Cleft lip and palate

- **PREVALENCE**

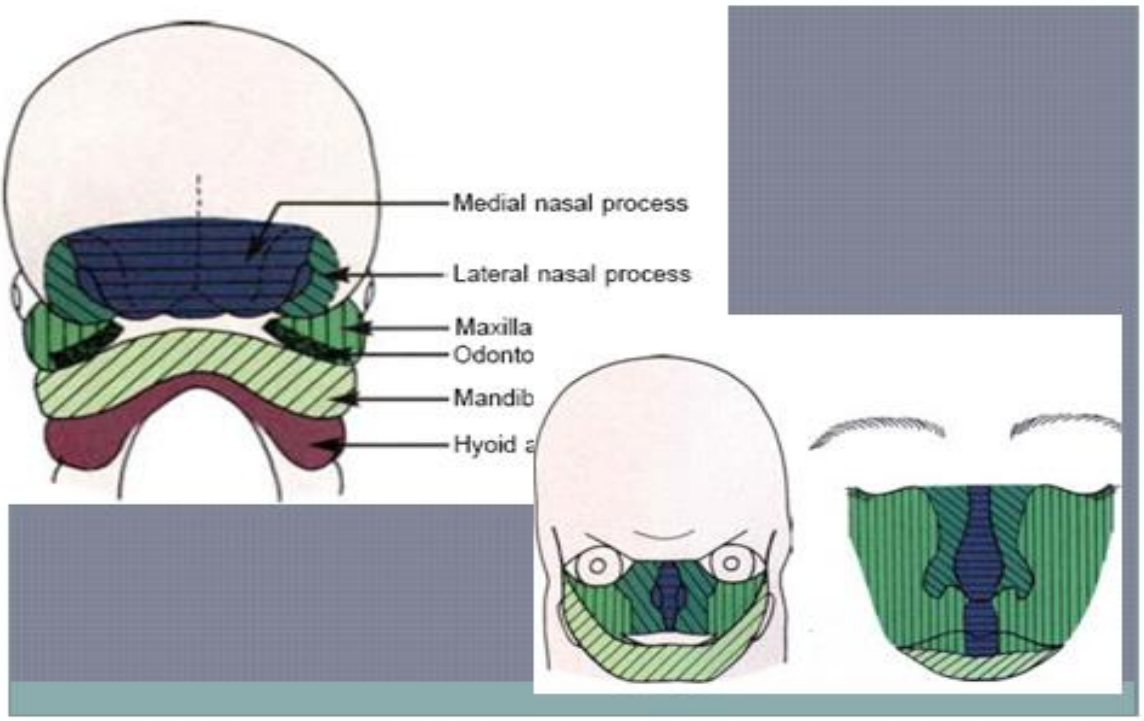
Cleft lip and palate is the most common craniofacial malformation, comprising 65 per cent of all anomalies affecting the head and neck. There are two distinct types of cleft anomaly, cleft lip with or without cleft palate and isolated cleft palate, which result from failure of fusion at two different stages of dentofacial development

Cleft lip and palate

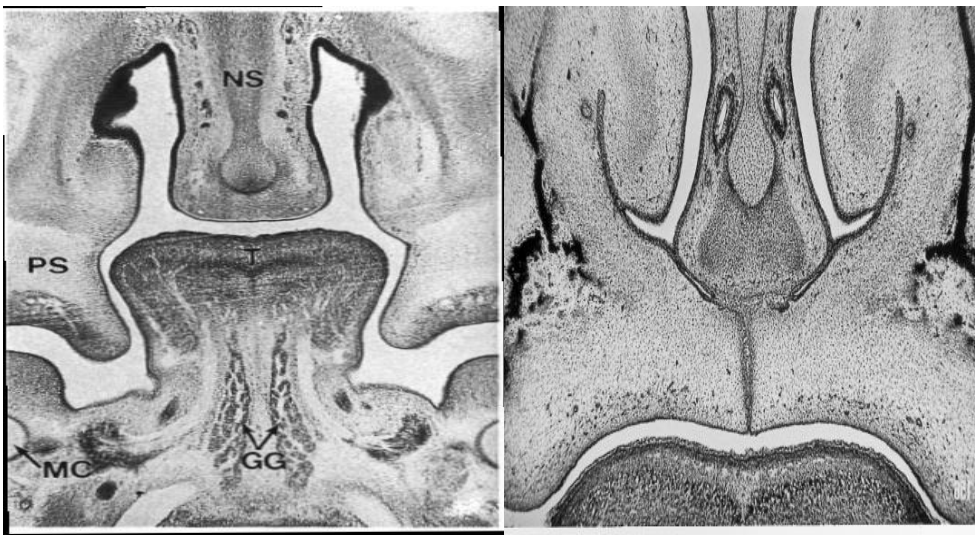
- **Amongst Caucasians, this anomaly occurs in approximately 1 in every 750 live births.**
- **. A family history can be found in around 40 per cent of cases of cleft lip with or without cleft palate, and the risk of unaffected parents having another child with this anomaly is 1 in 20.**
- **Males are affected more frequently than females, and**
- **the left side is involved more commonly than the right**

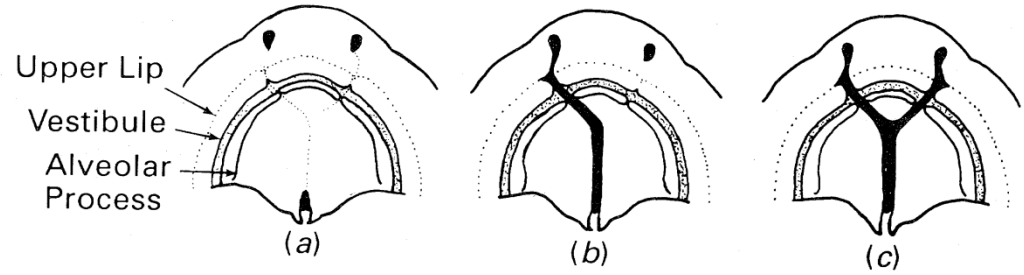
Isolated cleft of the secondary palate

- **occurs in around 1 in 2000 live births**
- **and affects females more often than males.**
- **Clefts of the secondary palate have a lesser genetic component, with a family history in around 20 per cent and a reduced risk of further affected offspring to normal parents (1 in 80).**
- **Isolated cleft palate is also found as a feature in a number of syndromes including Down, Treacher–Collins**
- **Clefting of the *lip* occurs because of a failure of fusion between the median and lateral nasal processes and the maxillary prominence, which normally occurs in humans during the *sixth week* of development**



- **Closure of the secondary palate by elevation of the palatal shelves follows that of the primary palate by nearly 2 weeks, which means that an interference with lip closure that still is present can also affect the palate.**
- **About 60% of individuals with a cleft lip also have a palatal cleft.**
- **An isolated cleft of the secondary palate is the result of a problem that arose after lip closure was completed.**
- **Incomplete fusion of the secondary palate, which produces a notch in its posterior extent (sometimes only a bifid uvula), indicates a very late-appearing interference with fusion.**
- **Delayed elevation of the palatal shelves from the vertical to the horizontal while the head is growing continuously results in a widening gap between the shelves so that they cannot meet and therefore cannot fuse. This leads to clefting of the palate when they eventually do become horizontal.**
- **Other causes of cleft palate are defective shelf fusion, failure of medial-edge epithelial cell death, possible postfusion rupture, and failure of mesenchymal consolidation and differentiation.**





Variations in palatal clefting: (*a*) bifid uvula; (*b*) unilateral cleft palate and lip; (*c*) bilateral cleft palate and lip.

Multifactorial Threshold Hypothesis

Multifactorial inheritance theory implies that many contributory risk genes interact with one another and the environment and collectively determine whether the threshold of abnormalities is reached, resulting in a defect in the developing fetus

Environmental factors for example

- **Infections Infections like Rubella, Influenza, Toxoplasmosis, etc. to the mother during pregnancy may cause formation of the defct in the fetus.**
- **drugs : anticonvulsant drugs, folic acid deficiency, or steroid therapy, hypervitaminosis and**
- **radiations**

PROBLEMS ASSOCIATED WITH CLEFT LIP AND PALATE

- **PSYCHOLOGICAL**

The disfigurement caused by the condition is enough to cause psychological stress for the patient and the family.

- **ESTHETIC**

The patients with un-repaired clefts are badly disfigured due to the nature of the deformity. Even following the closure of the cleft the maxilla remains underdeveloped and the patient usually has a Class III skeletal profile with compromised esthetics

- **SPEECH AND HEARING**

Cleft lip and palate have definite speech problems. These are sometimes associated with infections of the middle ear. Since speech is learnt by the art of imitation, if hearing is compromised so is the speech.

- **DENTAL**

- **The clefts are generally associated with underdeveloped maxilla and associated structures. The patient may present with some of the following features:**
  - **Multiple missing teeth (most commonly the maxillary lateral incisors).**
  - **Mobile premaxilla.**
  - **Anterior and / or posterior cross bites.**
  - **Ectopically erupting teeth.**
  - **Impacted teeth.**
  - **Supernumeraries.**
  - **Poor alignment often predisposes to poor oral hygiene.**
  - **Multiple decayed teeth.**
  - **Periodontal complications.**

MANAGEMENT OF CLEFT LIP AND PALATE

The management of cleft cases requires team work :-

- **orthodontist**
- **maxillofacial surgeon**
- **plastic surgeon**
- **speech therapist**
- **ear, nose, and throat (ENT) surgeon.**
- **health visitor**

Stage I

- **The first stage extends from birth to 24 months. The orthodontist may be called upon to perform the following two functions:**
- **Fabrication of a feeding plate or passive maxillary obturator.**
- **Strapping of the premaxilla or other infant orthopedic procedures**

<u>Infant Orthopedics</u>

An infant with a cleft lip and palate will have a distorted maxillary arch at birth

Types of movement of the maxillary segments **:**

1. ***The collapsed maxillary posterior segments must be expanded laterally.***
2. ***Pressure against the premaxilla can reposition it posteriorly into its approximately correct position in the arch.***

If presurgical movement of maxillary segments is indicated, this typically would be done at the beginning of 3 to 6 weeks of age .

- **Surgical correction of Lip is done in early infancy as it is compatible with a good long-term result.**
- **The common guidelines (as advocated by Millard) is age 10 weeks, weight 10 pounds and hemoglobin 10 gm%**

- **An intact palate aids the acquisition of normal speech. At this time speech is developing rapidly.**
- **For ideal speech, therefore palate closure between the age of 12 and 24 months is recommended.**
- **Some authors prefer to wait and recommend palatal repair in the age group of 9 to 12 years.**

Stage II

- **This stage extends from 24 months to 6 years of age.**
- **The period covers the primary dentition. The orthodontist plays the part of an observer and monitors the development of the dentition.**
- **Generally no active orthodontic treatment is undertaken during this stage**
- **The oral-hygiene instruction may be emphasized upon and procedures undertaken to preserve the existing tooth structures.**

Stage III

This stage extends from 6 to 12 years of age, i.e. the mixed dentition stage. The orthodontist plays a major role during this stage.

• Arch expansion can be undertaken.

• Maxillary protraction devices can be made use of.

• Fixed orthodontic treatment can be initiated, which will form the basis of the final alignment and position of the teeth.

- **The patient is referred for a bone graft in the palatal region, before the eruption of the permanent maxillary canine.**
- **If the canine can be made to erupt through the graft, it adds to its stability.**

Stage IV

- **This stage corresponds to the permanent dentition and final corrections are made during this stage.**
- **A reasonable amount of alignment along with esthetics should be achieved.**
- **The canine, if not erupted is exposed and brought into alignment.**
- **The arches are aligned and the occlusion made to settle**
- **Planning is done regarding the need for orthognathic surgery. Consultation with the oral and maxillofacial and plastic surgeons is a must.**

The retention planned should be permanent in nature. Prosthetic rehabilitation can be accommodated in the retention appliance- using fixed bridges or cast partial dentures

<u>Orthognathic Surgery for Patients with Cleft Lip and Palate</u>

- **Continued mandibular growth after the completion of active orthodontic treatment leads to the return of anterior and lateral crossbites.**
- **This result is not so much from excessive mandibular growth as from deficient maxillary growth, both anteroposteriorly and vertically .**
- **Orthognathic surgery to bring the deficient maxilla downward and forward may be a necessary last stage in treatment .**