

An Unusual Complication Of Nasotracheal Intubation- Unilateral Vocal Cord Palsy

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Abstract

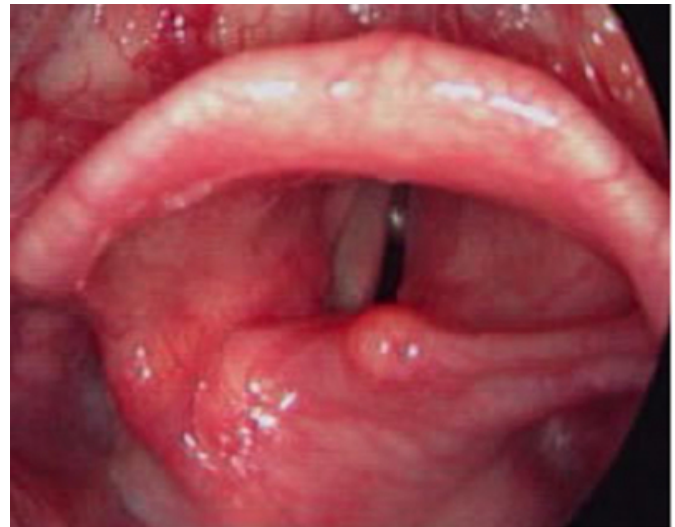
Nasotracheal intubations are frequently used for airway management during maxillofacial surgery, poor oral access, surgical field avoidance and prolonged ventilation. Complications such as hemorrhage occur more frequently with this route of intubation than with the orotracheal route. We present a 45 year old lady who developed post-operative unilateral vocal cord palsy following a nasotracheal intubation. The patient was put on regular speech therapy. She made a complete recovery of her voice after 11 months.

CASE REPORT

A 45 year old obese lady with a short neck was admitted with severe back pain. She underwent laminectomy and discectomy L5-S1, two years back. On further evaluation it was found that she was having post-laminectomy instability. She was scheduled for posterior decompression and instrumentation under general anesthesia and nasotracheal intubation. Pre-anaesthetic evaluation was normal except obesity and short neck. The specific examination of the upper airway did not indicate potential difficulties in managing the airway and the patient was assigned a modified Mallampati score of grade 1.6 Nasal anatomy was normal. A mixture of lidocaine 2% and phenylephrine was applied into both nostrils 30 min before induction of anaesthesia. After 4 min of breathing 100% oxygen via facemask, anaesthesia was induced with fentanyl 0.15 mg and thiopental 450 mg. Atracurium 45 mg was administered to facilitate laryngoscopy. 7.0-mm cuffed nasotracheal tube was inserted into the patient's right nostril. No force was applied to advance the tip of the tube into the hypopharynx. Surgical stabilization was done. Extubation was done and the patient was shifted to her bed. Patient complained of breathy voice. She was given steam inhalation. Otolaryngologist examined her and found right vocal cord palsy. The right arytenoid was prolapsed forward. (Fig1). Patient was given regular voice therapy. Speech therapy was continued and at the end of 11 month, she had regained her normal voice.

Figure 1

Figure 1: Photograph of the larynx showing right vocal cord paralysis. The right arytenoid has prolapsed forward and characteristically foreshortened, lateralized, and flaccid.



DISCUSSION

Vocal cord paralysis is a common problem found in the practice of anesthesiology and otolaryngology¹. It is a sign of disease and not a diagnosis. The commonest cause of unilateral vocal cord paralysis remains controversial. From the results of nine studies, dating from 1974-1991, it appears that malignancy is the most common cause of unilateral vocal cord paralysis. Surgical injury, often touted as the commonest cause by some authors, comes in second according to the combined results of these studies^{5,6}. Idiopathic causes are next in frequency. Unilateral vocal

cord paralysis far outnumbers bilateral vocal cord paralysis ⁸.

Patients with unilateral vocal cord paralysis have hoarse, breathy voice. Airway compromise and/or aspiration are usually not a problem. If the etiology of the paralysis is thought to be idiopathic or there is any thought that the paralysis may recover, definitive therapy should be deferred for at least six months to one year ⁸. Approximately 60% of idiopathic cases recover or compensate to near normal voices within one year. The patient should undergo flexible endoscopy after a thorough examination by indirect mirror diagnostic laryngoscopy. This is the most useful tool to evaluate vocal cord motion ^{1,5,6,8}. It allows prolonged study of laryngeal motion and allows for video or still documentation. Videostroboscopy allows for even greater study of the vocal cords throughout their vibratory cycle. Another diagnostic aid to be considered is laryngeal electromyography ^{2,8}. Described by Miller et al in 1982, this method of evaluation of laryngeal muscle innervation is gradually gaining acceptance by otolaryngologists. It is an analysis of the electrical activity generated by a motor unit. Miller, et al claims that laryngeal EMG is the most accurate method of determining superior laryngeal nerve paralysis ². It also appears to be helpful in cases of mechanical fixation of the cords and predicting outcome of certain cases of paralysis. Indications ^{5,6,8} for early intervention include:

1. The known etiology leaves no chance of recovery
2. Intractable aspiration
3. Psychological or professional factors

Temporary measures should be considered for the latter two indications. All approaches to unilateral vocal cord paralysis attempt to move the displaced, immobile cord toward the midline ^{5,6}. This can be managed by:

1. Speech therapy
2. Surgical medialization
3. Intracordal injection
4. Selective reinnervation

SPEECH THERAPY

Voice therapy can play a role in the treatment of unilateral vocal cord palsy ^{4,9,12}. Voice therapy can be used as sole

treatment or as part of combined treatment with surgical medialization of the paralyzed vocal fold. Voice therapy ^{9,12} is the primary treatment in patients who have a favorable (ie, median) position of their vocal fold paralysis and fairly equal tonicity between vocal folds or those who are unwilling or unable to undergo surgery because of psychological or medical limitations. In the setting of vocal fold paralysis, voice therapy is generally not a long-term treatment modality; substantive results are usually obtained in 2-3 sessions. Voice therapy used in combination with surgery is usually used postoperatively; however, 1-2 sessions of voice therapy prior to surgical treatment of unilateral vocal cord palsy can often be efficacious. This type of preoperative voice therapy focuses on vocal hygiene and establishes the principles of voice therapy that will be solidified during the postoperative period. The most commonly used voice therapy techniques for unilateral vocal cord palsy include vocal hygiene and modification of voice use and the voice use environment. In addition, direct voice therapy techniques ^{9,12} (eg, proper use of the respiratory support for phonation, phrase, and word timing) are often used. Preoperative voice therapy can decrease the secondary muscle tension dysphonia (MTD), while postoperative voice therapy can improve muscle strength, agility, and coordination ⁴.

SURGICAL MEDIALIZATION

This is currently the procedure of choice for most cases of unrecovered or uncompensated unilateral vocal cord paralysis. Laryngeal framework surgery was first introduced by Payr in 1915 with the development of a thyroid cartilage flap ^{1,5,6,8}. This failed to provide enough medialization and further developments were not introduced until the 1950's. Several authors then introduced different modifications but the procedure did not become popular until the late 1970's when Isshiki introduced his thyroplasty technique. Complications of surgical medialization include: airway compromise, wound infection, hematoma migration, possible extrusion of implant, and laryngocutaneous fistula formation. An adjuvant procedure to surgical medialization ^{4,5,6}, also described by Isshiki, is arytenoid adduction. This procedure can help close the posterior glottic chink that medialization alone often fails to do. This procedure can be performed alone, or in combination with medialization. This procedure can produce excellent results, especially in patients with combined superior and recurrent laryngeal nerve paralysis (hence, an intermediate cord), however it is irreversible, technically difficult, and has a relatively high

rate of complications (33% in one study). It should be reserved for surgeons experienced in laryngoplastic phonosurgery ^{1,3,4} .

INTRACORDAL INJECTION

Intracordal ¹¹ injection of polytetrafluoroethylene (Teflon), popularized in the 1960's, is still performed by some in the treatment of uncompensated unilateral vocal cord paralysis. Gelfoam paste may be used instead if the paralysis is thought to be temporary. Collagen has also been introduced as a potential substitute for Teflon. Complications of intracordal injection include: misplacement causing granuloma formation, displacement, or possible extrusion, airway edema with or without obstruction and unsatisfactory result

SELECTIVE REINNERVATION: NERVE-MUSCLE TRANSFER

Originally described by Tucker ⁴ in 1977, this procedure uses a branch of the ansa hypoglossi attached to a small block of omohyoid muscle as a nerve-muscle pedicle to innervate the thyroarytenoid muscle on the involved side. The results of this procedure have been very good. Tucker reports an 80% success rate, and other authors (May and Beery) have reported similar results. Teflon, Radiess voice gel, Hyaluronic acid Cymetra, Gelfoam Cross-linked bovine collagen (Zyplast/Zyderm) permanent vocal fold surgical treatment are the newer trends in the modern practice ^{7,10} . Injection technique is similar to that with temporary materials: however, more permanent substances such as fat, fascia, or calcium hydroxylapatite (CaHA) ^{7,10} are used.

Our patient had noticed post-operative a breathy voice. The examination revealed right vocal cord palsy. Regular speech therapy brought her normal speaking activities and function. The literature on unilateral vocal cord palsy is huge and refers, not specifically, to every reasons, management and individuals. The fact that unilateral vocal cord palsy following nasotracheal intubation has not been extensively described, does contribute a base for our observation.

CONCLUSION

Unilateral vocal cord palsy can occur following a nasotracheal intubation. Usually they recover or compensate

to near normal voices within one year. Expected voice outcome following the treatment for Unilateral vocal cord palsy is excellent. Most patients resume normal speaking activities and functions and are able to meet all normal voice demands. Voice therapy plays a definite role in the treatment of unilateral palsy. Voice therapy can be used as sole treatment or as part of combined treatment with surgical medialization of the paralyzed vocal fold. The future goal of laryngology research is to create a method of dynamic rehabilitation of the paralyzed vocal fold which has been present for decades, and much work has been devoted to the concept of reinnervation of the vocal fold.

References

1. Terris, DJ, et al. Contemporary Evaluation of Unilateral Vocal Cord Paralysis. *Otolaryngol Head Neck Surg* 1992; 107:84-89.
2. Miller, RH and Rosenfield, DB. The Rule of Electromyography in Clinical Laryngology. *Otolaryngol Head and Neck Surg* 1983; 92:287-291.
3. Koufman, JA and Isaacson, G. Laryngoplastic Phonosurgery. *Otolaryngologic Clinics of North America* 1991; 24: 1151-1177.
4. Tucker, HM. Rehabilitation of the Immobile Vocal Fold: Paralysis or Fixation. In: Fried, MP. *The Larynx. A Multidisciplinary Approach*. Boston, Toronto: Little, Brown and Company, 1988.
5. Miller, RH and Rosenfield, DB. Hoarseness and Vocal Cord Paralysis. In: Bailey, BJ, et al, eds. *Head and Neck Surgery - Otolaryngology*. Philadelphia: J.B. Lippencott, 1993.
6. Willatt, DW and Stell, PM. Vocal Cord Paralysis. In: Paparella, MM, et al, eds. *Otolaryngology*. Philadelphia: W.B. Saunders, 1991.
7. Belafsky PC, Postma GN: Vocal fold augmentation with calcium hydroxylapatite. *Otolaryngol Head Neck Surg* 2004; 131: 351-354.
8. Bielamowicz S, Stager SV: Diagnosis of unilateral recurrent laryngeal nerve paralysis: laryngeal electromyography, subjective rating scales, acoustic and aerodynamic measures. *Laryngoscope* 2006; 116: 359-364.
9. Branski R, Murry T, Rosen CA: Voice Therapy. In: *Otolaryngology and Facial Plastic Surgery*. Available at: <http://www.emedicine.com/ENT/topic 683.htm>; 2000.
10. Kwon TK, Buckmire R: Injection laryngoplasty for management of unilateral vocal fold paralysis. *Curr Opin Otolaryngol Head Neck Surg* 2004; 12: 538-542.
11. Laccourreye O, Papon JF, Kania R: Intracordal injection of autologous fat in patients with unilateral laryngeal nerve paralysis: long-term results from the patient's perspective. *Laryngoscope* 2003; 113: 541-545.
12. Miller S: Voice therapy for vocal fold paralysis. *Otolaryngol Clin N Am* 2004; 37: 105-119.

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