Embryological Development of the Face

- Lip and palate development: 5.5 weeks to 12 weeks
- Prepalate separate embryological development from palatal in time and process
- Prepalate 4-8 weeks; palate 8 - 12 weeks
- Facial development result of **merging** and **fusion** of 5 facial processes

Underlying Mechanisms

- Idea of processes as growth center
- Based on proliferation of mesoderm underneath ectoderm
- Grooves visible on surface “smoothed out” by underlying growth
- Implication: prepalatal clefts not a normal feature of development
- Palate - true “fusion” process

Modes of Joining

- **Merging** = superficial depressions/grooves are “smoothed out” by underlying tissue proliferation
- **Fusion** - breakdown of epithelial covering of adjacent structures: grow together

Merging vs. Fusion

Face-week 3-4

- Very early formation
- Frontal process
- Primitive mouth
- Paired mandibular processes
- Note: potential for chin dimple

Face 5th week

- Formation of nasal pits
- Pits define lateral and medial nasal processes
- Beginning eye formation
- Maxillary process lateral to mouth

Nasal pits

- Begin as ectodermal thickening (nasal placodes)
- Deepen into pits 2ndary to proliferation of mesoderm
- Contact ectoderm of roof of mouth
- Breakdown of tissue results in continuity of nasal and oral cavity, formation of nasal septum/vomer, premaxilla

Eye formation

- Begin as optic cups on lateral aspect of head
- “Migrate” to front of face
- Migration 2ndary to underlying mesodermal proliferation
- Developmental sequence basis for hypo/hypertelorism
9  Face-6th week
   - Maxillary processes grow toward midline
   - Join: lateral and medial nasal processes
   - Lateral nasal & maxillary processes form ala
   - Medial and maxillary = middle upper lip and premaxilla

10  Face-7th week
    - Joined medial nasal processes = midportion of lip (philtrum), alveolus, premaxilla
    - Joined medial nasal and maxillary = philtral ridge
    - Failure = cleft

11  Review
12  Review
13  Review
14  Prepalatal clefts
   - Failure of maxillary process on the affected side to merge with medial nasal elevations
   - Mesodermal masses do not “push out” overlying ectoderm/epithelium
   - Epithelium in labial groove stretched and breakdown
   - Results in persistent groove
   - Simonart's band - thin residual tissue

15  5 week embryo - normal
16  6 week embryo
17  7 week embryo
18  10th week
19  Palate
   1. Palatal shelves grow medially and inferiorly from maxillary process, week 8
      - Form 2/3 hp (anterior 1/3-premaxilla) and sp
      - Initial vertical orientation
      - 69 week, tongue drops down
   2. Shelves move horizontally
      - Approximate
      - Fuse in craniocaudal sequence
      - True fusion process
      - Complete by 12th week
      - Epithelial pearls

20  Palate Formation - Late
21  Palatal Clefts
   - Result from failure of shelves to meet and fuse with each other, nasal septum and premaxilla

22  Pathogenesis
• what can go wrong?
• Cellular level
• Structural level