Arytenoid Subluxation

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Arytenoid Subluxation

- Comorn; first described in 1973, due to endotracheal intubation.
- Arytenoid dislocation, arytenoid subluxation, arytenoid displacement
- Incidence: 0.023% to 6.2%
- arytenoids – comes from Greek word arytainoeides, meaning “ladle shaped”
- cricoid and arytenoid cartilages and the cartilages of the trachea come from the sixth brachial arch.
- pyramid shape
  - base: articulates with the cricoid cartilage
  - apex: attaches to the corniculate (cartilage of Santorini) and to the aryepiglottic fold
  - two processes
    - anterior: vocal ligment (vocal process)
    - posterior-lateral: PCA LCA insertion (muscular process)
  - three surfaces: anterolateral, medial, and dorsomedial surfaces
the cricoid facet is 6mm long and cylindrical

- motion: rocking or rotating movement around the axis of joint, and a linear glide parallel to this axis.

- cricoarytenoid joint: arthrodial joint, supported – lax capsule lined with synovium (strengthened posteriorly by cricoarytenid ligment)

- axis: 45 degrees from the sagittal plane, 40 degrees from the horizontal plane

- control by: PCA, LCA, TA, oblique arytenoids, thyroarytenoid, cricothyroid, thyroepiglottic
Symptoms

- hoarseness, odynophagia, dysphagia, sore throat, dyspnea, vocal fatigue, loss of vocal control, cough
Symptoms

- primary symptom: persistent hoarseness in adults
  respiratory compromise in pediatric and neonatal cases.

- anterior subluxations of the arytenoid may be better tolerated with persistent hoarseness while posterior subluxations are associated with severe sore throat and odynophagia, as well as hoarseness.

- pain is most likely related to motion of the subluxated cartilage, which extends into the hypopharynx and is moved during swallowing.
Etiology

- intubation trauma (50-80%), external blunt trauma (30%), laryngeal mask, microdirect laryngoscopy, whiplash injury, unknown
Etiology

- Intubating trauma, ranking ahead of neck injury, is still the most commonly reported etiologic factor.
- Use of lighted stylet, laryngeal mask airway, McCoy laryngoscope, endotracheal intubation with double lumen tube, difficult intubation
Two types

- Anterior arytenoids dislocation with vocal cord adduction.
- Posterior arytenoids dislocation with vocal cord abduction.
Predisposing factors

- Chronic disease states (degeneration of the posterior ligament)
  - laryngomalacia,
  - renal insufficiency
  - acromegaly
  - chronic glucocorticoid intake
- Diseases involving the CAJ itself
  - Cricoarytenoid arthritis,
  - rheumatoid arthritis
  - Degenerative changes in the CAJ.
- A recent study: persons aged 40 years or older the incidence of osteoarthrotic changes in the CAJ is approximately 50%.
Theory

- *Quick and Merwin (1978)* – three posterior lateral dislocation of left mechanisms
- Laryngoscope was held in left hand
Dudley – posterior dislocation mechanism
more extubation than intubation
tube cuff was deflated incompletely –
pull out posteriorly and superiorly
Fig. 2. (A) Form of arytenoid dislocation typically caused by the blade of a laryngoscope. If a laryngoscope blade is inserted too deeply, it can lift the cartilage in an anterior direction. (B) Form of arytenoid dislocation typically caused by an endotracheal tube. A misdirected endotracheal tube tip or stylet can displace the cartilage. (C) Form of anterior dislocation likely to be caused by a transesophageal echocardiography (TEE) probe. External force applied by the TEE probe can push up the arytenoid cartilage. $\Phi$ denotes arytenoid cartilage.
Anterior dislocation mechanism

- The blade of laryngoscope displaces the arytenoid directly anteriorly.
- The epiglottis, aryepiglottic fold, and arytenoids cartilages are being tensed anteriorly.
- A misdirection of endotracheal tube tip or stylet injury.
simulate the trauma in intubation trials on 37 unfixed larynges in cadavers

endotracheal intubation does not cause subluxation of a arytenoid cartilage *per se*, but rather the formation of hemarthros leads to fixation of the joint surface.

NEW TERM: *postintubation cricoarytenoid joint dysfunction*. 
motor reactions during endotracheal intubation, or direct trauma to the cricoarytenoid joints leading to joint cavity hemorrhage or serosynovitis.

After this, pathological process can be followed by adhesion of articular surfaces or periarticular structures that fix the arytenoid in an abnormal position.
Sides

- Left side > right side (in first paper 70% > 30%), but equal in later papers
Diagnosis

Flexible nasopharyngoscopy

- anterior dislocation: displaced vocal process and fold inferiorly, medially rotated
- posterior dislocation displaced vocal process and fold superiorly, laterally rotated
- hematoma and other surrounding conditions.
Diagnosis

Stroboscopy

- Disparity in height between the vocal processes is much easier to see in slow motion under stroboscopic light at various pitches.
Posterior dislocations: the vocal process is higher on the abnormal side.

Anterior dislocations: the vocal process is lower on the involved side.
absence of a Jostle’s sign (movement of the arytenoids on the abnormal side caused by contact with the mobile side during adduction in cases of vocal fold paralysis)
A typical pathological anteromedial shift of one arytenoid resulting in cord immobility with a residual, slight, but ineffective movement of the subluxated arytenoid cartilage.
Diagnosis

CT scan

- Arytenoid disclocation and reveal clouding or obliteration of the cricoarytenoid joint space
HRCT: Although positive results from the CT scan may be helpful in confirming AS, nondiagnostic CT scan results do not rule out AS.

Typical findings: displacement of the arytenoid body, altered angulation of the aryepiglottic fold, and widening of the ventricle on the affected side.

CT scans may be of limited usefulness if the laryngeal cartilages are insufficiently mineralized, especially in the pediatric population.
Diagnosis

EMG

- Differentiate an immobile dislocated arytenoid joint from vocal fold paralysis
Treatment

- Voice therapy
- Surgical intervention
  - early
  - late
Treatment

- **Early treatment**
  - direct laryngoscopy and closed reduction of the displaced arytenoid.
  - Tracheotomy may be required in the acute period of laryngeal edema and airway compromise.
  - Arytenoidectomy reserved for when the arytenoid obstructs the airway or when all other interventions have failed.

- **Late treatment (>1 year)**
  - Vocal fold medialization,
  - Direct laryngoscopy with attempted reduction
Treatment

- Endoscopic procedures under general anesthesia or under local anesthesia with intravenous sedation.
- Sataloff et al:
  - Holinger laryngoscope for anterior dislocations.
  - Miller-3 straight intubating laryngoscope for posterior subluxations
- Smaller microlaryngeal instruments (ie, cups forceps): less effective and may lacerate the mucosa.
- Intraoperative steroids (triamcinolone acetate (Kenalog) at 40 mg/mL) can be injected into the cricoarytenoid joint to prevent joint ankylosis and reduce edema
Treatment

- botulinum toxin for anteromedial AS: unbalanced forces placed on the arytenoid by the intrinsic laryngeal musculature.
- Botulinum toxin 2.5 units/0.1cc into the laryngeal adductor muscles (TA, LCA of lesion site and IA) allows the arytenoid to remain in the reduced position.

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Treatment

- compensation to near-normal voice quality without surgical intervention.
- most patients require either endoscopic reduction in the early period or medialization procedures in the late period.
- Outcomes for both procedures have been favorable, although not uniformly successful.
References


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