Etiology of Orthodontic Problems Part II

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In the Name of Allah

the Compassionate the Merciful

Goals

- Leisure
- Get energy for the week
- Think differently

- Bring a new insight for the next session

Classification

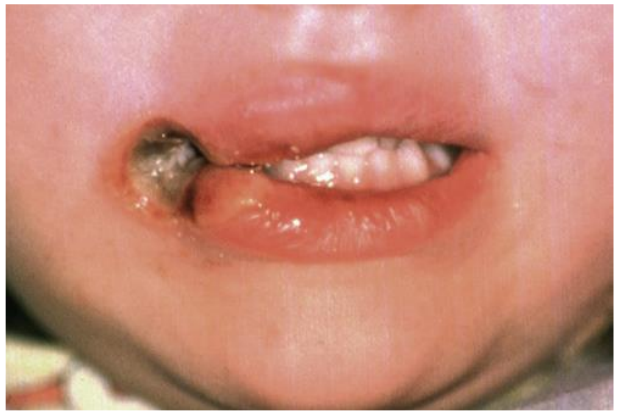
- Specific
  - Embryologic development
  - Fetal and Perinatal
  - Progressive in childhood
  - Adolescence and early Adult
  - Dental Development
- Genetic
- Environmental
  - Equilibrium
  - Masication
    - Function and dental arch size
    - Biting force and eruption
  - Habits (sucking, etc.)
  - Tongue thrusting
  - Respiratory pattern

Environmental factors

- During growth and development
- A relationship between anatomic form and physiologic function….genetic
- Heavy work…stronger muscle

Equilibrium consideration

- PDL &Alveolar bone
  - Heavy, short duration (mastication)
    - PDL fluid …. shock absorber
    - Alv. bone bends
  - Light, long lasting (6hs/D)
    - Tooth movement



- Mastication vs rest
- Alteration of skeleton…mandible…muscles
- Heavy work…density of facial skeleton

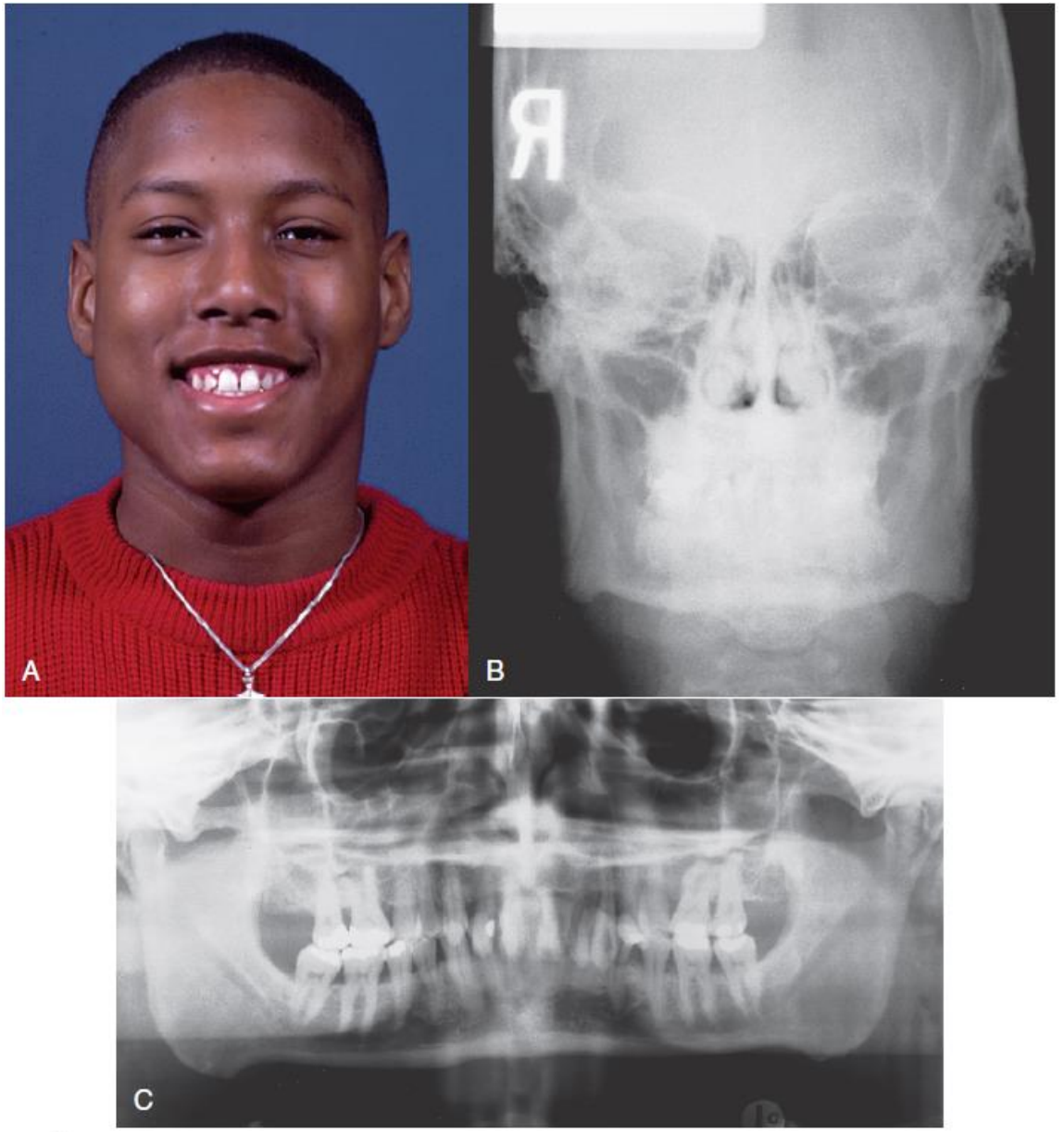
Magnitude & duration of force

Possible Equilibrium Influence	Force Magnitude	Force Duration
Tooth Contacts		
Mastication	Very heavy	Very short
Swallowing	Light	Very short
Soft Tissue Pressures of Lip, Cheek, and Tongue		
Swallowing	Moderate	Short
Speaking	Light	Very short
Resting	Very light	Long
External Pressures		
Habits	Moderate	Variable
Orthodontics	Moderate	Variable
Intrinsic Pressures		
PDL fibers	Light	Long
Gingival fibers	Variable	Long

PDL, Periodontal ligament.

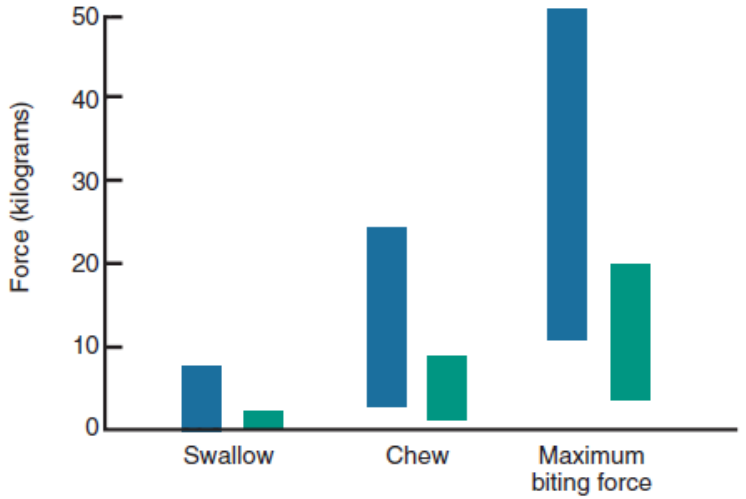
Masticatory function

- Function and dental arch size
- Disease of civilization
- Animal studies

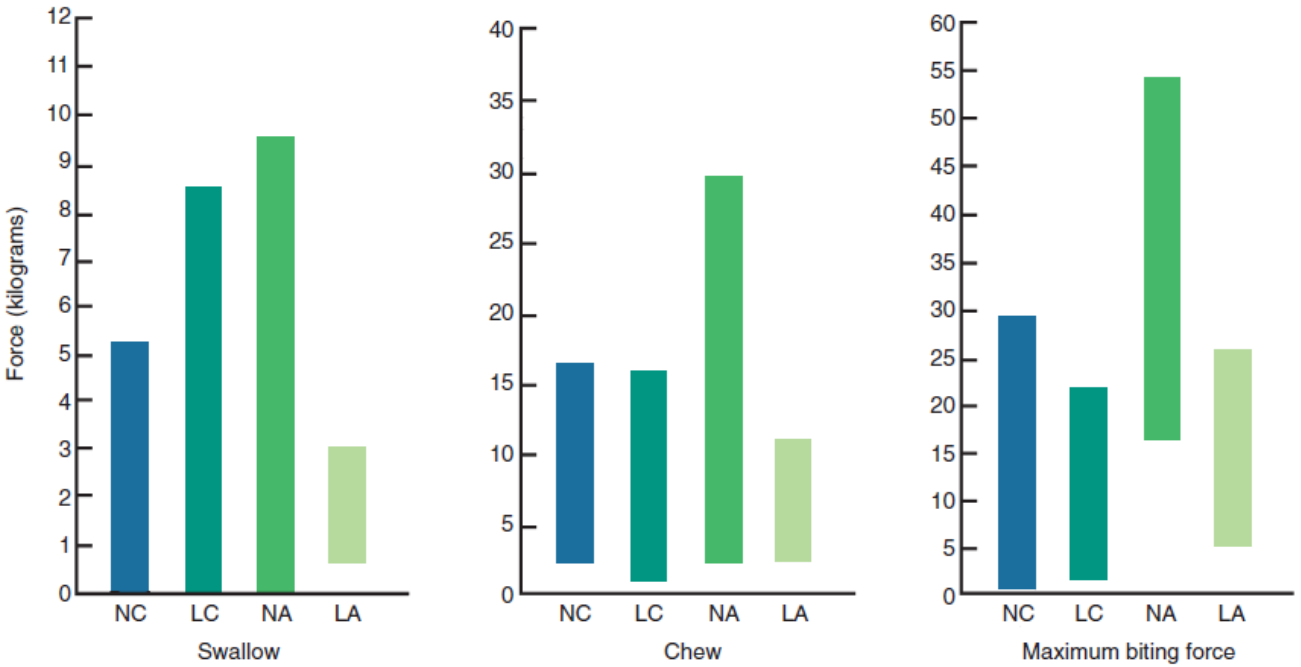


• **Fig. 5.30** Hypertrophy of the masseter muscles leads to excessive bone formation at the angles of the mandible, as would be expected in a bony area that responds to muscle attachment. Note the unusual fullness of the masseteric area, especially on the right side, in the frontal view of the face (A). Bony enlargement at the gonial angles, especially on the right, can be seen in a P-A cephalogram (B) and a panoramic radiograph (C).

Biting force and eruption

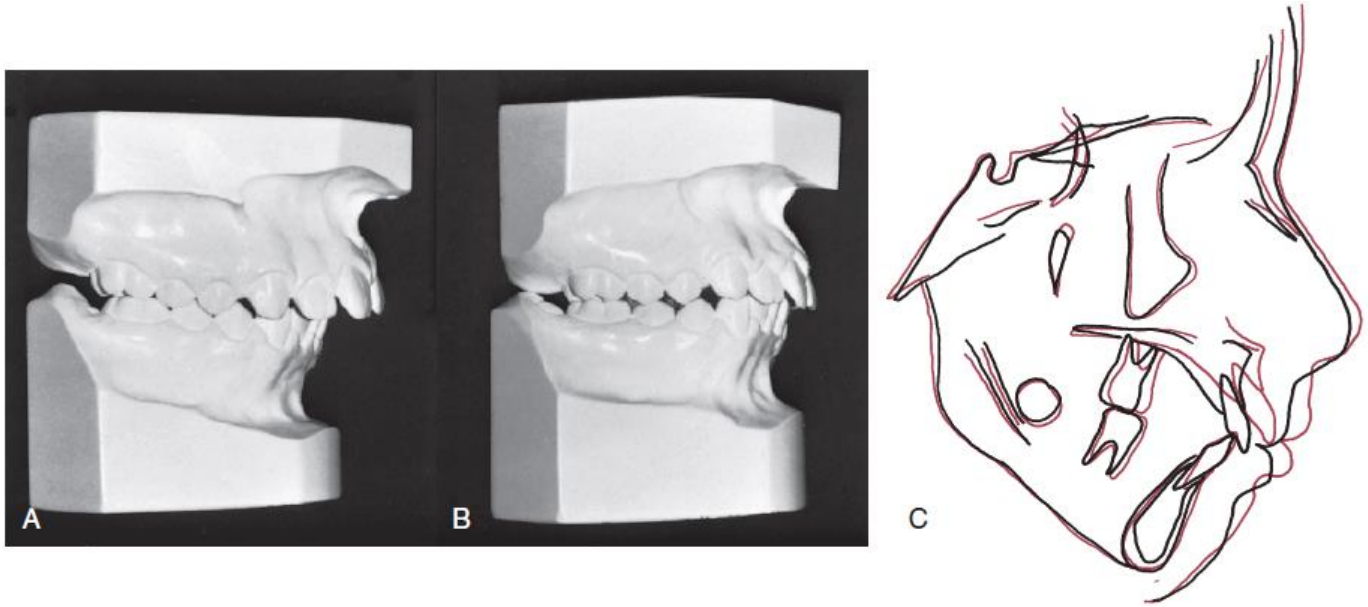


• **Fig. 5.31** Comparison of occlusal force for swallowing, simulated chewing, and maximum effort at 2.5 mm of molar separation in normal face *(blue)* and long face *(green)* adults. Note that the normal subjects have much greater occlusal force during swallowing and chewing as well as at maximum effort. The differences are highly significant statistically. (From Proffit WR, Fields HW, Nixon WL. *J Dent Res.* 1983;62:566–571.)



• **Fig. 5.32** Comparison of occlusal forces in normal-face children *(NC, blue),* long-face children *(LC, aqua),* normal-face adults *(NA, green),* and long-face adults *(LA, light green).* Values for both groups of children and the long-face adults are similar; values for normal adults are significantly higher than for any of the other three groups. The implication is that the differences in occlusal force in adults result from failure of the long-face group to gain strength during adolescence, not to the long condition itself. (From Proffit WR, Fields HW, Nixon WL. *J Dent Res.* 1983;62:566–571.)

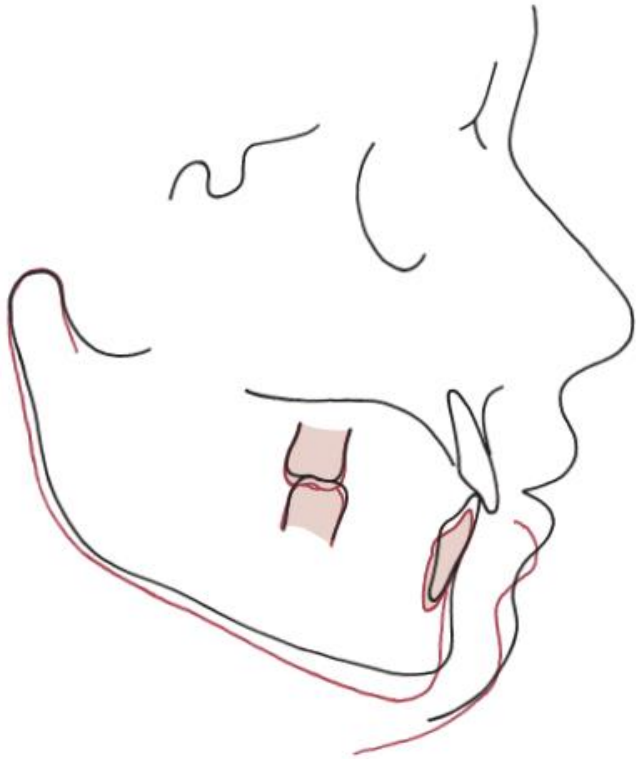
Sucking and other habits



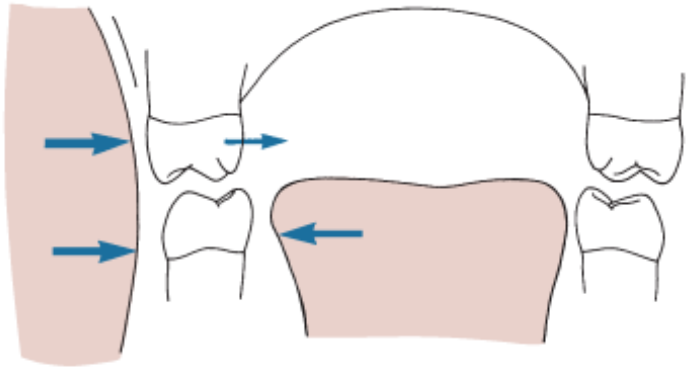
• **Fig. 5.33** In this pair of identical twins, one sucked her thumb up to the time of orthodontic records at age 11 and the other did not. (A) Occlusal relationships in the thumb-sucking girl and (B) her non–thumb-sucking twin. Note the increased overjet and forward displacement of the dentition of the thumb-sucker. (C) Cephalometric tracings of the two girls superimposed on the cranial base of the two girls. As one would expect with identical twins, the cranial base morphology is nearly identical. Note the forward displacement of not only the maxillary dentition but also the maxilla itself. (Courtesy Dr. T. Wallen.)

• **Fig. 5.34** A child sucking the thumb usually places it against the roof of the mouth, causing pressure that pushes the lower incisors lingually and the upper incisors labially. In addition, the jaw is positioned downward, providing additional opportunity for posterior teeth to erupt, and cheek pressure is increased while the tongue is lowered vertically away from the maxillary posterior teeth, altering the equilibrium that controls width dimensions. If the thumb is placed on one side instead of in the midline, the symmetry of the arch may be affected.

Sucking and oral habits



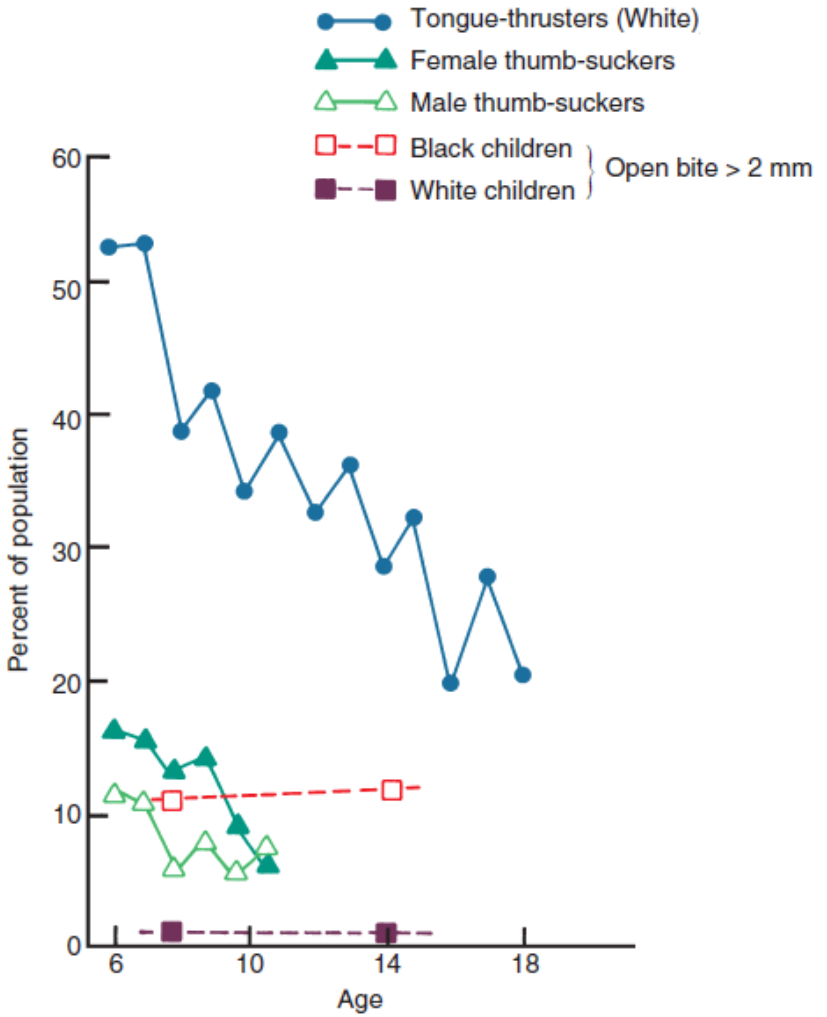
• **Fig. 5.35** Cephalometric tracing showing the effects of posterior eruption on the extent of anterior opening. The only difference between the red and black tracings is that the first molars have been elongated 2 mm in the red tracing. Note that the result is 4 mm of separation of the incisors because of the geometry of the jaw.



• **Fig. 5.36** Diagrammatic representation of soft tissue pressures in the molar region in a child with a sucking habit. As the tongue is lowered and the cheeks contract during sucking, the pressure balance against the upper teeth is altered, and the upper but not the lower molars are displaced lingually.

Tongue thrusting

• **Fig. 5.37** The typical appearance of a "tongue thrust swallow" with the lip pulled back. Note the tongue tip between the incisors protruding forward toward contact with the elevated lower lip.



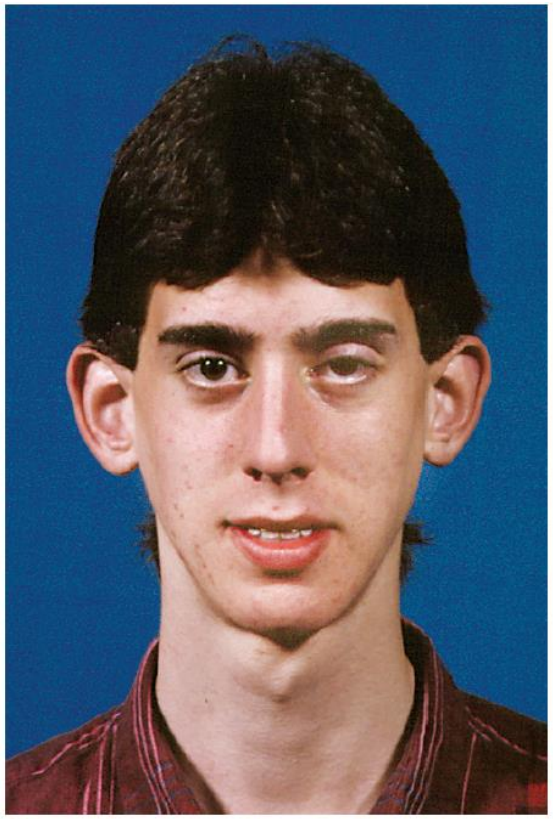
• **Fig. 5.38** Prevalence of anterior open bite, thumb-sucking, and tongue thrust swallowing as a function of age. Open bite occurs much more frequently in blacks than in whites. Note that the prevalence of anterior open bite at any age is only a small fraction of the prevalence of tongue thrust swallowing and is also less than the prevalence of thumb-sucking. (Data from Fletcher SG, Casteel RL, Bradley DP. *J Speech Hear Disord.* 1961;26:201–208; Kelly JE, et al. DHEW Pub No [HRA] 1977;77–144.)

Tongue thrusting cont’d

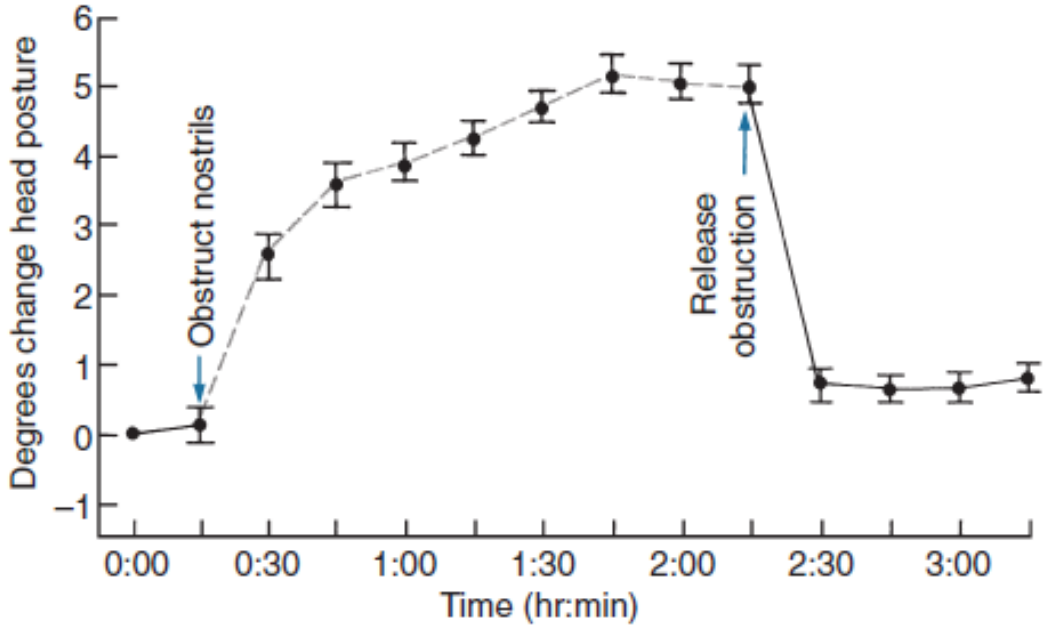
- Adult swallow…..3 ys/o, 6 ys/o
- 10-15% retained
- Brain damage….truly infantile swallowing

- Classic tongue thrust swallow (transition) ….. Young children
  - Protrusion of tongue tip sooner than coordinated movement of
    - Post tongue
    - Elevation of mand.
  - Sucking habit superimposition….delay in transition

Respiratory pattern



• **Fig. 5.39** The classic adenoid facies, characterized by narrow width dimensions, protruding teeth, and lips separated at rest, has often been attributed to mouth breathing because of enlarged adenoids. Because it is perfectly possible to breathe through the nose with the lips separated, simply by creating an oral seal posteriorly with the soft palate, the facial appearance is not diagnostic of the respiratory mode. On careful study, many patients with this facial type are found not to be obligatory mouth breathers.

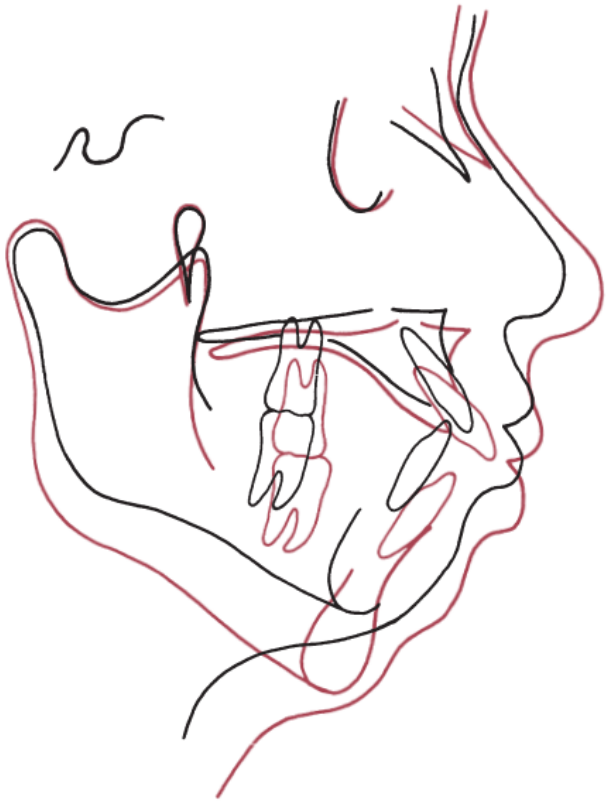


• **Fig. 5.40** Data from an experiment with dental students, showing the immediate change in head posture when the nostrils are totally blocked: The head tips back about 5 degrees, increasing the separation of the jaws. When the obstruction is relieved, head posture returns to its original position. (From Vig PS, Showfety KJ, Phillips C. *Am J Orthod.* 1980;77:258–268.)

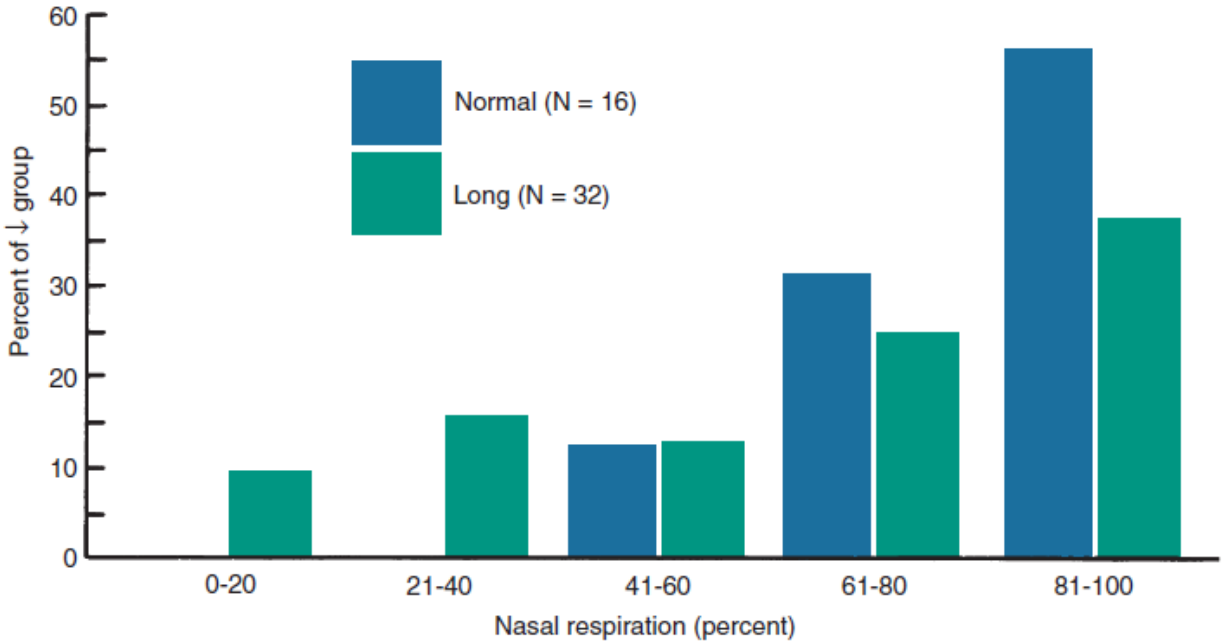
Respiratory pattern cont’d

- Ventilatory exchange
  - 40-45 L/min ….. Transition to partial oral breathing
    - Deep concentration
    - Normal convesation
  - ≥80 L/min …… half is obtained through mouth
    - maximum effort
  - 20-25 L/min …… at rest
    - Full nasal breathing, partial mouth breathing (resistance 3.5-4 CmH2O/L/min)
- common cold vs Chronic respiratory obstruction

Respiratory pattern cont’d



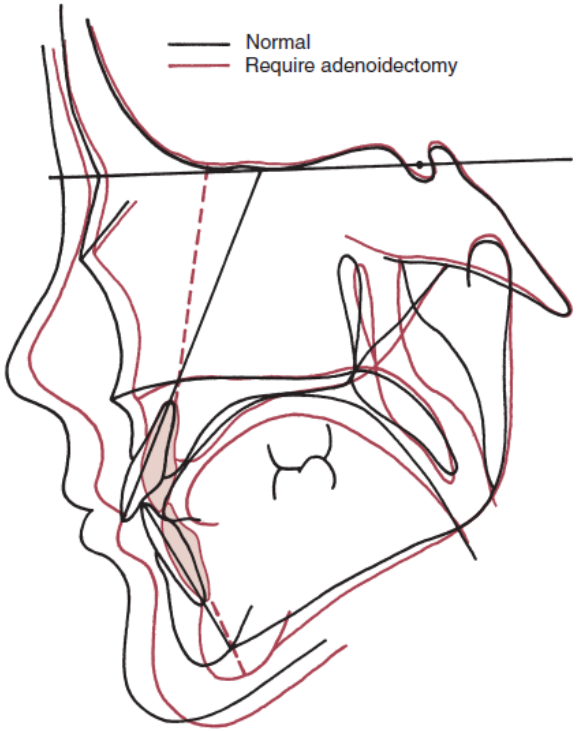
• **Fig. 5.41** Cephalometric superimposition showing the effect of total nasal obstruction produced by a pharyngeal flap operation (for cleft palate speech) that sealed off the nose posteriorly. From age 12 *(black)* to 16 *(red)*, the mandible rotated downward and backward as the patient experienced considerable growth. (Redrawn from McNamara JA. *Angle Orthod.* 1981;51:269–300.)



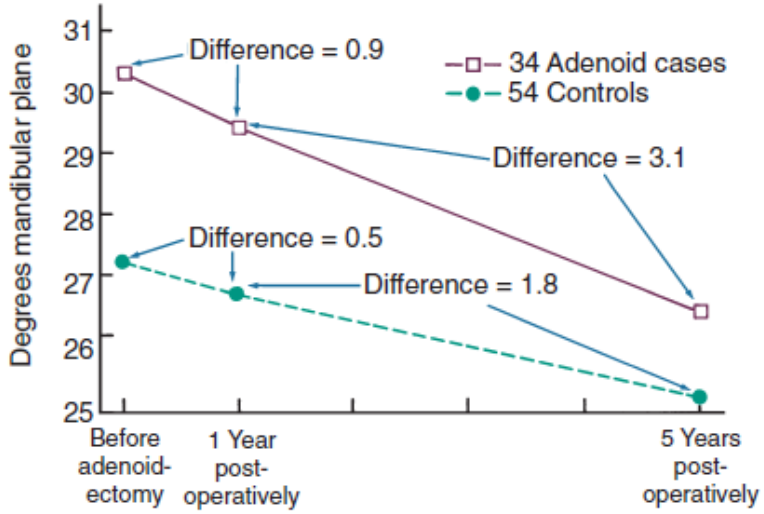
• **Fig. 5.42** Comparison of the percentage of nasal respiration in long-face versus normal-face adolescents. About one-third of the long-face group have less than 50% nasal respiration, whereas none of the normal-face group have such a low nasal percentage, but most of the long-face group are predominantly nasal breathers. The data suggest that impaired nasal respiration may contribute to the development of the long-face condition but is not the sole or even the major cause. (Data redrawn from Fields HW, Warren DW, Black K, et al. *Am J Orthod Dentofac Orthop.* 1991;99:147–154.)

Respiratory pattern cont’d

- Mouth breathing as habit after relieved the obstruction



• **Fig. 5.43** Composite (mean) cephalometric tracings for a group of Swedish children requiring adenoidectomy for medical purposes, compared with a group of normal controls. The adenoidectomy group had statistically significantly greater anterior face height and steeper mandibular plane angles than the controls, but the differences were quantitatively not large. The tracing is oriented with the nose to the left, as it is done routinely in Europe, because it was originally published that way. (From Linder-Aronson S. *Acta Otolaryngol Scand.* 1970;[suppl]:265.)



• **Fig. 5.44** Comparison of mandibular plane angles in a group of post-adenoidectomy children compared with normal controls. Note that the differences existing at the time of adenoidectomy decreased in size but did not totally disappear. (From Linder-Aronson S. In: Cook JT, ed. *Transactions of the Third International Orthodontic Congress.* St. Louis: Mosby; 1975.)

summary

- Etiologic categories
- Characteristics
- importance

Reference

Proffit, 6th edition, Ch.5

Thanks for Your Attention

Any Questions?

For the slide presentation you can visit:

www.drkarandish.ir