Airway Closure

- During the swallow, the pharynx is reconfigured from a respiratory tract to an alimentary tract
- Laryngeal airway can be compromised at any time before, during, or after this alimentary reconfiguration and return to respiration
Airway Protection

- Several components of the swallow that are related to airway protection
  - Laryngeal elevation
  - Glottic closure
  - Supraglottic closure
  - Epiglottic inversion over the airway
Glottic Closure

- Glottic closure is not well-visualized with fluoroscopy
- AP view gives fair impression of true vocal fold and ventricular fold movement toward the mesial plane
- Lateral projection
  - Allows observation of anterior tilting of the arytenoid cartilages
  - Contact of arytenoids to base of epiglottis base during laryngeal elevation
Glottal closure patterns associated with swallowing.

- **Type 1:** The vocal folds are observed to remain in contact along their entire length after laryngeal elevation is initiated. 58%

- **Type 2:** The vocal folds are in contact in the anterior half of their length but slightly separated in the posterior portion, leaving a small gap. 7%

- **Type 3:** The vocal folds are not in contact with each other, leaving a small, elongated triangular opening between the folds. 35%
Patients instructed to “hold your breath”

Optimum laryngeal valving obtained in only 17%.

When instructions were varied
  (i.e., “hold your breath hard”)
  percentage of successful vocal fold approximation increased significantly
Normal Subjects:

- Instruction to perform “relaxed” breath-holding
- resulted in vocal fold closure in only 57%
- “The high variability of laryngeal valving during breath-holding in normal subjects suggests that video nasolaryngoscopy should be undertaken in all patients who are taught the supraglottic swallow”.
Fiberoptic nasendoscopy was used to assess vocal cord adduction.

- 45 normal subjects asked to hold their breath
- 57.7% of normal subjects did not fully close their vocal cords for the complete duration of breath holding.
- implications for the efficacy of teaching methods of the supraglottic safe swallow technique.
Compared

- Supraglottic maneuver (SGM)
- Super supraglottic maneuver (SSGM)
  - Simultaneous MBS and FEES
  - Eight healthy volunteers
- SSGM resulted in:
  - Earlier cricopharyngeal opening
  - Prolonged pharyngeal swallow
  - Laryngeal valving before swallow
  - Change in extent of vertical laryngeal position before swallow.

Hard breath-hold instruction most effective method to attain full laryngeal closure
Breath-Holding

- Request patient to hold his or her breath.
- If laryngeal breath-holding is not observed
  - Ask the patient to
    - “Bear down, as if lifting something heavy.”
    - “Bear down, as if having a bowel movement.”
Case Study

- 50 year old veteran
- Exacerbation of Multiple Sclerosis
- Clinical signs of aspiration with thin liquids