Arytenoid Adduction and Related Procedures

Arytenoid repositioning procedures such as arytenoid adduction and arytenopexy are typically used as adjunctive procedures when performing medialization laryngoplasty to address posterior glottic insufficiency.

Historical Background

- First described by Dr. Nobuhiko Isshiki in 1978 to close a posterior glottal gap, an arytenoid adduction (AA) simulates the lateral cricoarytenoid muscle (LCA) by rotating the arytenoid vocal process medially while pulling the muscular process anteriorly.
    - Isshiki N, Tanabe M, Sawada M. Arytenoid adduction for unilateral vocal cord paralysis. Arch Otolaryngol. 1978;104:555-8.
- Maragos and Netterville (Mayo Clinic and Vanderbilt respectively) were early adopters of this procedure in the United States and reported on their overall positive results when combined with type I thyroplasty between the years 1992-1994.
    - Slavit DH, Maragos NE. Physiologic assessment of arytenoid adduction. Ann Otol Rhinol Laryngol. 1992 Apr;101(4):321-7.
    - Netterville JL, Stone RE, Luken ES, Civantos FJ, Ossoff RH. Silastic medialization and arytenoid adduction: the Vanderbilt experience. A review of 116 phonosurgical procedures. Ann Otol Rhinol Laryngol. 1993;102:413-24.
    - Slavit DH, Maragos NE. Arytenoid adduction and type I thyroplasty in the treatment of aphonia. J Voice. 1994 Mar;8(1):84-91.
- Instead of focusing solely on the LCA's action, Zeitels innovated a new procedure called an arytenopexy that, if done correctly, simulates the combined effects of the interarytenoid, lateral cricoarytenoid, lateral thyroarytenoid, and posterior cricoarytenoid muscles.
    - Zeitels SM, Hochman I, Hillman RE. Adduction arytenopexy: a new procedure for paralytic dysphonia and the implications for medialization laryngoplasty. Ann Otol Rhinol Laryngol. 1998;107(supplement173):1-24.

Pathophysiology or Scientific Premise

- Unilateral vocal fold immobility can occasionally show a widened posterior glottal gap or a lateralized position. Medialization laryngoplasty alone can close the membranous portion of the true vocal fold but the cartilaginous portion may remain open resulting in a breathy voice if the arytenoid vocal process remains lateralized.
    - Daniero JJ, Garrett CG, Francis DO. Framework Surgery for Treatment of Unilateral Vocal Fold Paralysis. Curr Otorhinolaryngol Rep. 2014 Jun 1;2(2):119-130.
- AA can be helpful to improve quality of life related to voice (measured by the Voice Handicap Index) in certain patients with the above vocal fold configuration when added to medialization laryngoplasty
    - Zimmermann TM, Orbelo DM, Pittelko RL, Youssef SJ, Lohse CM, Ekbom DC. Voice outcomes following medialization laryngoplasty with and without arytenoid adduction. Laryngoscope. 2018 Dec 24. PMID: 30582612

Indications and Contraindications

- Historical indications for an AA or arytenopexy are a widened posterior gap and vertical height mismatch with a lateral but also a superiorly-located vocal process. The AA procedure will bring the vocal process back into its physiologic phonating position by medializing and lowering the vocal process.
    - Isshiki N, Tanabe M, Sawada M. Arytenoid adduction for unilateral vocal cord paralysis. Arch Otolaryngol. 1978;104:555-8.
- If the vocal process is inferiorly displaced, it can be elevated with an arytenopexy, along with the typical medialization.
    - Zeitels SM, Mauri M, Dailey SH. Adduction arytenopexy for vocal fold paralysis: indications and technique. J Laryngol Otol. 2004;118:508-16.

Treatment method

- See these articles below for specifics on techniques.
- Arytenoid adduction
    - F.R. Miller, G.L. Bryant, J.L. Netterville. Arytenoid adduction in vocal fold paralysis. Oper Tech Otolaryngol Head Neck Surg, 10 (1999), pp. 36-41
        - https://www.sciencedirect.com/science/article/pii/S1043181099800475

- Arytenopexy
    - Franco RA. Adduction arytenopexy, hypopharyngoplasty, medialization laryngoplasty, and cricothyroid subluxation for the treatment of paralytic dysphonia and dysphagia. Operative Techniques in Otolaryngology-Head and Neck Surgery. Volume 23, Issue 3, September 2012, Pages 164-172.
        - https://www.sciencedirect.com/science/article/pii/S1043181012000504
- Cricothyroid subluxation is often added to an arytenopexy to lengthen the TVF.
    - Zeitels SM, Desloge RB, Hillman RE, Bunting GA. Cricothyroid subluxation: a new innovation for enhancing the voice with laryngoplastic phonosurgery.

Management of common complications

- Dyspnea can occur following an AA or arytenopexy due to glottic, arytenoid, and/or pyriform sinus edema. These patients are typically observed overnight with IV steroids and an oral steroid regimen may be recommended on discharge. Tracheotomy is a risk, but occurs rarely.
    - Weinman EC, Maragos NE. Airway Compromise in Thyroplasty Surgery. Laryngoscope 2000 Jul;110(7):1082-5.
    - Ekbom DC, Orbelo DM, Sangaralingham LR, Mwangi R, Van Houten HK, Balakrishnan K. Medialization laryngoplasty/arytenoid adduction: U.S. outcomes, discharge status, and utilization trends. Laryngoscope. 2018 Nov 22. doi: 10.1002/lary.27538.
- Other uncommon risks include hematoma/seroma, infection, hypopharyngeal perforation, implant extrusion (if ML is added to arytenoid procedure).
    - Abraham MT, Gonen M, Kraus DH. Complications of type I thyroplasty and arytenoid adduction. Laryngoscope. 2001 Aug;111(8):1322-9.