

# Surgical Management of Cleft lip and Cleft palate



# Introduction

- Facial clefting is the second most common congenital deformity
- Affects 1 in 750 births
- Problems are cosmetic, dental, speech, swallowing, hearing, facial growth, emotional

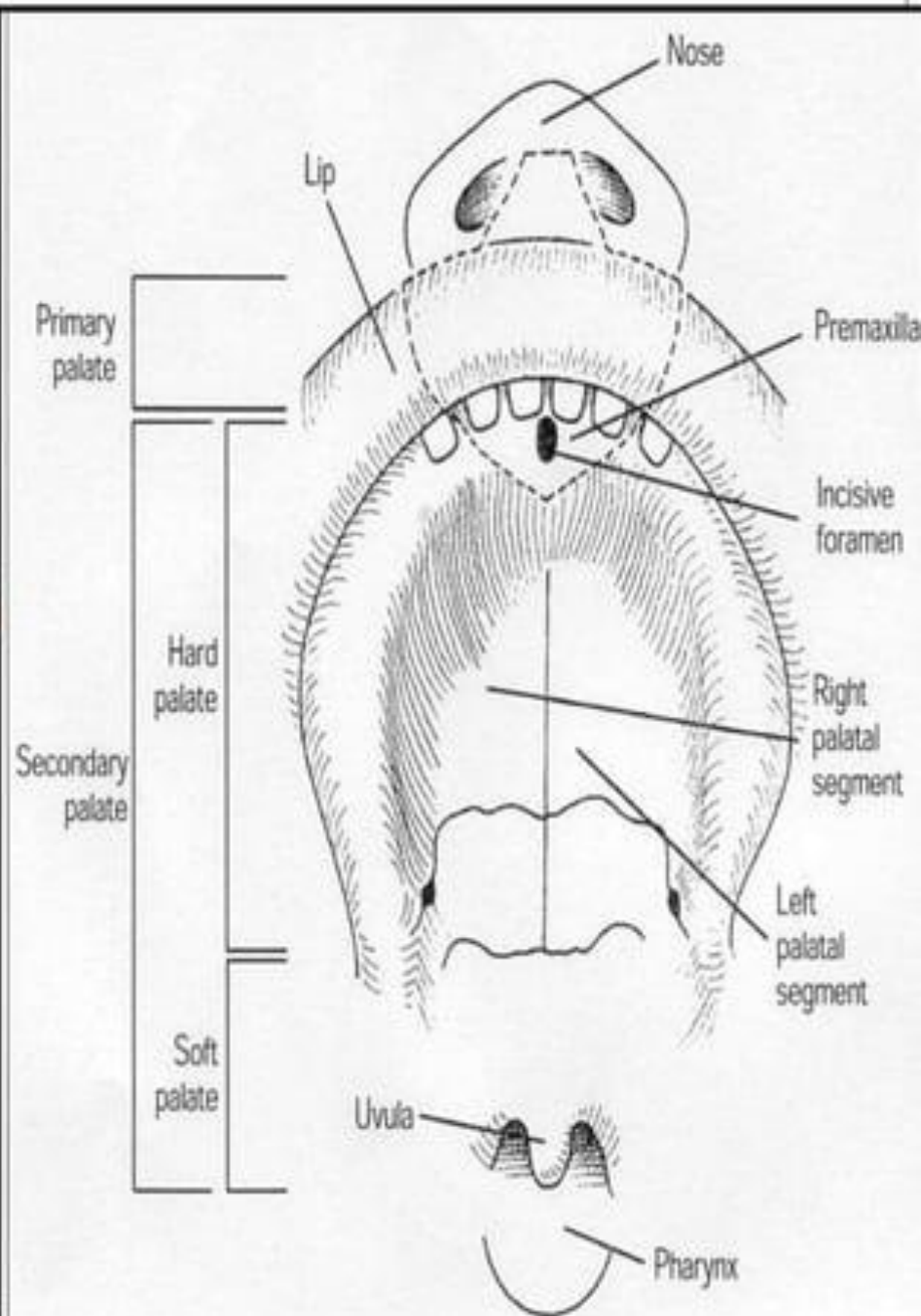
Dr. Nikitha Sree,  
K

# Embryology

**Primary Palate**- Triangular area of hard palate anterior to incisive foramen to point just lateral to lateral incisor teeth

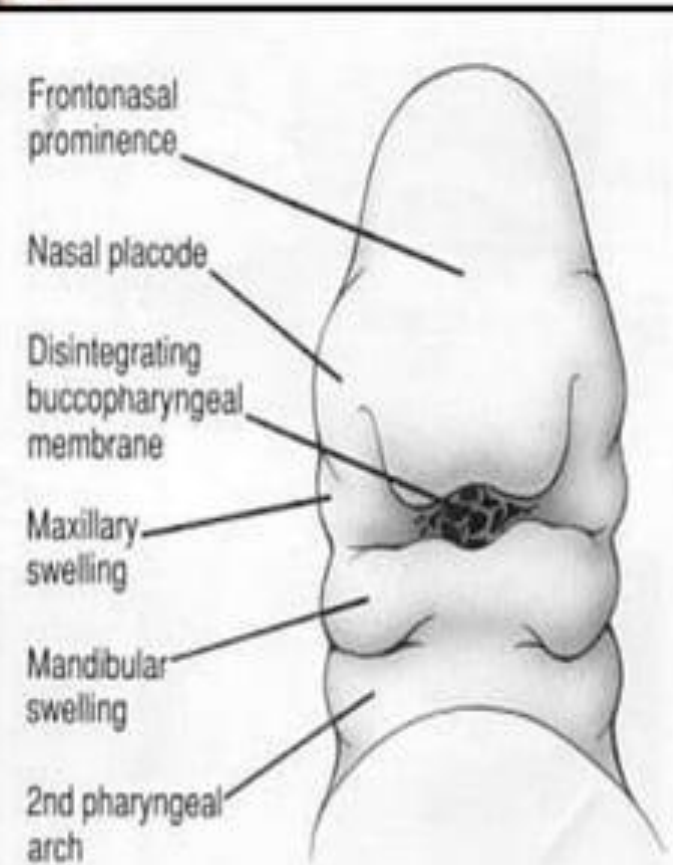
- Includes that portion of alveolar ridge and four incisor teeth.

**Secondary Palate**- Remaining hard palate and all of soft palate



## Facial Development - 4<sup>th</sup> - 10<sup>th</sup> week of development

- Formed by the fusion of five prominences
- Unpaired frontonasal process
- lateral/medial nasal processes
- Nose/Philtrum of upper lip
- Paired maxillary swellings
- Cheeks/Upper lip (-philtrum)
- Paired mandibular swelling
- Lower face (lower lip/chin)



# Facial Development

*6<sup>th</sup> week*

Medial nasal processes  
(green) migrate toward each  
other and fuse

*7<sup>th</sup> week*

Inferior tips of medial nasal  
processes expand laterally to  
form the intermaxillary process

Tips of maxillary swellings  
(yellow) grow to meet the  
intermaxillary process and fuse



**Failure of maxillary  
swellings to fuse with  
intermaxillary process  
= cleft lip**

Lateral nasal process

Medial nasal process

Maxillary process

A

B

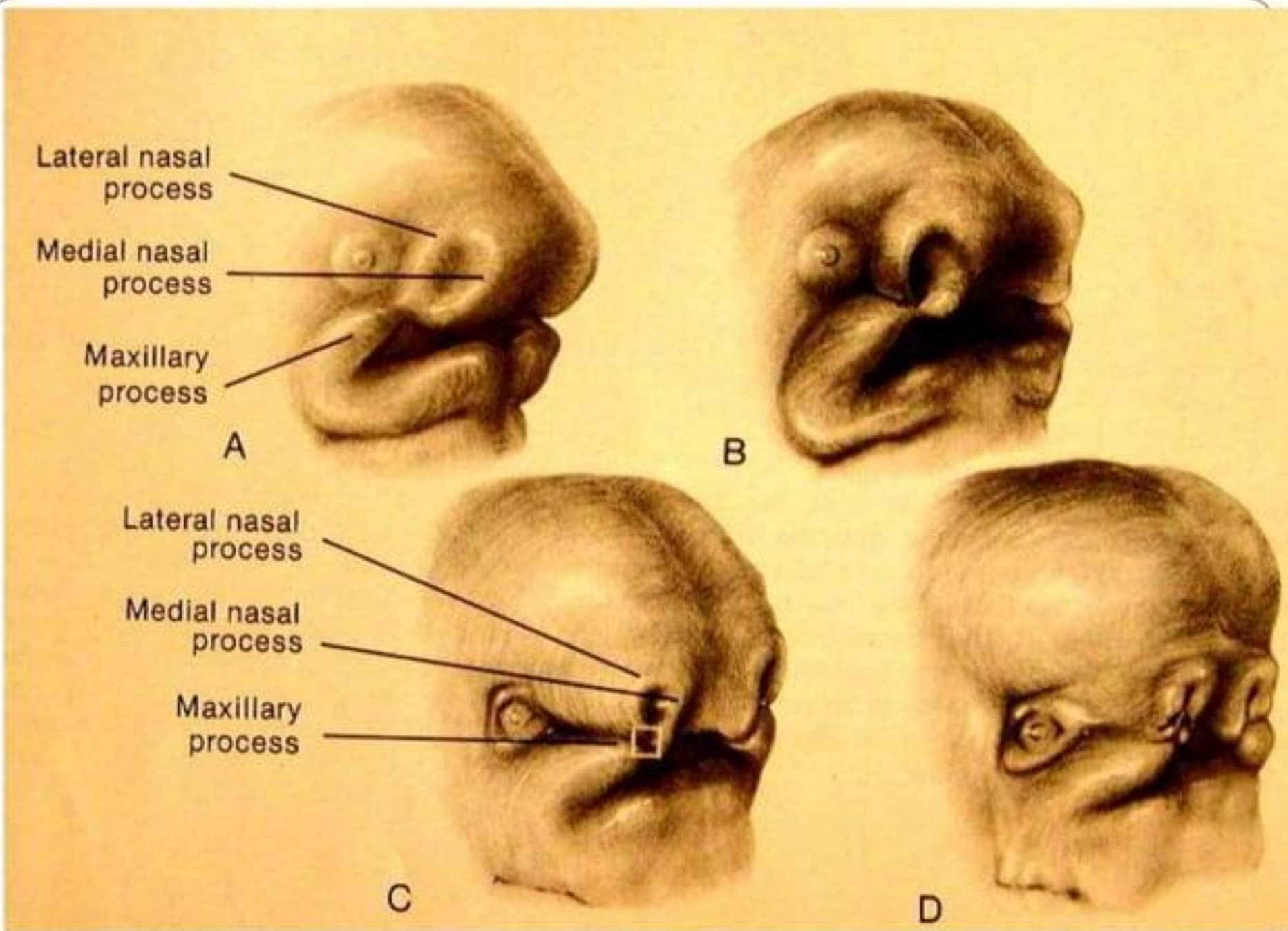
Lateral nasal process

Medial nasal process

Maxillary process

C

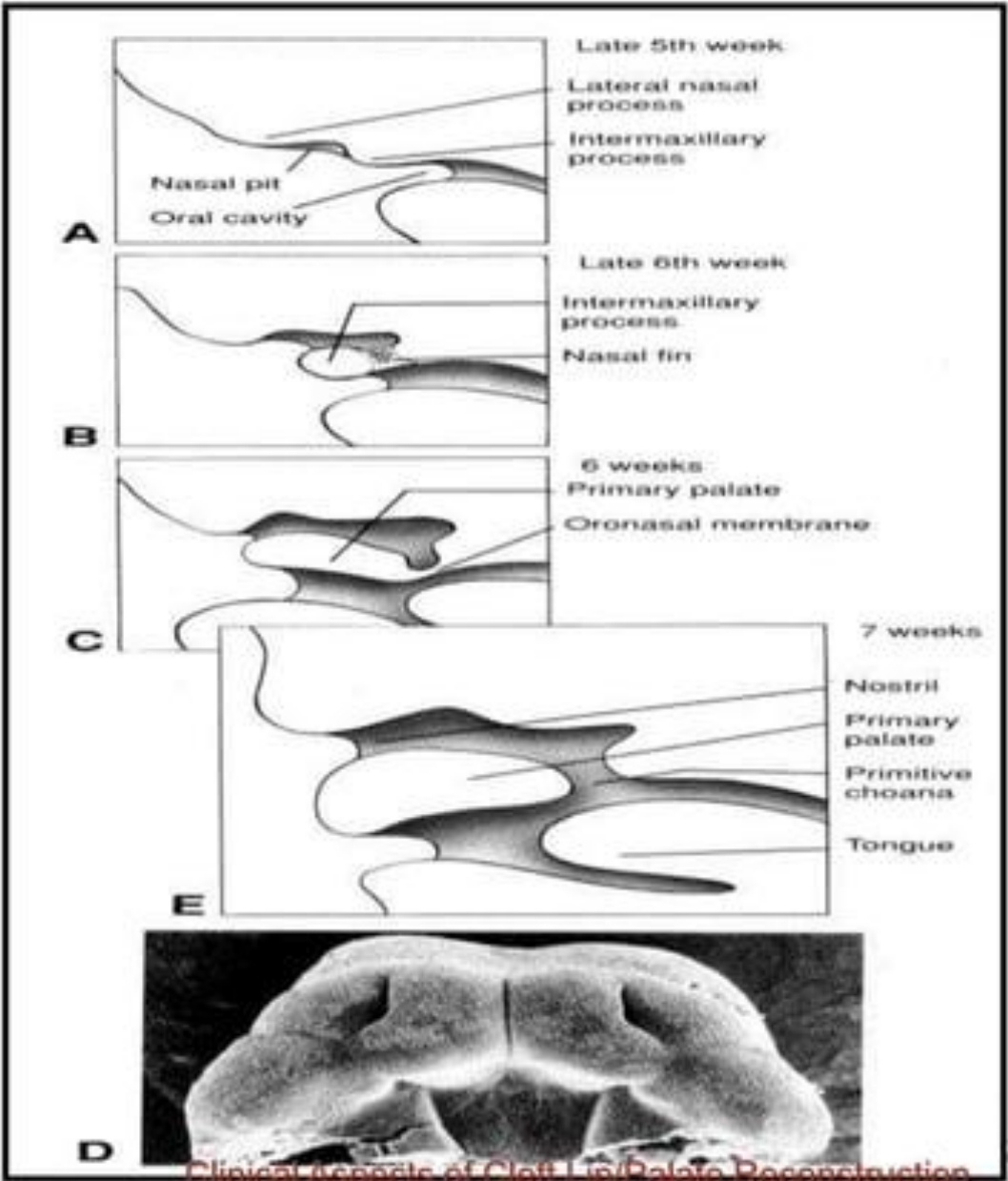
D



# Formation of the Palate

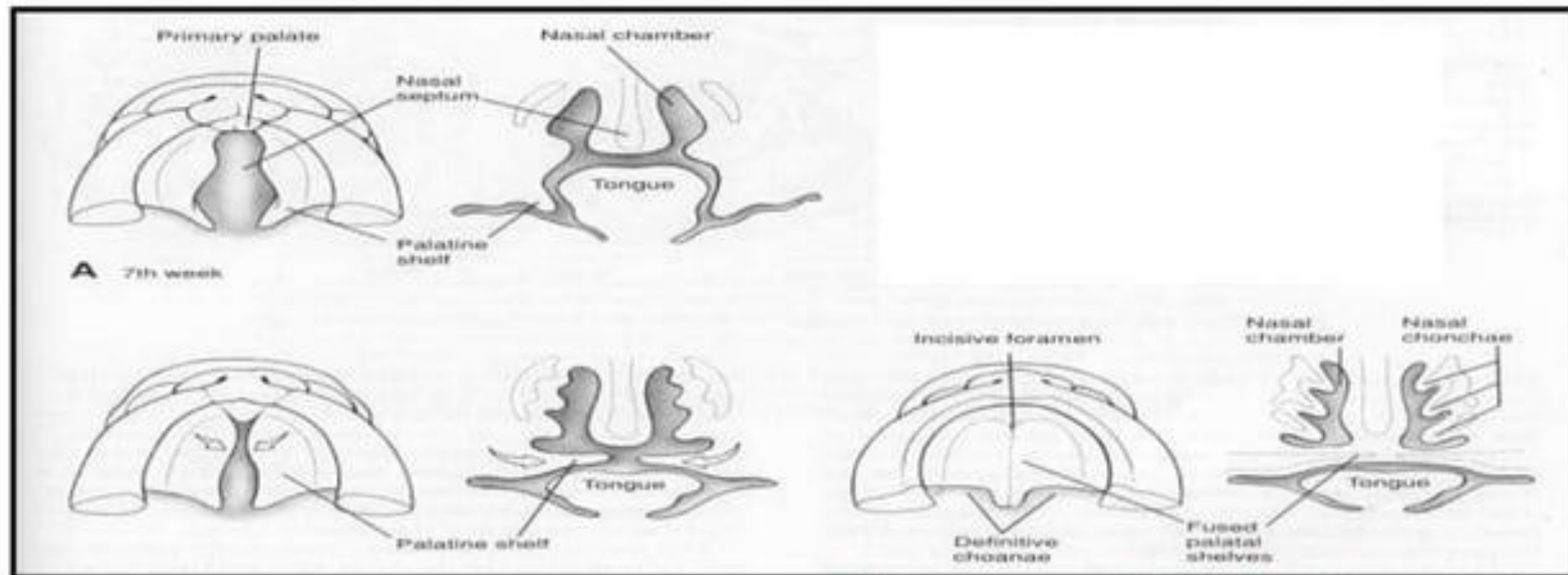
6<sup>th</sup> week

1) As nasal pits of lateral nasal process invaginate and fuse, intermaxillary process extends to form primary palate



## 8<sup>th</sup> - 9<sup>th</sup> week

- 2) Medial walls of maxillary processes produce palatine shelves
- 3) Shelves grow downwards, parallel to lateral surface of tongue
- 4) End of week 9, rotate upward into a horizontal position and fuse with each other and primary palate to form secondary palate



# Epidemiology

- The second most common congenital anomaly
- Affects 1 in 750 births
- The incidence of cleft lip/palate varies among different populations
  - The most common in asians (1:500)
  - In whites (1:750)
  - The lowest in blacks (1:1000 or less)
- Cleft lip more often in boys (left side)
- Isolated cleft palate more often in girls
- Young mothers are less risky

# Distribution (Fogh-Anderson, 1942)

Cleft Lip % 25

Cleft and palate  
%50

Cleft palate  
% 25

Dr. Nikitha Sree,  
K

# ETIOLOGY (Multifactorial)

- Genetic factors (% 25-40)



- Environmental factors (% 60-75)

# Genetic Factors

- First child has anomaly
  - Probability of second child  
% 4
  - Probability of third child  
% 10
- Two children have anomaly
  - Probability of third child  
% 20
- Mother or Father has anomaly
  - Probability of first child  
% 5
- Both mother and father have anomaly
  - Probability of first child  
% 25

# Environmental factors

- Mothers sickness during first trimester (viral infections)
- Chronic diseases ( Diabetes Mellitus etc.)
- Drugs (excessive use of antibiotics, steroids and insulin,antiepileptic drugs)
- Smoking
- Aspirin
- X Rays

Dr. Nikhil S. S. S.  
K

# CLASSIFICATION

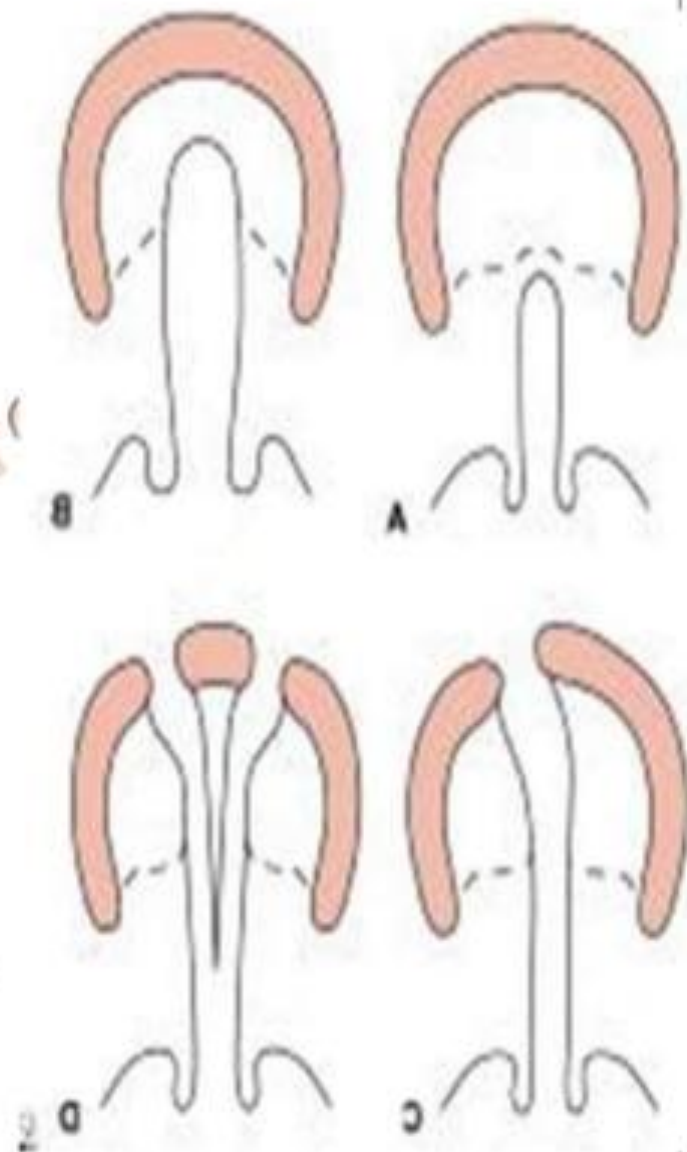
## DAVIS AND RITCHIE CLASSIFICATION (1922)

Based on position of the cleft in relation to the alveolar process:

- Group I- Prealveolar clefts – (unilateral,bilateral,median)
- Group II- Postalveolar clefts
- Group III- Complete alveolar clefts (unilateral,bilateral,median)

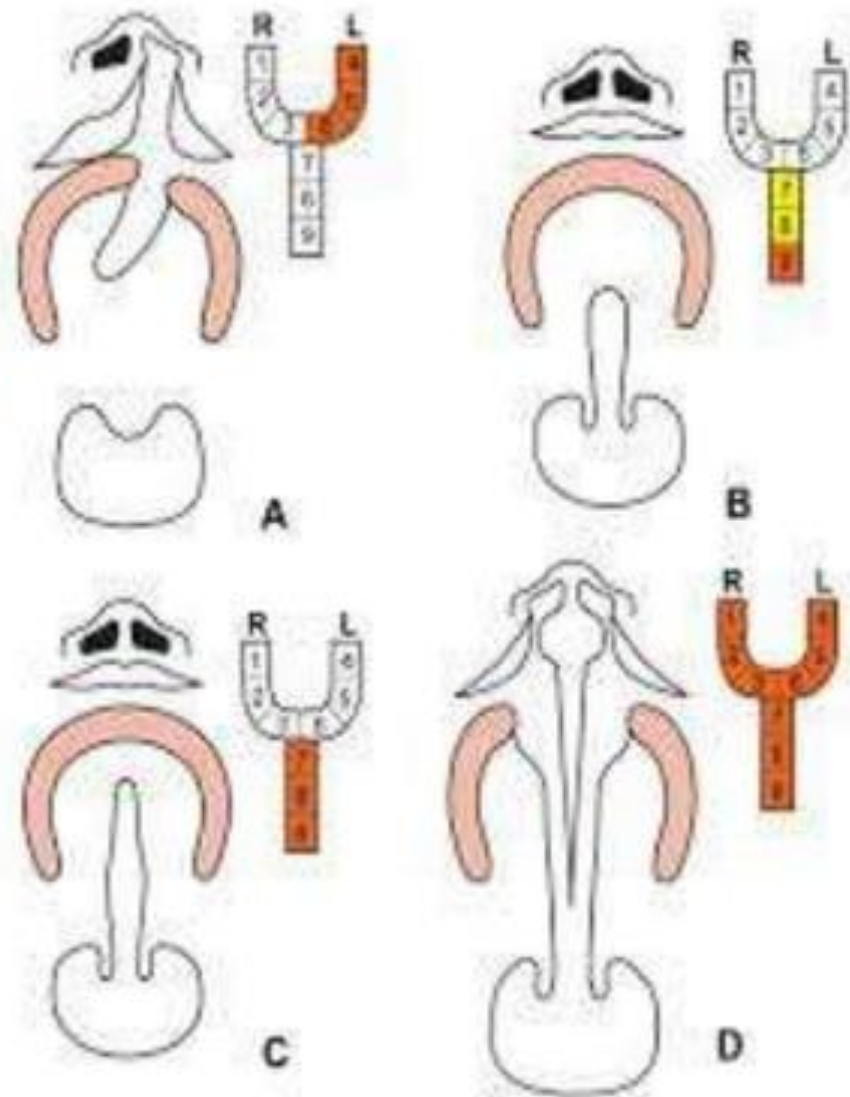
## VEAU CLASSIFICATION (1931)

- **Group I:** Cleft of the soft palate only
- **Group II:** Cleft of soft and hard palate
- **Group III:** Complete unilateral cleft, extending from uvula to incisive foramen and then deviates to one side extending through the alveolus
- **Group IV:** Complete bilateral alveolar cleft



# Kernahan and Stark symbolic classification

- Areas 1 and 4 – Lip
- Areas 2 and 5 – Alveolus
- Areas 3 and 6 – Palate between the alveolus and the incisive foramen
- Areas 7 and 8 – Hard palate
- Area 9 – Soft palate



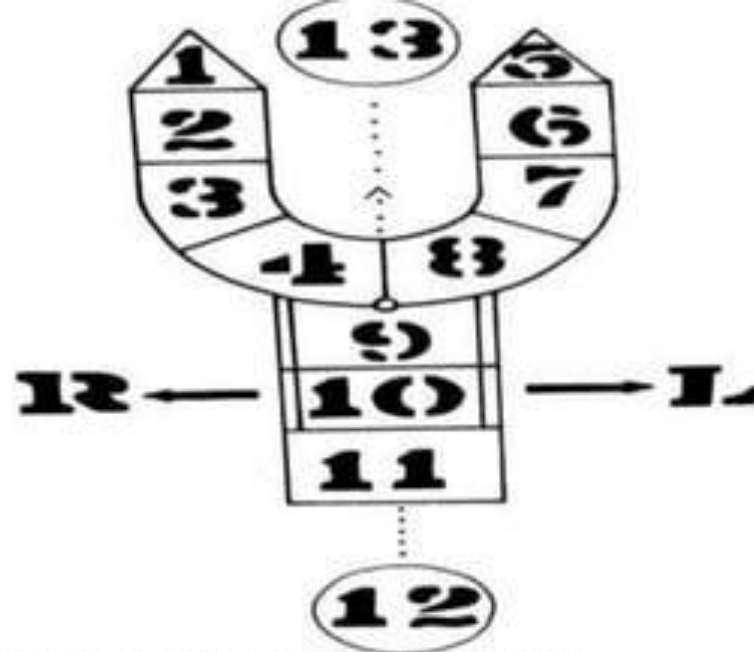
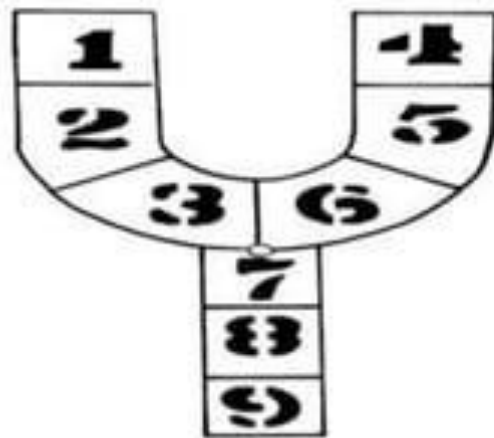


FIGURE 1. Left: The Striped Y; Right: The modified Striped Y.

1 & 5 - Floor of nose on right & left sides

2 & 6 - Lip

3 & 7 - Alveolar ridges

4 & 8 - Premaxilla to incisive foramen

9 & 10 - Each half of the hard palate

11 - Soft palate

12 - Congenital velopharyngeal incompetence without obvious clefts

13 - Protrusion of premaxilla

# Problems in Cleft Lip and Cleft Palate

- Feeding
- Speech problems
- Frequent upper respiratory tract infection
- Otitis media
- Nasal regurgitation of food
- Aspiration pneumonia
- Growth retardation
- Dental problems
- Psychological problems (family)

# Dental problems

- Congenitally absent teeth
- Supernumerary teeth
- Narrow maxillary arch
- Crowding
- Hypomineralisation
- Eruption at the cleft margin
- pseudoprognathism



# MANAGEMENT

## Multidisciplinary team approach

### Cleft lip and palate team



# Surgical correction of orofacial clefts

- Lip adhesion- 1 month
- Definitive lip repair- 4-6 weeks
- Cleft palate repair- 12-24 months
- Alveolar grafting- 8-11 years
- Orthognathic surgery + cleft nose repair- 17-18 years
- Final prosthodontics- 17-19 years

# Lip repair

- **Timing of lip surgery**
- **Millard's Rule of 10**
  - 10 weeks of age**
  - 10 gm of Hb**
  - 10 pounds of weight**
- **Recently- 4-6 weeks**

Dr. Nikitha Sree,  
K

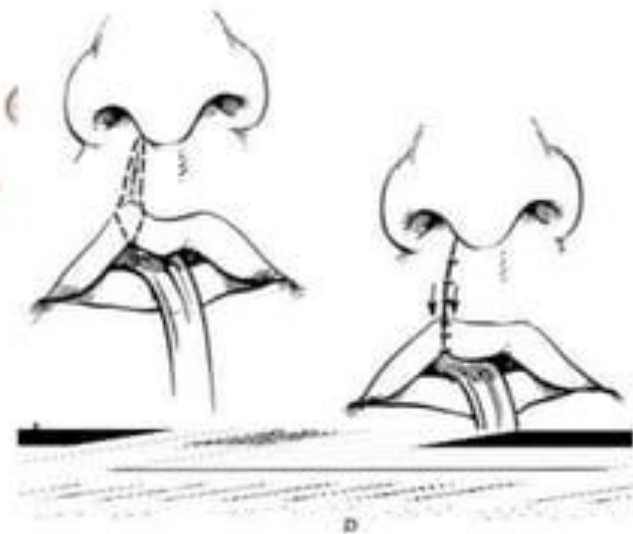
# Lip adhesion procedure

- Done at the age of one month old
- Only the cleft lip margins were sutured without involving muscular component.
- Re modelling of maxilla take place and assist in feeding.
- Additional surgical procedure is needed.



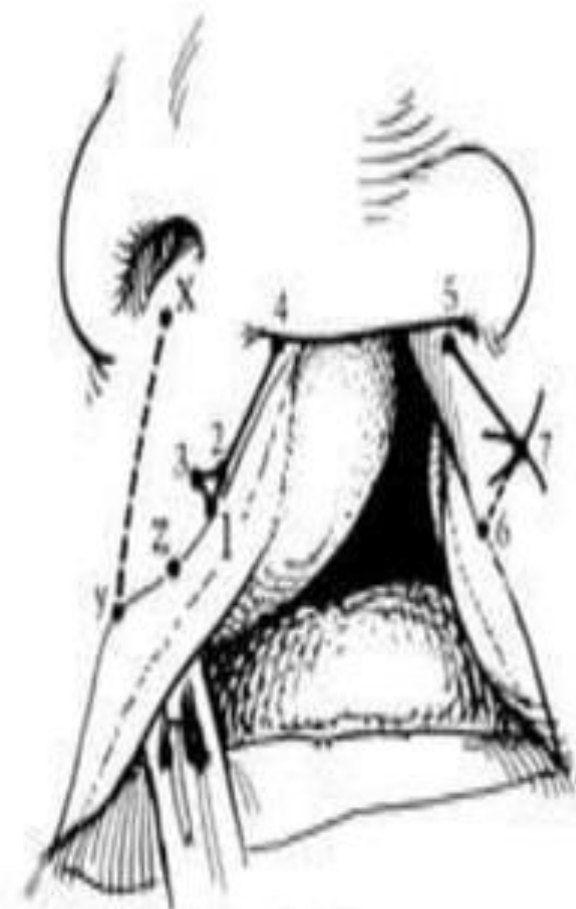
# Rose-Thompson operation or straight line repair

- Edges of cleft are excised and approximated in a figure of eight sutures.
- Rose used curved incisions with concavities and Thompson used straight incisions running obliquely across the lip to gain length.
- Indicated in incomplete and narrow clefts.



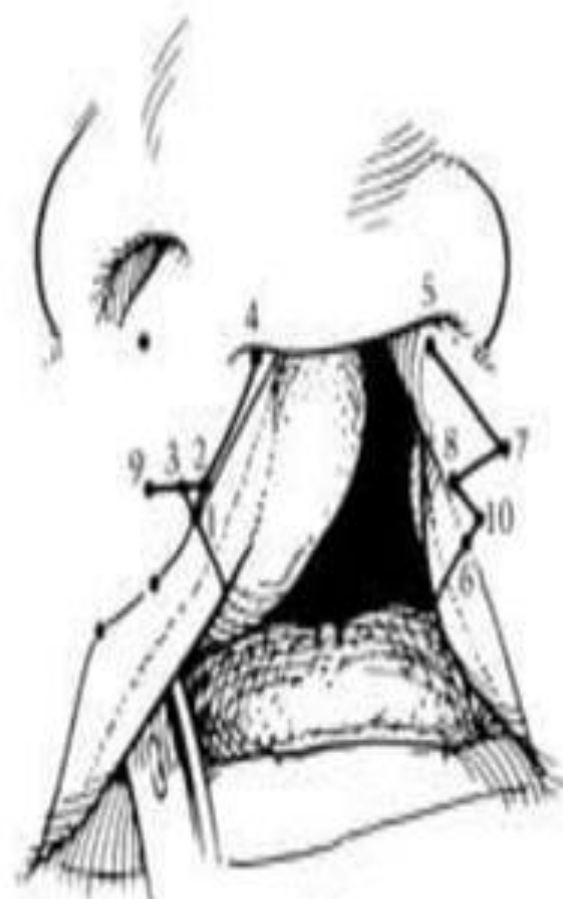
# Tennison triangular flap

- Tennison in 1952 used the height of the normal side of the lip for estimating the repaired side.
- A wire bent into a Z shape, the two sides were marked to give a method of measurement that is simple, preserves the cupid bow and gives a zig zag scar, which helps to hide the scar.
- A cut is made to correct the upward tilt of cupid's bow on the lower one third of the lip, the gap is later filled with a triangle of skin, muscle and mucosal flap from the lower end of lateral lip element



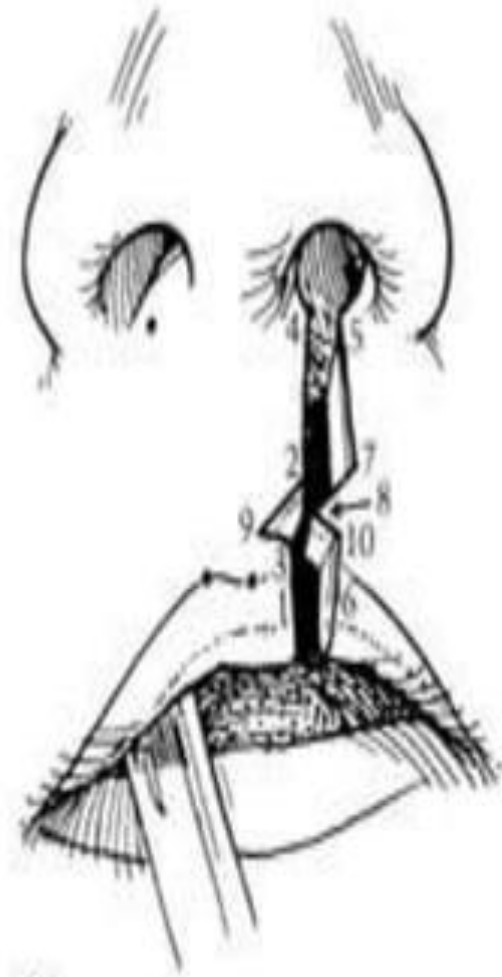
1-2 = 1 mm  
 1-2-3 =  $\Delta$   
 5-7 = 4-2  
 6-7 =  $\times 4$   
 minus 4-2  
 minus 1 mm

A



7-8 = 2-9  
 6-10 = 1 mm  
 8-10 = 3-9

B



C

- **Advantages**

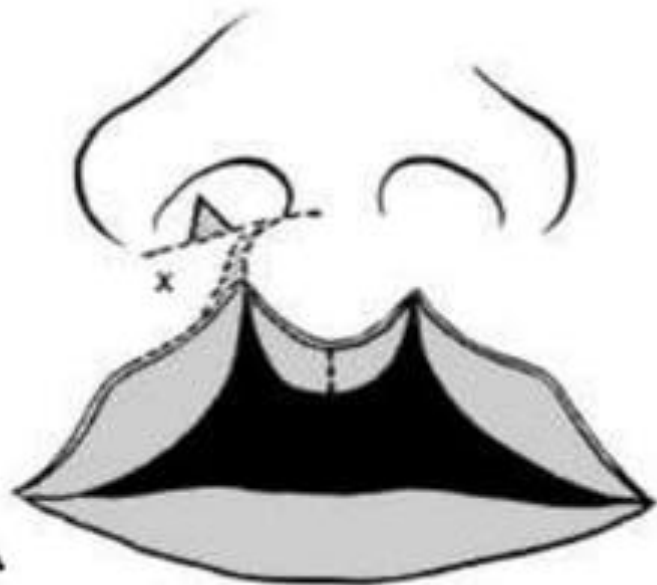
- Cupid's bow is brought from its angulated, upright position to a level one.
- The added tissue on medial side gives a natural protrusion in this area.
- The zig zag scar hides the line from the vermilion to the nasal floor.

- **Disadvantages**

- Philtral column is not restored
- May produce a lip that is too long.

## Millard rotation advancement repair

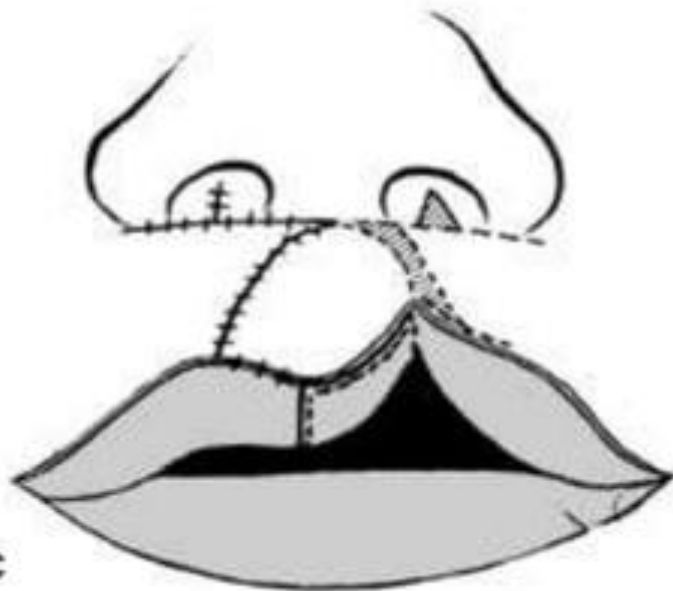
- Used in complete, incomplete and wide cleft lip repairs.
- In this repair, the tilted cupid's bow is rotated down following a curved incision extending under the columella. The high rotation gap created will be filled with a triangular flap comprising skin, muscle and mucosa.
- The resultant scar is hidden under the nose and follows the line of philtrum.



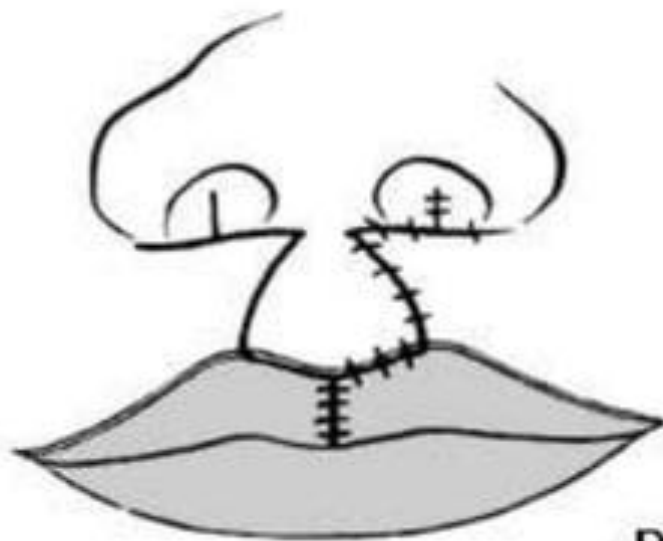
A



B



C



D

## • **Advantages**

- The resultant scar follows natural lines in the lower half of the lip and provides a scar that is simple to revise.
- Preserves cupid's bow and philtral dimple.
- Preserves pleasing outward pointing of the lower portion of the lip.

## • **Disadvantages**

- Difficult to get adequate rotation and optimal lateral flap in wide cleft lip.

# Palate repair

- The hard palate is supported by bony shelves with mucosal coverings, while the soft palate consists of muscle with mucosal covering.

- **TIMING OF REPAIR**

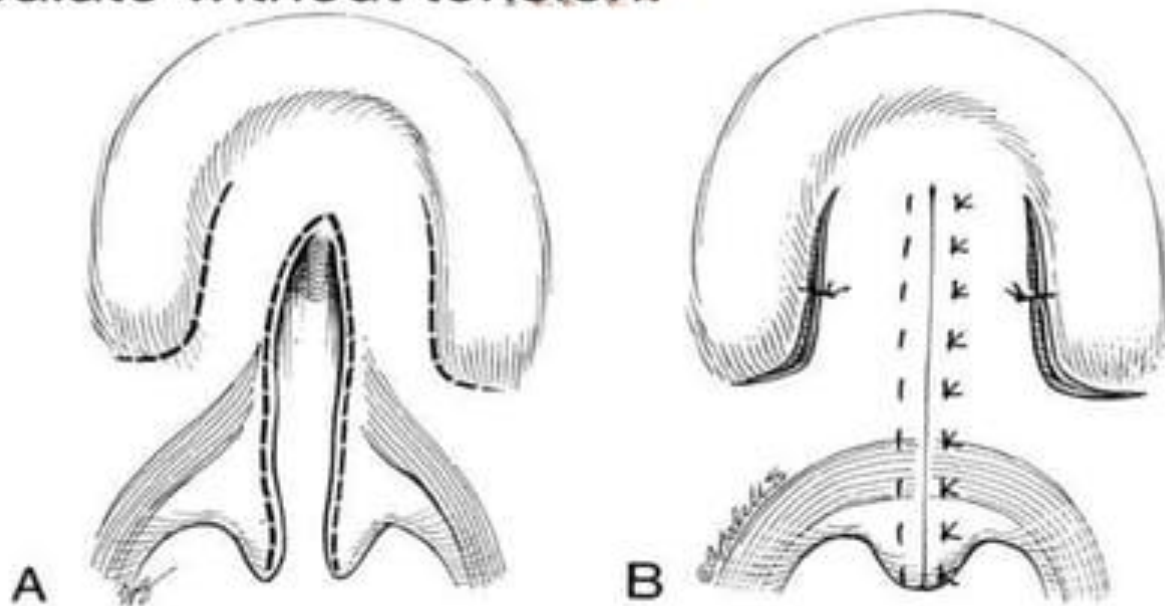
Most surgeons close the soft and hard palate as early as 6 – 9 months of age and almost always before 18 months of age.

# Primary veloplasty

- Introduced by Schweekendick
- Soft palate is closed at an early stage(6-12 months) and hard palate is closed few years later.
- Principle behind this technique is that soft palate aids in speech and essential to be closed early for velopharyngeal mechanism.
- But it seen to cause severe speech problem due to scarring and shortening of soft palate. So it is rarely indicated.

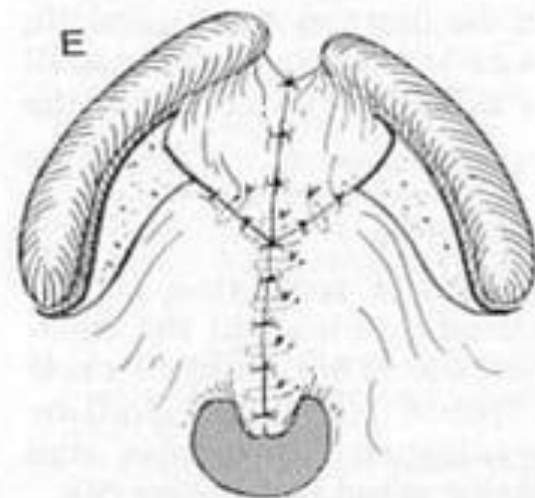
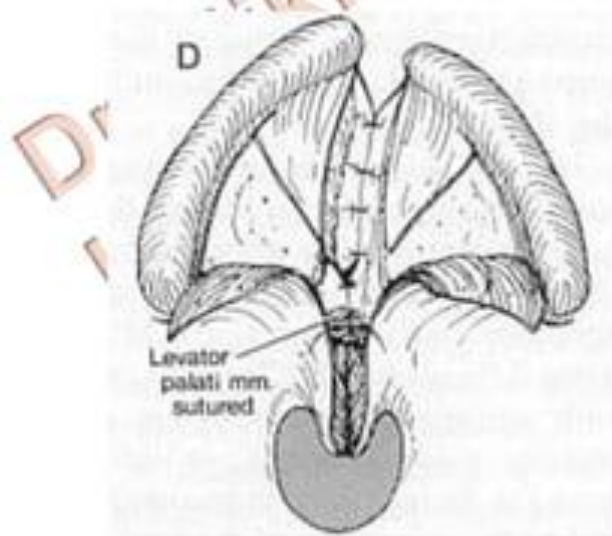
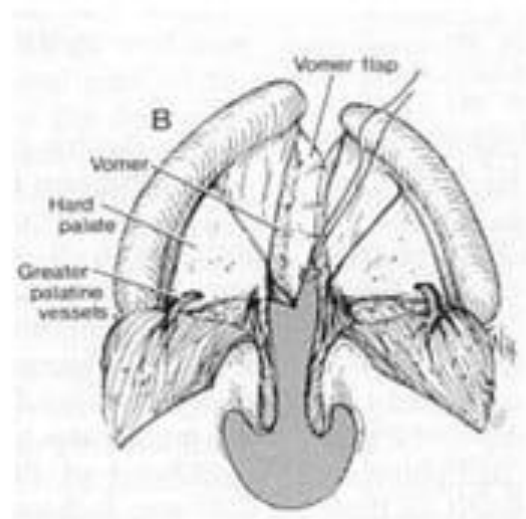
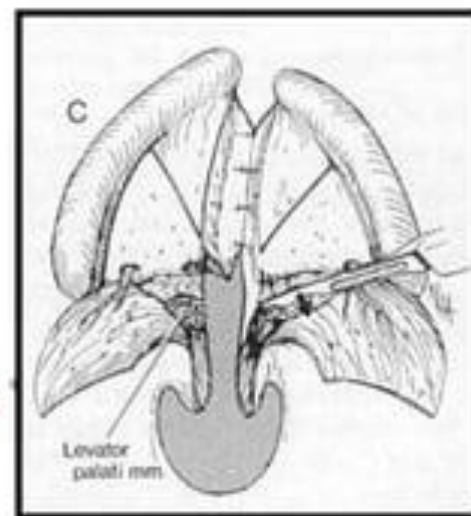
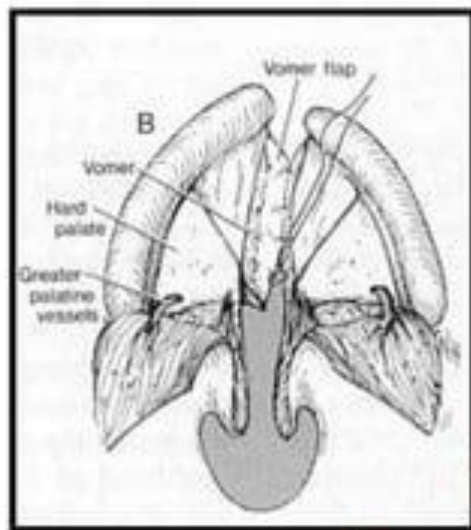
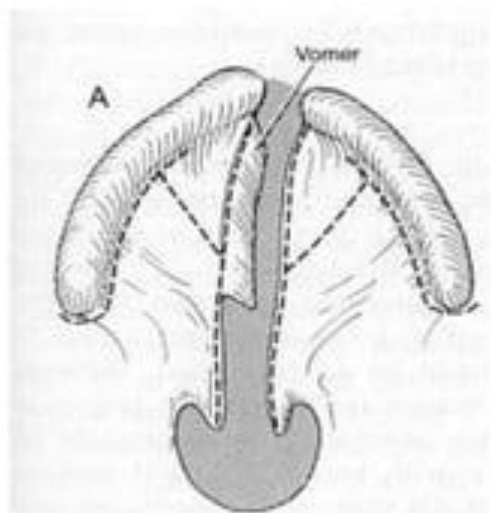
# Von Langenbeck's palatoplasty

- It is a side to side approximation of the cleft margins of both the hard and soft palate, with detachment of the levator muscles from their bony insertions and use of long relaxing incisions laterally to close the hard palate without tension.



# Wardill –kilner- V-Y Palatoplasty

- An incision is placed to enable v-y closure.
- This includes lateral relaxing incision and bilateral island flaps based on the posterior palatine arteries.
- Soft palate is also incised along the margins and oral and nasal layers are separated.
- Nasal layers are sutured and soft palate is closed in 3 layers.
- Lengthens palate and better velopharyngeal seal, which allows better speech.



# Alveolar Grafting

- Placement of bone graft during the eruption of permanent canine(8-11 years)
- Bone harvested is mainly from cancellous bone of iliac crest, and packed tightly in to the defect.

Dr. Nikitha Sree  
K

# Orthognathic surgery

- Facial deformity is corrected at the age of 17-18 years, after the growth completion.
- Maxillary advancement by orthognathic surgery or by distraction osteogenesis.
- Mandibular retrusion may also be done

Dr. Nirajita S.P.E.  
K

# Cleft nose repair

- Cleft nose requires correction and rhinoplasty at a much later stage of growth of the patient

# Final prosthodontics

- From 17-19 years, final implant placement for the missing lateral incisors may be done.

# Reference

- Textbook of Oral and Maxillofacial Surgery- Chitra Chakravarthy
- Textbook of Oral and Maxillofacial and Surgery- Neelima Anil Malik

Dr. Nikitha Sree  
K

Thank you

Dr. Nilaksha Sree,  
K