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Technical note

Endoscopic lateralization of the vocal fold[☆]

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ABSTRACT

Vocal fold paralysis in adduction can result in significant breathing difficulties. Techniques such as vocal fold lateralization and/or arytenoidopexy help to improve respiratory function in this setting. These techniques require open approach or specific instruments. The authors describe an original vocal fold lateralization technique performed exclusively via an endoscopic approach. This technique helps to enlarge the glottic aperture, while preserving laryngeal architecture, and permanently improves respiratory function in patients with vocal fold paralysis in adduction.

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1. Introduction

Vocal fold paralysis in adduction, especially when it is bilateral, can induce severe and poorly tolerated inspiratory dyspnea, requiring urgent intubation or tracheostomy. The main causes of vocal fold paralysis in adduction are postoperative, especially after thyroid surgery, but it can also be neoplastic, neurodegenerative, traumatic (post-intubation), or idiopathic [1]. Symptomatic vocal fold paralysis in adduction must be treated as soon as possible.

The surgical management of this disease has been considerably improved. The first techniques consisted of open surgery with tracheostomy for airway protection. Surgical techniques have gradually become less invasive and exclusive endoscopic or combined (open and endoscopic) techniques can now be proposed [2]. Endoscopic techniques include cordotomy and arytenoidectomy (partial or total), which are considered to be invasive techniques, as they involve resection of laryngeal anatomical structures. Lateralization of the vocal folds with or without arytenoidopexy is considered to be a conservative technique, allowing enlargement of the glottic aperture, while preserving anatomical structures [3]. It always requires open surgery, possibly associated with an endoscopic approach [4–7]. We describe an exclusive endoscopic vocal fold lateralization technique than can be performed by a single opera-

tor, allowing easy control of the tension and lateralization of the vocal folds and arytenoid cartilage in relation to the midline.

2. Technique

The technique is performed under general anesthesia with suspension laryngoscopy and the patient is optimally ventilated by low-frequency jet ventilation, using a jet ventilation tube positioned in the posterior commissure or through a metal tube connected and integrated into the laryngoscope to perform supraglottic low-frequency jet ventilation. After anesthesia induction, 120 mg of methylprednisolone and 2 g/200 mg of amoxicillin-clavulanic acid are administered by intravenous injection.

Classical transoral laser reconstructive microsurgery instruments are used [8]. Good exposure of the posterior part of the larynx is essential to perform this technique.

Fig. 1 shows the various steps of the procedure. Supraglottic laryngotomy, lateral to the ventricular fold, is performed with CO₂ laser in Super Pulse mode (Lumenis, Israel). Dissection is continued with micro-instruments and laser in the paraglottic space as far as the inner perichondrium of the thyroid cartilage.

The lateralization suture is performed with 4/0 polypropylene suture material using a triangular needle. The first step consists of passing the needle through the perichondrium and the inner surface of the thyroid cartilage from proximal to distal. The needle is then advanced submucosally below and then above the vocal process of the arytenoid and subsequently redirected towards the laryngotomy. A second needle passage, identical to the first, can be performed to reinforce the lateralization suture. The two sutures are tightened together and held with a clip with the desired tension

[☆] The surgical technique presented here was developed by Paul F. Castellanos.

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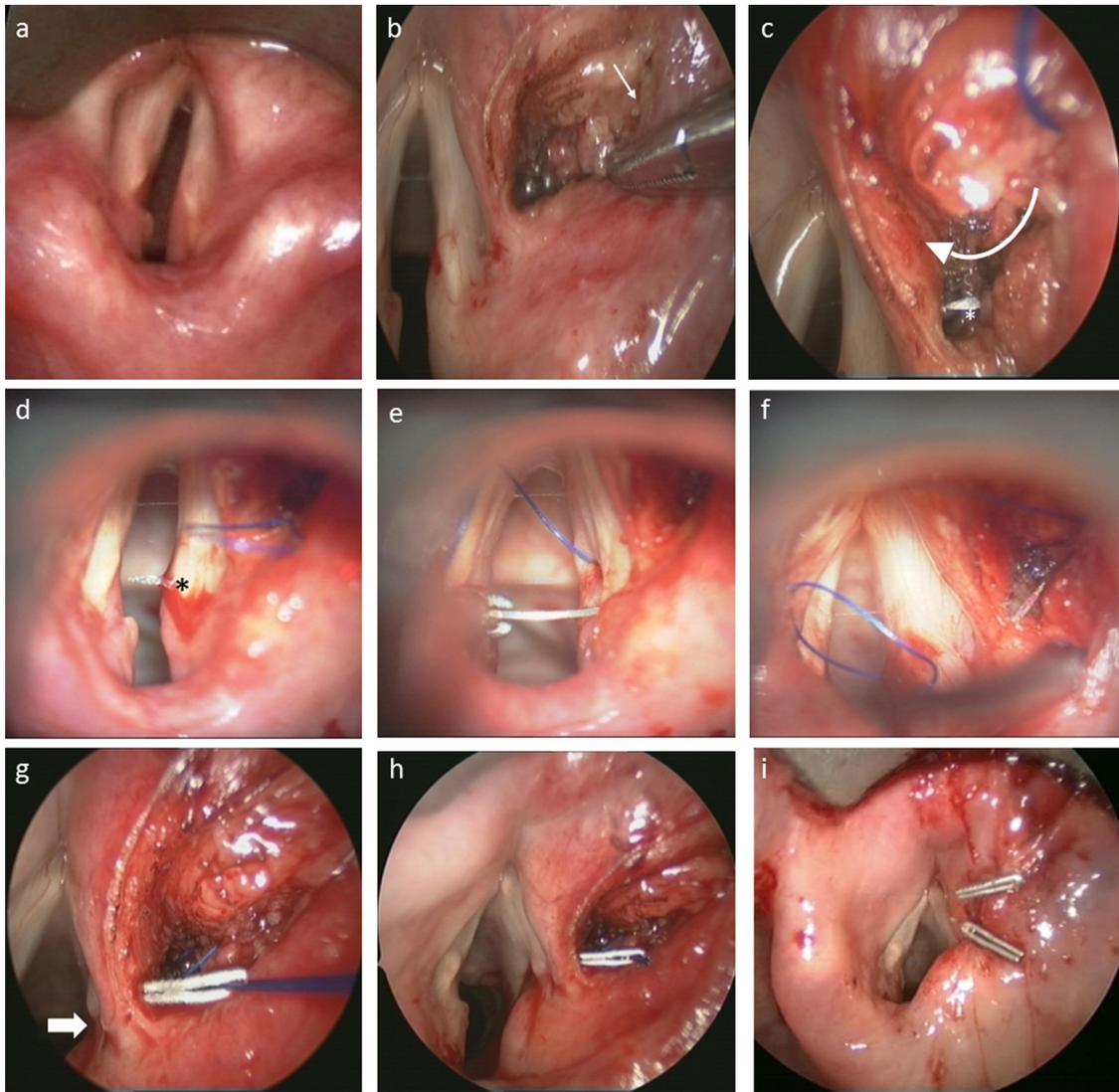


Fig. 1. Endoscopic arytenoid and vocal fold lateralization technique: a: right vocal fold paralysis in adduction; b: supraglottic laryngotomy and paraglottic dissection as far as the inner perichondrium of the thyroid cartilage (arrow); c: the needle is inserted subperichondrally in the inner surface of the thyroid cartilage from proximal to distal (arrow showing the direction of insertion of the needle and asterisk showing the needle tip); d: the needle is inserted below the vocal process (asterisk) then above (e) the vocal process, exiting (f) through the supraglottic laryngotomy; g: the two sutures are held together by a clip with the desired tension allowing lateralization of the vocal process (arrow) together with the corresponding vocal fold; h: excess suture material is cut with micro-instruments or laser; i: the supraglottic laryngotomy is closed by two absorbable sutures secured by clips. Note the lateral position of the right vocal fold compared to its position at the beginning of the procedure (a).

allowing lateralization of the arytenoid and corresponding vocal fold. Excess suture material is then cut with micro-instruments or laser.

The supraglottic laryngotomy is then closed by one or two absorbable sutures maintained by clips.

3. Discussion

Most of the lateralization techniques currently described in the literature require an open approach to perform the extralaryngeal suture that maintains the vocal fold and arytenoid cartilage in abduction. This approach requires a skin incision of variable dimensions in order to attach this suture subdermally to the external perichondrium of the thyroid cartilage or to the infrahyoid muscles, which is associated with a potential risk of infection and an unsightly scar [3–7]. The technique described here can be performed through an exclusive endoscopic approach without a skin incision, thereby avoiding a neck scar. It can also be performed by a single operator without the need for an assistant to control and

assist in placement of the extralaryngeal suture. This technique allows easy control of the appropriate tension and lateralization of the vocal fold and arytenoid cartilage with respect to the midline. This technique also does not require any potentially costly and poorly accessible specific instrumentation [9].

Reconstructive transoral laser microsurgical techniques that we use allow lateralization of the arytenoid and vocal fold, ensuring optimal positioning of the lateralization suture in the vocal process of the arytenoid, which avoids any consequences on the middle third of the vocal fold. Voice quality should consequently be more effectively preserved than with other techniques, which involve placing the lateralization suture in the middle third of the vocal fold [10].

Invasive techniques, such as arytenoidectomies and cordotomies, destroy normal laryngeal anatomy and are often associated with granulomas, scar retraction or chondritis. They can be also responsible for functional sequelae affecting phonation and swallowing with a risk of aspiration [5]. Although these resections can be performed via a submucosal approach, they remain associated with

the same risks as classical resection without mucosal preservation [11]. The technique described here preserves laryngeal architecture and can also be reversed in the event of recovery of vocal fold mobility or in the case of excessive lateralization with an unsatisfactory vocal result for the patient, as the lateralization suture over the vocal process of the arytenoid cartilage simply needs to be cut with micro-instruments or laser to release all of the lateralization process. Minimal pressure exerted by micro-instruments on the arytenoid cartilage may sometimes be necessary to restore the initial position of the arytenoid prior to lateralization. It should be stressed that the lateralization suture must be performed submucosally in the vocal process to avoid posterior glottic granuloma formation, in contrast with the other lateralization techniques, in which the suture passes through the larynx with no mucosal protection.

This technique can be performed by all laryngologists experienced in reconstructive transoral laser microsurgery. It requires good exposure of the posterior part of the larynx, including the arytenoid cartilage and the posterior third of the vocal folds and vestibular folds. Prior training in the use of CO₂ laser and endoscopic sutures is essential before performing this new technique.

4. Conclusion

The proposed endoscopic vocal fold lateralization technique is an innovative method allowing enlargement of the glottic aperture in the case of laryngeal dyspnoea secondary to vocal fold paralysis in adduction. It can be used as first-line technique in patients with respiratory symptoms. This technique also optimally preserves laryngeal structures, especially the mucosa. It is reproducible and reliable for all laryngologists experienced in laryngeal microsurgery.

Disclosure of interest

The authors declare that they have no competing interest.

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