Bilateral arytenoidectomy with lateralisation of vocal folds: review of two cases

Parmanand Prasad · Siddharth Shankar

Abstract We present a review of two cases of bilateral abductor palsy of vocal cords with cords in paramedian position. The aetiology was not clear. As definitive treatment, arytenoidectomy and vocal cord lateralization on both sides were done by external laryngofissure approach. Objective of this review is to emphasize upon the fact that external procedures under direct vision has still a role to play in the era of endoscopic maneuvers. It can be performed successfully even at centers having limited gadgets. The two procedures of arytenoidectomy and vocal cord lateralization were combined to achieve higher success rate irrespective of fixity of cords. Result seems to be at par with other newer surgical modalities.

Keywords Bilateral abductor palsy of vocal cords · Arytenoidectomy · Laryngofissure

Keymessages Endoscopic procedures of vocal cord lateralization, cordectomy & LASER arytenoidectomy are certainly state of the art techniques in the surgical management of bilateral abductor palsy/fixation of vocal cords, but extralaryngeal approach of arytenoidectomy and vocal cord lateralization will continue to have its place due to its simplicity and equally comparable results.

P. Prasad (Pal)¹ · S. Shankar¹

¹Department and institution
Department of ENT,
Patna Medical College & Hospital,
Patna,
Bihar, India

S. Shankar (✉)

Dept of ENT, Kamineni institute of medical sciences,
Sreepuram, Narketpally,
Nalgonda - 508 254
Andhra Pradesh, India

e-mail: drsiddharth1@yahoo.com
Ph: +91 / 9347312810

Introduction

Bilateral vocal cord abductor palsy is commonly due to involvement of both recurrent laryngeal nerves during surgery of the neck. Other causes include trauma during intubation, systemic diseases like rheumatoid arthritis, gout, Crohn's disease, collagen vascular disease, systemic lupus erythematosus, Wegner's granulomatosis, amyloidosis, tuberculosis etc. In neonates and children, Arnold-chiari malformation, hydrocephalus and meningomyelocoele are the causative factors [1].

In sizable number of cases the aetiology remains unclear. Symptoms depend on the onset and severity of the vocal cord palsy. Initially there is stridor and mild difficulty in breathing but the voice quality may be good. Later on as condition progresses, breathing difficulty gets severe enough to require tracheostomy.

Vocal fold paralysis has a distinct effect on both the vocal functions and respiratory functions. As the cause of a unilateral or bilateral paralysis can be any lesion from the brainstem to the region of the upper mediastinum, it is essential that a methodical approach based upon thorough clinical evaluation and disease specific investigations are used to ascertain the cause of paralysis. Standard approach to treatment is removal of cause, if any, and then only surgery is targeted towards correction of vocal cord palsy. Even in idiopathic cases, depending upon the degree of palsy, expectant treatment is carried out for 2–6 months before undertaking any corrective procedure. This allows vocal cord palsy to improve spontaneously in many cases [2]. Electrical tests of muscle (EMG) to see the motor potentials may be helpful in determining the timing of surgery.

Active management include arytenoidectomy, lateralization of the vocal cords either by external approach or endoscopically, partial resection & posterior cordectomy. Use of laser is done for precision in the surgery [2, 3, 4].

Material and method

Two cases of bilateral abductor vocal cord palsy came to the ENT department of PMCH, Patna. Arytenoidectomy and vocal cord lateralization on both sides were done under local anesthesia.

Case 1

A 14-year-old boy presented with stridor and dyspnoea on exertion for 2 years, increasing slowly in severity. He had no history of any prolonged medical illness, neck swelling, trauma or surgery in neck region. Clinical examination and investigations were carried out thoroughly including CT scan of brain, base of skull and neck & chest to know the diagnosis. On indirect and fiberoptic laryngoscopy, vocal cords were found to be in the paramedian position. History and investigations were inconclusive about the aetiology. Surgery was planned after discussion with the patient's attendant.

Operative procedure

Elective tracheostomy was performed under local anesthesia to secure the airway. 45 minutes before the actual procedure, 1 amp fortwin (pentazocin) & 1 amp promethazine (phenergan) were injected IM. Patient was laid supine on the OT table with neck extended. Skin was infiltrated with 2% xylocaine with adrenaline along the horizontal skin crease in middle of the neck. Transverse skin incision was given. Deep fascia was incised to reach the strap muscles, which were retracted laterally.

Stay sutures were given to fix the flaps. Surface of the larynx with its perichondrium was reached. Midline incision was given superiorly in the thyrohyoid membrane, continued through the laryngeal cartilage & extended inferiorly up to the cricothyroid membrane to open the larynx (Fig. 1). Inside of larynx was visualized. Posteriorly, arytenoids were identified. Incision over the medial and posterior aspects of arytenoid was given and it was dissected out leaving behind the vocal process, providing alignment to the cord. Arytenoidectomy was done to achieve some lateralization, postoperatively, by cicatrization [3]. A 5-0-prolene sutures was passed around the vocal cord at the junction of middle and posterior third and cord was lateralized. Suture was fixed with thyroid ala at the level of vocal cord. This was done to get maximum opening near posterior commissure during respiration. Similar procedure was repeated on the other side. Closure was done in layers.

Our aim was to lateralize vocal cords so as to allow glottic space of about 5–6 mm, to serve functions of both respiration and phonation and to avoid aspiration (Fig. 2). During the procedure, patient had cough reflexes on few

Fig. 1 Midline incision was given superiorly in the thyrohyoid membrane

Fig. 2 Lateralization of vocal cords to create glottic space to avoid aspiration

occasions, which were controlled by spraying 10% xylocaine directly over the mucosa. Ryle's tube was passed & kept for 3 days for feeding and allowing rest to the laryngeal framework. Post-operative recovery was uneventful. Decannulation was started after 2 weeks and was successfully achieved.

Case 2

A female patient aged 50 years presented with complaints of severe dyspnoea and stridor. She had history of progressive breathlessness for over 6 months. On indirect laryngoscopy, bilateral abductor palsy of the vocal cords was diagnosed.

Emergency tracheostomy was performed to relieve the dyspnoea. Further history, clinical examination and

imaging were inconclusive of any clear-cut aetiology. Patient was explained of the situation. She wanted to get rid of tracheotomy tube, hence bilateral arytenoidectomy with vocal cord lateralization, as in case 1, was planned under local anesthesia. Similar operative procedure was employed.

Postoperatively, patient did well and decannulation was possible after 2 weeks time after assessing the glottic space on laryngoscopy.

Both patients have uneventful follow up for periods of 18 months and 12 months respectively.

Both patients were subjected to speech therapy for the period of two months to improve their voice quality. Vocal exercises were mainly aimed at improving the articulation of speech and to avoid hyperventilation syndrome due to excessive air leak as a result of vocal cord lateralization.

Patients were able to communicate more clearly after speech therapy. Quality of voice was acceptable.

Discussion

The treatment of bilateral vocal cord palsy has always caught imagination of the clinicians, considering the function of larynx as organ for vocalization and respiration. Vocal cords adduct during voice production and abduct during inspiration. Functional vocal cords also prevent aspiration.

History of the treatment modalities for vocal cord palsy cases is full of experiments with variable results [2, 3, 4].

In the early 1900s, the only treatment option for bilateral vocal cord palsy was tracheostomy.

In 1922, Jackson described the unilateral excision of the false and true vocal cords, which led to improved breathing. Some patients were successfully decannulated but results were not satisfactory in others. One disadvantage related to the procedure was a weak voice postoperatively.

Few years later, Hoover performed “submucous resection” of the vocal cords but it led to scarring and vocal stenosis with severe dyspnoea.

The first major breakthrough came in 1939 when King, an orthopaedician, introduced a function restoring procedure that consisted of suturing the arytenoid cartilage to the omohyoid muscle. He suggested that improved breathing was related to a return of function of the vocal cord because of the contraction of the omohyoid muscle during inspiration. However it was later found that the arytenoids became fixed in the lateral position.

Kelly modified King’s technique by excising the arytenoids through a window in the thyroid cartilage and by placing a suture to lateralize the vocal cord.

In 1946, Woodman [5] described a new method that was the treatment of choice for several decades. Using an external approach through the postero-lateral part of the larynx, he removed the arytenoid cartilage except the vocal process. He did not lateralize the vocal cord.

In the first endoscopic arytenoidectomy, performed by Thornell, the arytenoid cartilage was dissected after tracheostomy, with coagulation of the exposed area to promote scarring. This method had reported success rate of 80%. The main drawbacks were difficulty of manipulating the microsurgical instruments through the laryngoscope and associated edema and bleeding.

In 1976, Tucker re-innervated the vocal fold by transferring part of the omohyoid muscle along with a branch of ansa hypoglossi and implanted it within the posterior crico-arytenoid muscle. This technique had inconsistent results.

Eskew and Bailey first used the CO₂ laser for arytenoidectomy in 1983 in a dog model.

In 1989, Dennis and Kashima introduced the posterior cordectomy technique. They excised of the posterior part of the vocal cord with CO₂ laser without arytenoidectomy.

Laryngofissure technique, employed in our case, is simple procedure to visualize the inside of larynx. In our opinion, arytenoidectomy coupled with lateralization on both sides decreases the failure rate, which is the major concern with the surgeries for this condition [3]. It also facilitates postoperative recovery with early decannulation and provides reasonable phonation. It can also obviate the need of general anesthesia in adult patients, if preoperative preparation is done correctly. Arytenoidectomy done on both sides allows space posteriorly for airway and subsequently decreases the need of excessive lateralization of cords in achieving desired results. All these eventually prevent complications like aspiration. In both the cases, transverse skin incision was given and closure of skin was done by subcuticular stitches to avoid any cosmetic problem.

References

1. Holinger LD, Holinger PC, Holinger PH (1976) *Ann of Otol Rhinol Laryngol* 85(4pt1):428–436
2. Scott-Brown’s otolaryngology, vol-5 (laryngology and head and neck surgery), 5/9/14-15, sixth edition
3. Cumming’s otolaryngology head & neck surgery; laryngeal palsy, 2199, 4th edition
4. Logan Turner’s diseases of the nose throat and ear, bilateral abductor palsy, 183, 10 th edition, 1988
5. Woodman DG (1946) A modification of the extra laryngeal approach in arytenoidectomy for bilateral abductor palsy. *Archives of otolaryngology* 48:63–65