arch from collapsing.
The obturator is fabricated using cold cure acrylic after selective blocking of all undesirable undercuts. Clasps can aid in retention. In case of insufficient retention, wings made of thick wire can be embedded in the acrylic and made to follow the cheek contour extraorally. These wings can be stabilized against the cheeks using microspore adhesive tape.

Total dental management of cleft lip and palate

<table>
<thead>
<tr>
<th>Age</th>
<th>General dental &amp; Pediatric dental care.</th>
<th>Orthodontic care.</th>
<th>Surgical care</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Initial contact and interview with parents.</td>
<td>Construction of pre-surgical orthopedic appliance if required</td>
<td>Initial assessment.</td>
</tr>
<tr>
<td></td>
<td>Case discussion with surgical and orthodontic teams.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-6 months</td>
<td>Introduce dental care plan. Study model at time of lip repair.</td>
<td></td>
<td>Primary surgical repair of lip</td>
</tr>
<tr>
<td>12 months to 2</td>
<td>Review.</td>
<td></td>
<td>Surgical repair of palate</td>
</tr>
<tr>
<td>years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>2-6 years</td>
<td>6 monthly reviews for assessment of growth and development,</td>
<td>Possible revision of lip repair.</td>
<td>Pharyngoplasty if required.</td>
</tr>
<tr>
<td></td>
<td>preventive advise.</td>
<td></td>
<td>Myringotomy and grommets by ENT.</td>
</tr>
<tr>
<td></td>
<td>Topical fluoride applications and fissure sealing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-7 years</td>
<td>Fissure sealing of first permanent molars.</td>
<td>Myringotomy and grommets by ENT as required.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Composite resin restoration of hypoplastic teeth adjacent to cleft.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preventive advice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-10 years</td>
<td>Case discussion with surgical and orthodontic teams for bone grafting.</td>
<td>Assessment for maxillary expansion prior to bone grafting.</td>
<td>Bone grafting at one-half to two-thirds root development of</td>
</tr>
<tr>
<td></td>
<td>Possible extraction of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Range</td>
<td>Description</td>
<td>Treatment Options</td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>11-15 years</td>
<td>Retention of palatal expansion. 6 month review. Fissure sealing of bicuspids and second molars.</td>
<td>Full fixed appliance therapy. Minor tooth irregularities may be corrected by removable appliance. Review and possible surgical revision if required.</td>
<td></td>
</tr>
<tr>
<td>16-17 years</td>
<td>Restoration of teeth in the cleft by crowns, bridges, implants, dentures etc.</td>
<td>Retention, following orthodontic therapy. Assessment of the need for orthognathic surgery.</td>
<td></td>
</tr>
</tbody>
</table>

**Management of cleft lip and palate**

1. Children born with cleft lip and palate have a number of problems that have to be solved for successful rehabilitation.
2. The complexity of the problem requires that a number of specialists get together at various stages of development for the eventual better treatment of the patient.

The aim of treatment is to improve:

a. Appearance
b. Speech
c. Function

Stages of management:

The management of patient can be divided into 4 distinct overlapping stages. The stages have been created based on the dentition of the patient.

1. **Stage I**

The first stage extends from birth to 24 months. The orthodontist may be called upon to perform the following 2 functions:

I. Fabrication of a feeding plate or passive maxillary obturator

II. Strapping of the pre-maxilla or other infant orthopedic procedure
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17. Yoshiaki S. Lecture/class notes. Associate Professor and chairman, Dept. of Orthodontics, School of dental science, Hokkaido University, Japan.
Dedicated To

My Mom, Zubaida Shaheen
My Dad, Md. Islam
&
My Only Son
Mohammad Sharjil
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