

Normal and impaired swallowing

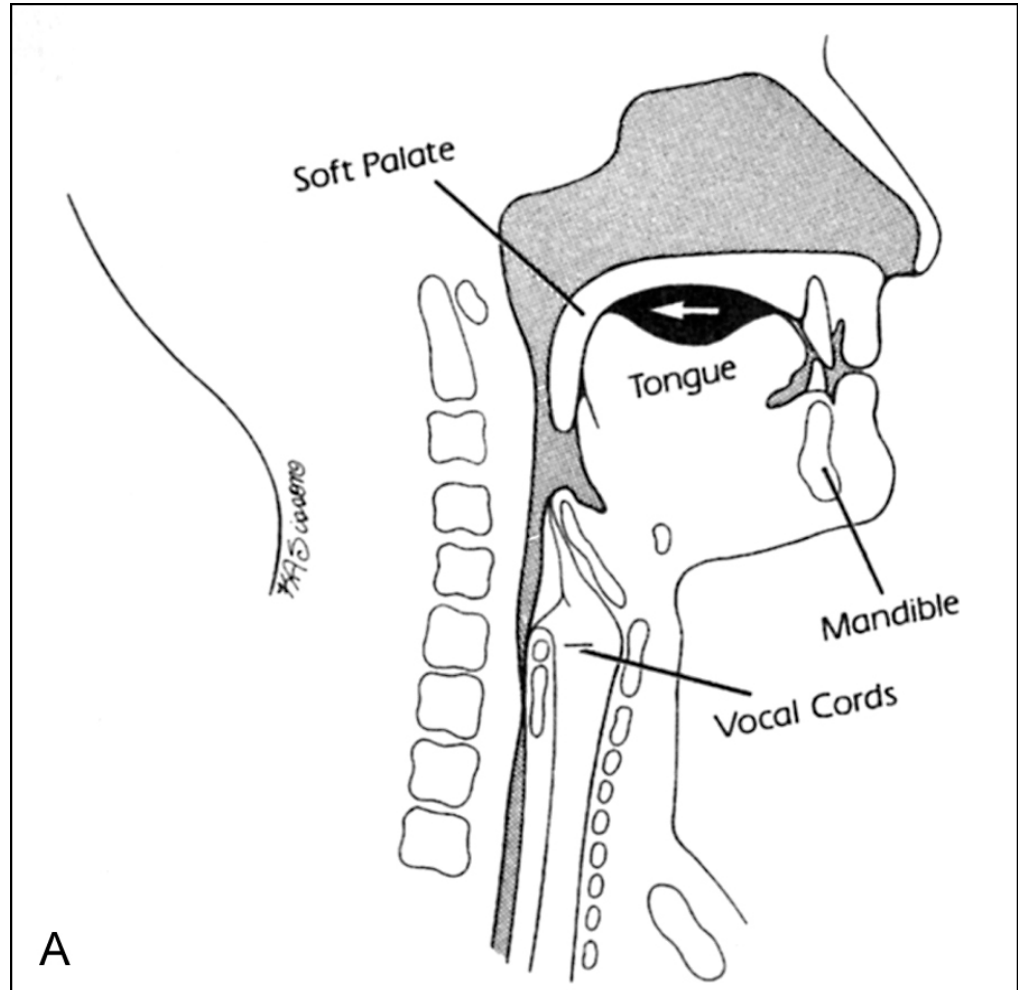
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Swallow physiology

Oral preparatory phase

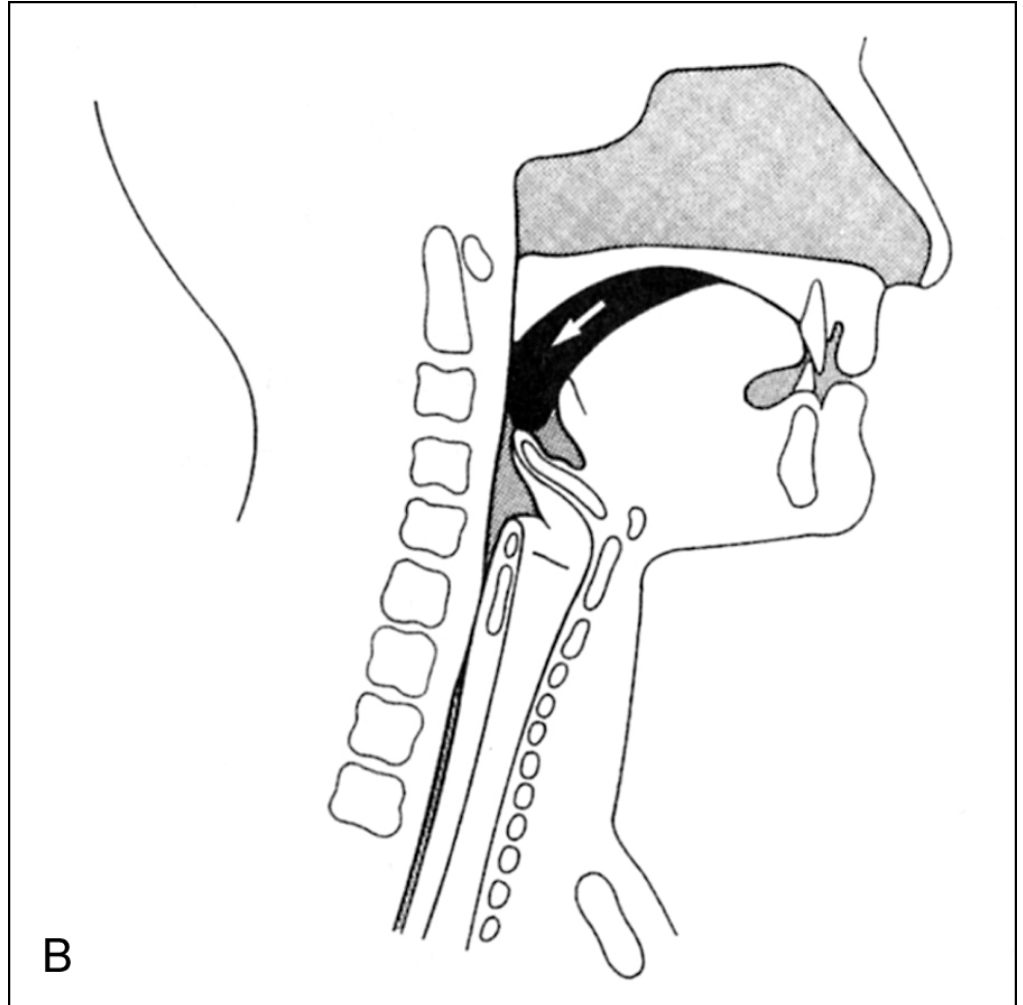
- Food / liquid chewed & formed into a bolus
- Bolus held on centre of tongue
- Lip, jaw, tongue & palate sensory & motor function needed [& dentition]
- **Voluntary task**
- V, VII, IX, X, XII



Swallow physiology

Oral transit phase

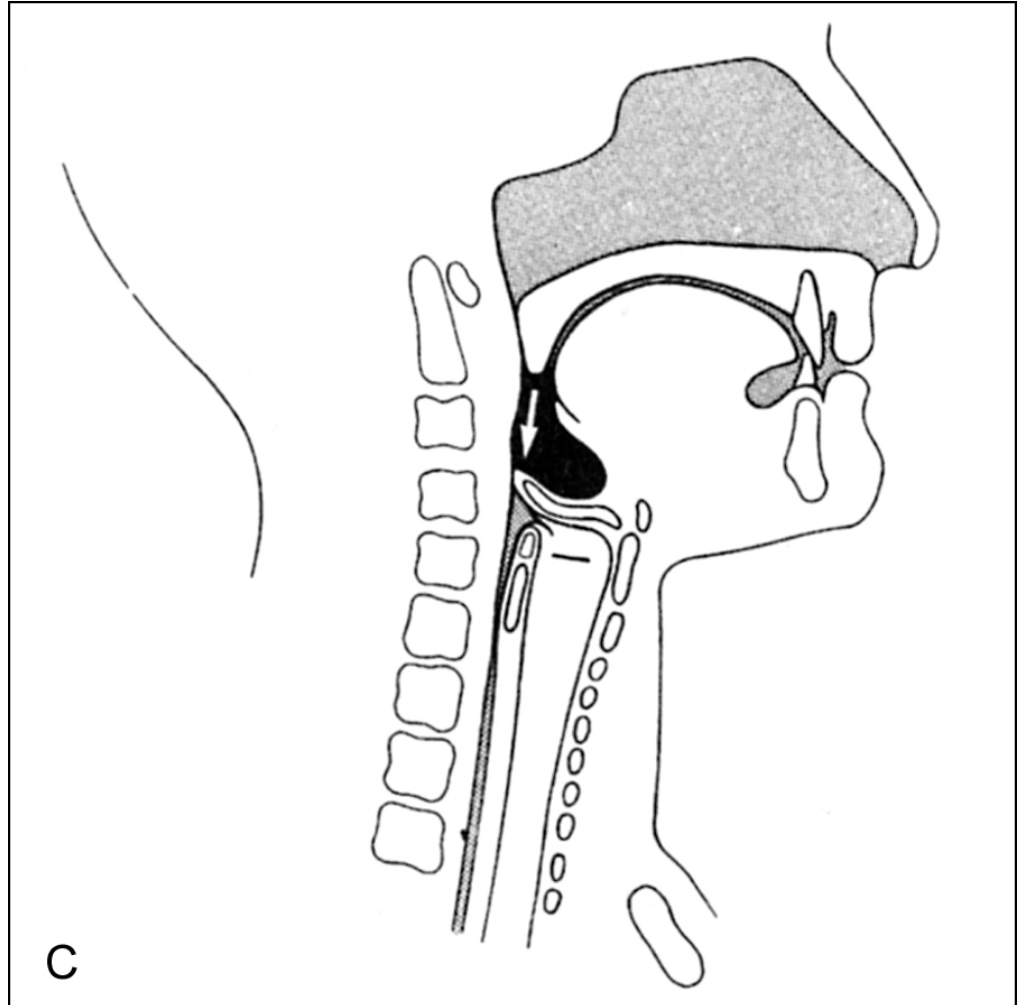
- Bolus propelled to back of mouth
- Palate seals entrance to nasal cavity
- Lip, jaw, tongue & palate sensory & motor function needed
- **Voluntary control**
- V, VII, IX, X, XII
- NB: **AIRWAY OPEN**



Swallow physiology

Pharyngeal phase I

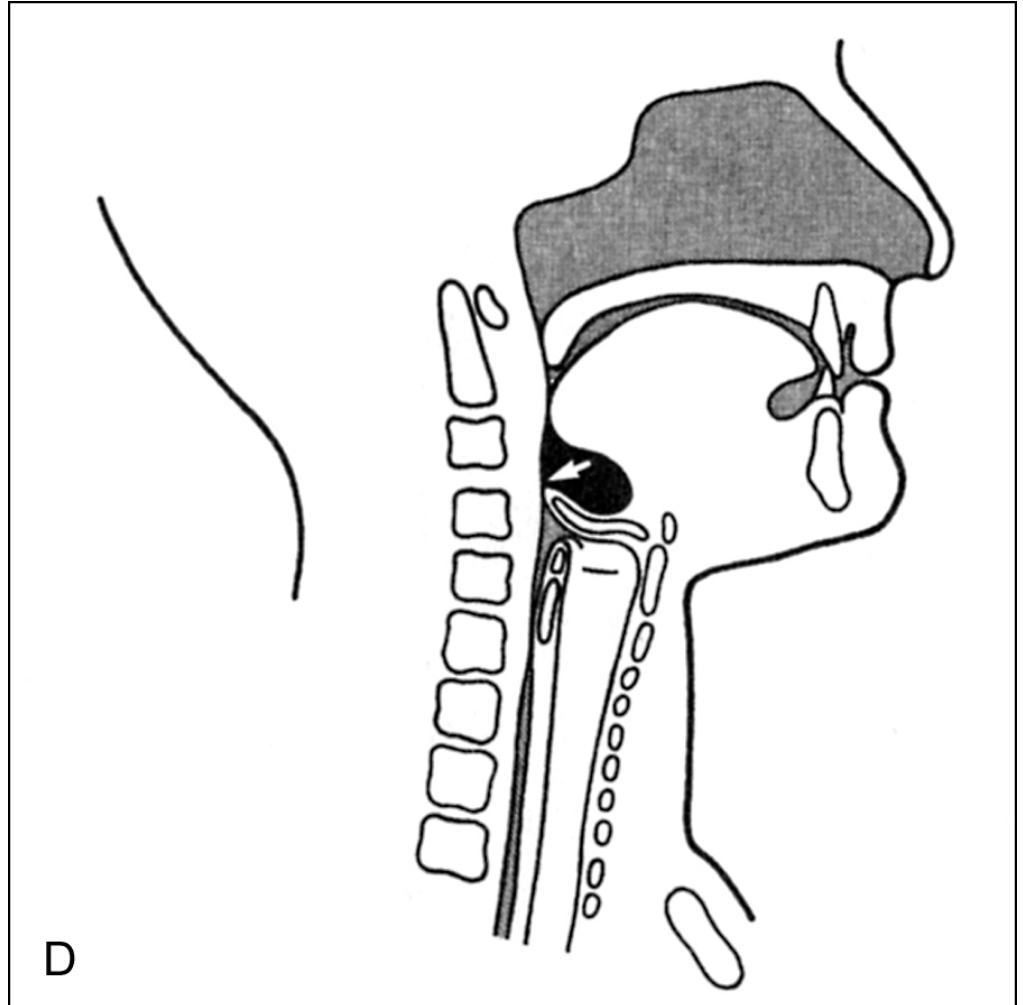
- Triggered when bolus reaches faucial arch
- Palate stays elevated
- Tongue retracts, to push bolus to pharynx
- Tongue, palate & laryngeal sensory & motor function needed
- **Reflex control**
- IX, X, XII
- **AIRWAY CLOSED**



Swallow physiology

Pharyngeal phase II

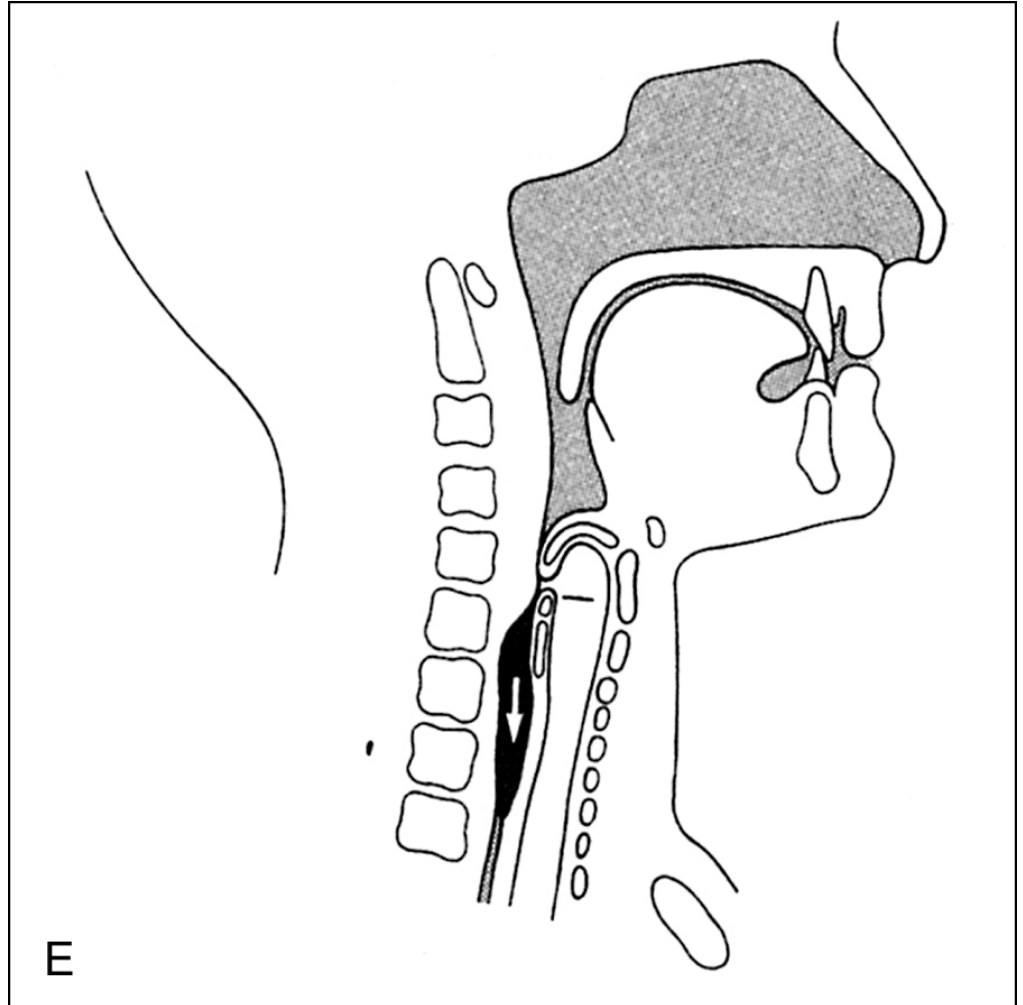
- Bolus propelled through pharynx
- Tongue, palate & laryngeal sensory & motor function needed
- Reflex control
- IX, X, XII
- AIRWAY CLOSED by epiglottis, vocal cords & arytenoid action



Swallow physiology

Oesophageal phase

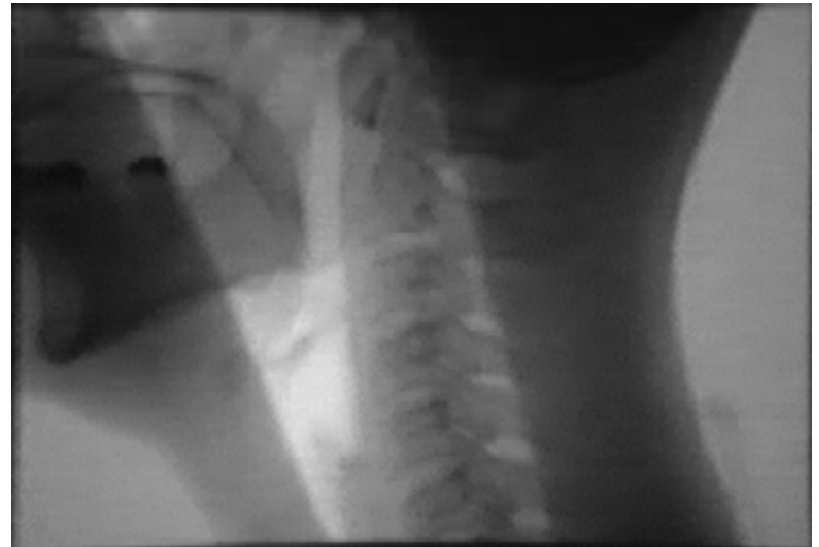
- Oesophagus opens, airway closed, breath held
- Bolus propelled through oesophagus
- Under reflex control
- IX, X,
- Respiration then resumes with an exhalation, to clear any food particles from airway entrance

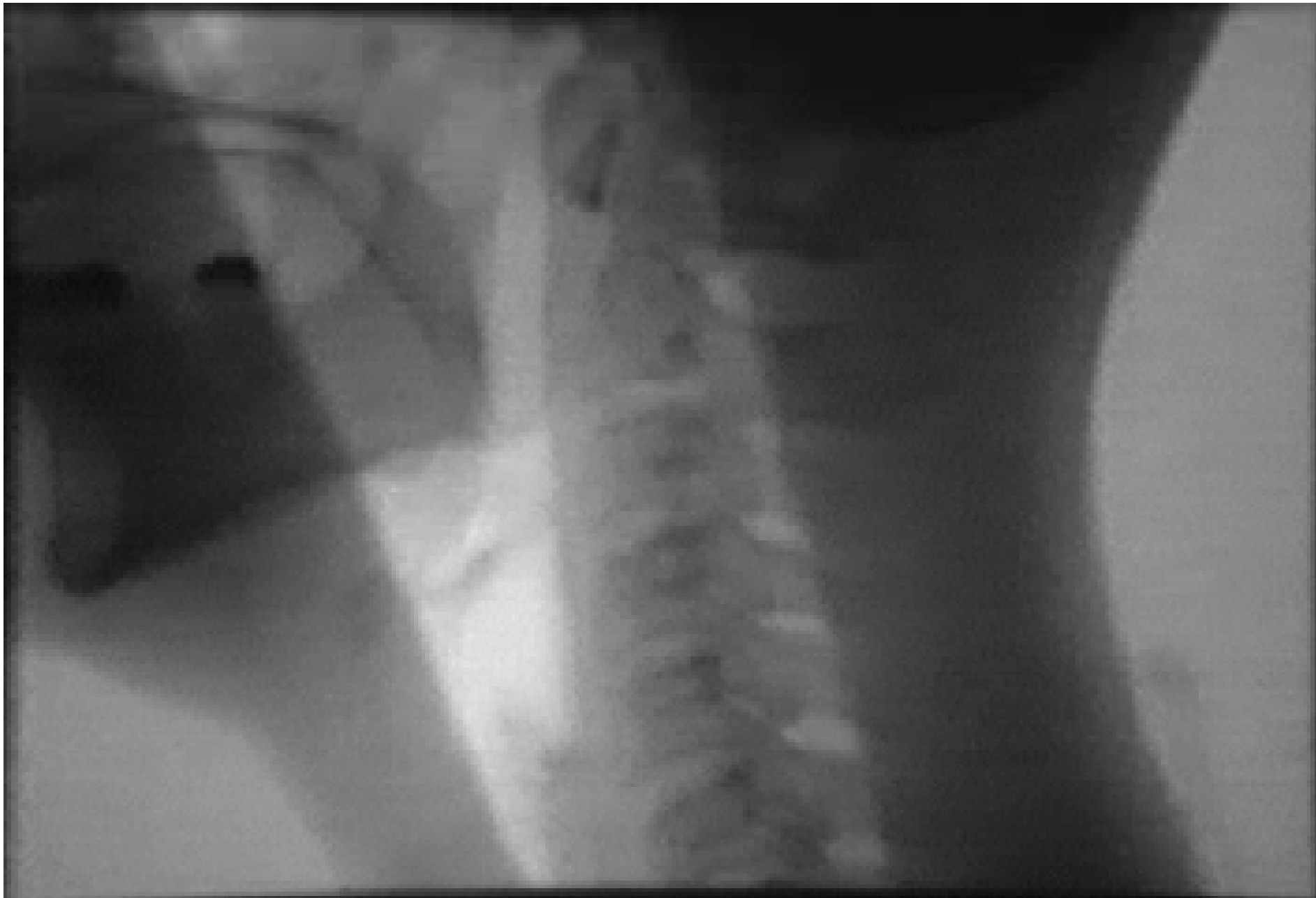


The normal swallow

Videofluoroscopy

- Barium transit through mouth 1sec
- Pharyngeal transit 1-2sec
- No residue in mouth / pharynx
- No spillage from lips or into airway





Impaired swallowing

Cerebellar haematoma

Ataxic swallow

- Unco-ordinated tongue retraction to propel food
- Delayed airway closure → food enters airway
- Delayed & ineffective cough to clear airway → food aspirated to lungs
- **Rx:** Flexed neck during swallow prevents aspiration
- Also exercises to ↑ swallow speed & strength



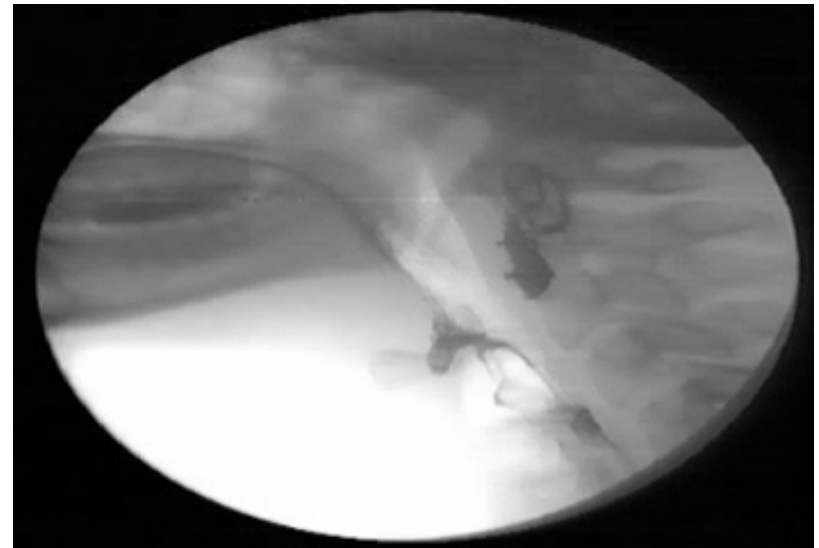


Impaired swallowing

Excised Acoustic Neuroma

Lower motor neurone lesion

- Ipsilateral paresis of pharynx, larynx, tongue
- Weak bolus propulsion → pharyngeal & oral residue
- Failed airway closure → aspiration
- **Rx:** head rotation to direct bolus down strong side of pharynx & ↑ airway closure
- Also exercises to ↑ tongue & laryngeal muscle strength for 9 mths



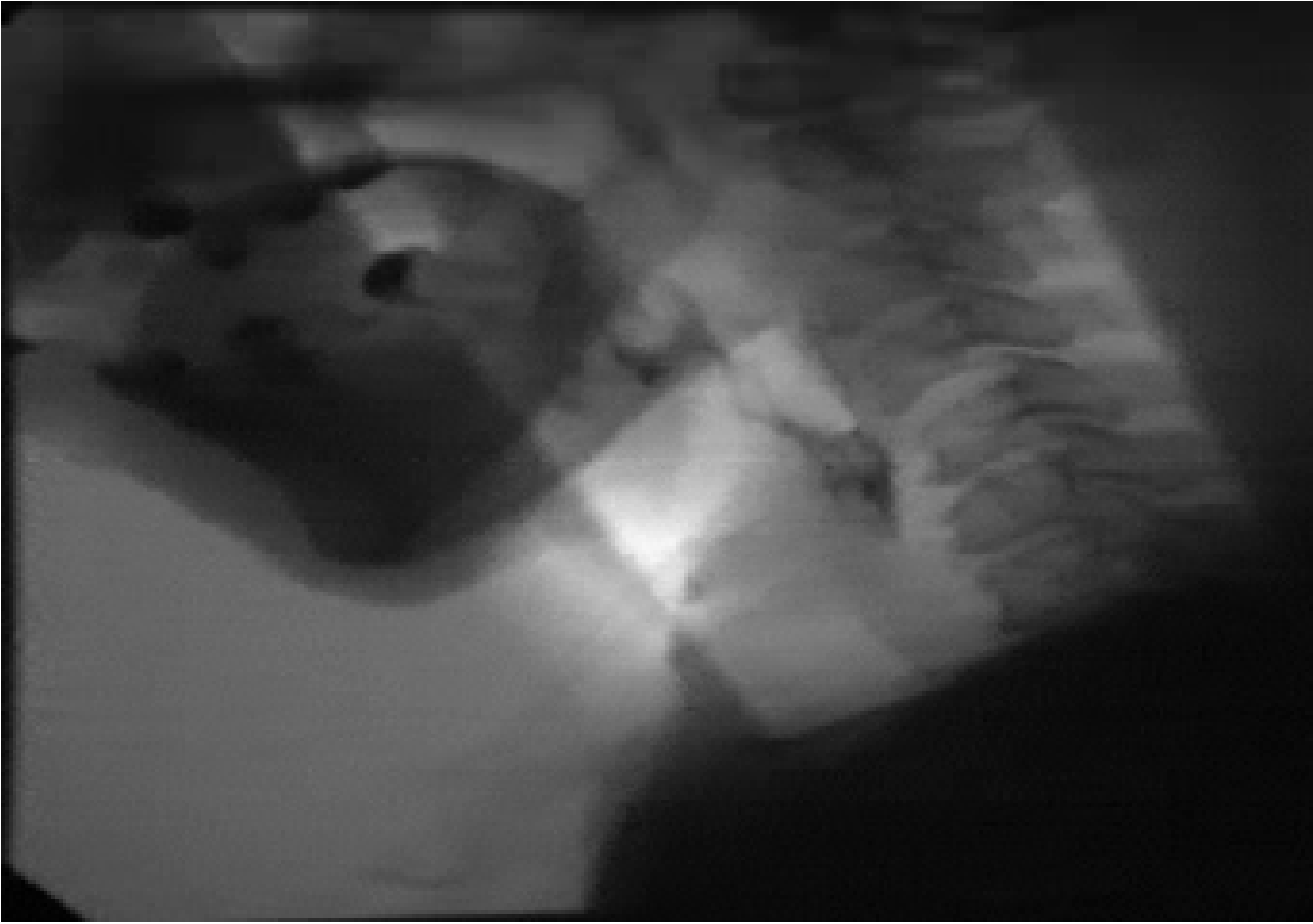


Impaired swallowing

Parkinsons Disease

- Difficulty initiating swallow
- Typical repetitive tongue movements
- Linked with muscle rigidity, unable to lower the back of the tongue
- Rx: Active range of motion exercises of lips and tongue



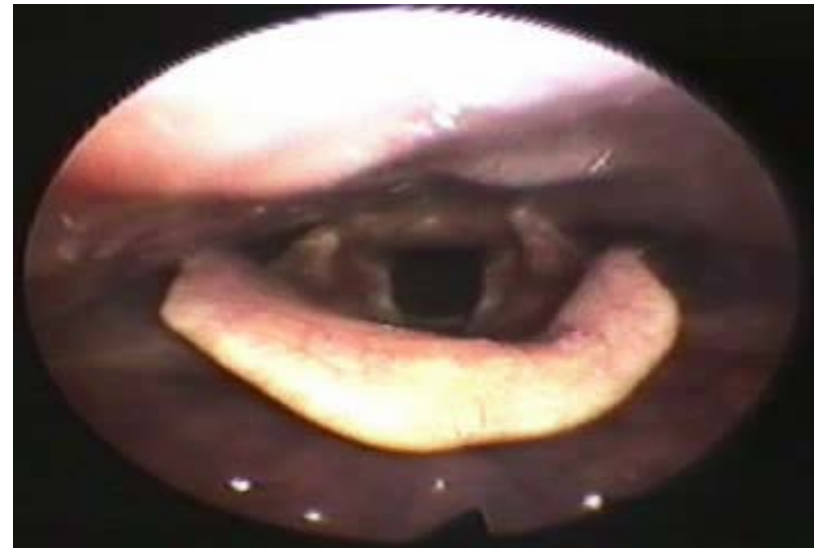


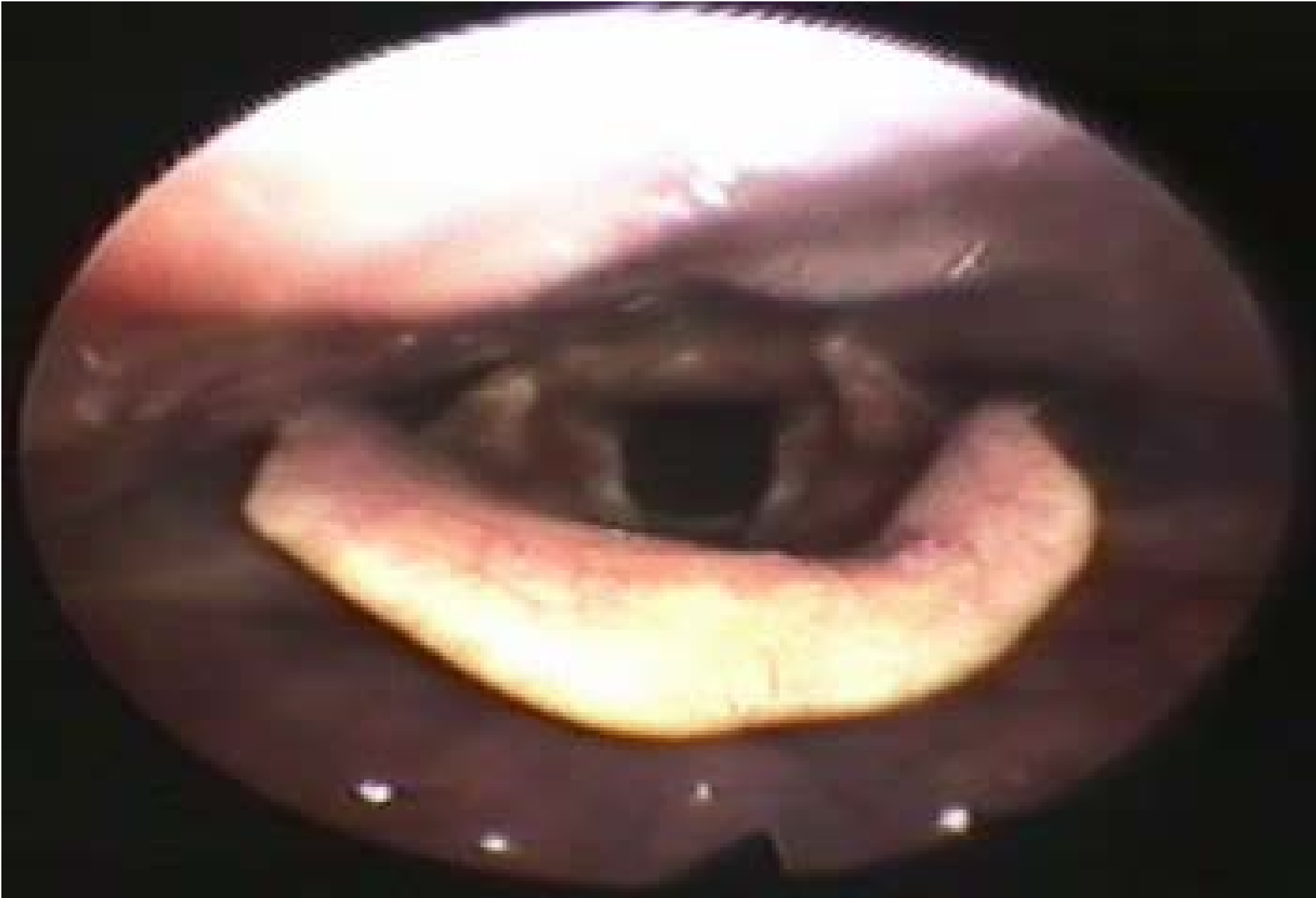
The normal swallow

Fibreoptic Endoscopic Evaluation

Normal voice & swallow

- vocal cords adduct to produce voice & to close airway
- saliva is cleared in a single swallow & does not accumulate
- water swallowed in < 1 second
- no residue in pharynx or in trachea





The impaired swallow

Fibreoptic Endoscopic Evaluation

Severe Head Injury

- Myoclonus from anoxia / brainstem involvement
- Spastic ++ pharynx and tongue → ↓ movement
- Infrequent swallow 1 per 17 mins [*Norm = 2 per 3mins*]
- Ineffective / weak swallow → residue in pharynx → aspiration of saliva
- Ineffective cough → unable to clear saliva from airway
- Rx: long term NBM & Tracheostomy





Conclusions

- Swallowing is a complicated process
- regulated at cortical & brainstem level
- series of synchronised movements of oral, pharyngeal, laryngeal & oesophageal components
- impairments can be permanent or chronic requiring tube feeding & rehabilitation of reflexes & muscles