

Vocal Cord Lateralization in Bilateral Abductor Paralysis by Extra-Endo Laryngeal Suture Technique: A Case Series

Sharanabasappa Rudragouda Malipatil¹ · Shilpa Potnuru¹ · Ravindrakumar Ningappa Karadi¹

Received: 21 December 2017 / Accepted: 16 May 2018
© Association of Otolaryngologists of India 2018

Abstract Bilateral Abductor vocal cord paralysis is certainly amongst the most emergent situation an otorhinolaryngologist come across during his/her practice. The treatment of this condition has undergone prominent shift from a blind life-saving “Tracheostomy” to more exquisite and promising laryngeal function preserving surgeries. The objective of the study is to throw light on our experience of a novel method of lateralization of vocal cord in six patients. The procedure was found to be reliable as well as associated with numerous advantages including shorter operating time and lesser intra operative manipulation on larynx. The method is less irritant (knot on outer aspect of larynx), adjustable (knot can be tightened and loosened accordingly) and reversible (knot can be removed if patient recovers). Additional benefits of the practice are smooth learning curve and economic in nature. The procedure has also been modified from quadruple prick to triple prick technique by us. This development further led to decreased operative time as well as lowered risk of trauma to larynx.

Keywords Abductor palsy · Lateralization · Vocal cord paralysis

Introduction

Bilateral Abductor cord paralysis is a rare clinical scenario attributed to simultaneous damage to both recurrent laryngeal nerves. The damage could be Iatrogenic (post-

surgery-thyroidectomy), idiopathic or traumatic. Other infrequent causes include inflammation, malignancies and prolonged intubation. Such patients present with varying degree of breathing problems such as dyspnoea on exertion, stridor, respiratory distress and cough. Speech is usually well preserved in this condition.

Majority of patients with bilateral abductor palsy require intervention (Tracheostomy) on emergency basis to relieve obstruction in upper airway tract. Few of them circumvent this situation due to paramedian position of vocal cords. The treatment for this condition is usually an equilibrium between phonation and airway maintenance. Until the advent of novel procedure [1], conventional line of treatment for bilateral abductor paralysis was Tracheostomy. In 1991, discovery of suspension laryngoscope by Kleinsasser entirely redefined the treatment of bilateral abductor cord palsy. Following which several treatment options materialized opportunely named cord lateralization, cordotomy, tracheotomy, posterior cricoid split, laser cordectomy [2], arytenoidectomy and additionally others like laryngeal reinnervation (Tucker’s procedure) [3], transplant and muscle transfer procedures.

Materials and Methods

Case 1

Aged 17, male stated 10 years of difficult breathing and occasional snoring. Absolute no history of previous neck surgeries. No interventional history. Video laryngoscopy revealed paramedian immobile vocal cords. The case was finally diagnosed of idiopathic bilateral abductor vocal cord palsy. Tracheostomy and lateralization of left vocal

✉ Sharanabasappa Rudragouda Malipatil
sharnu_rmp@yahoo.co.uk

¹ Department of Otorhinolaryngology, Shri B M Patil Medical College, Bijapur, Karnataka, India

cord (Procedure-1) was done. Postoperatively decannulation was done on day-7.

Case 2

Aged 55, female showed up with difficulty in breathing on exertion, frequent Tracheostomy tube blockade and trouble in maintaining tube hygiene. The patient had a history of Thyroidectomy for ca thyroid for which Tracheostomy had been done in 2012. Lateralization of vocal cord (Procedure-1) was done on 05-07-2014. Tracheostomy tube was removed on 09-07-2014 (postop day-4).

Case 3

Aged 50, female turned up with noisy breathing. The patient had a history of hepatitis-B, pneumonia which followed intubation and ventilation in Intensive Care Unit. During which acute respiratory obstruction was developed and with the diagnosis report of bilateral abductor palsy, emergency Tracheostomy was done. Lateralization of Right vocal cord (Procedure-1) was decannulation was done on postoperative day 7.

Case 4

Aged 35, female presented difficult breathing and stridor. The patient stated medical history of thyroidectomy with unpremeditated injury to bilateral recurrent laryngeal nerve leading to bilateral cord palsy. Patient was tracheostomized for 3-months intractable stridor. During the period of the admission, she underwent lateralization of left vocal cord (Procedure-1).

Case 5

Aged 4, female stated difficulty in breathing for over a period of 1 year. Tracheostomy was done 6 months back. Endoscopy showed bilateral immobile vocal cords, fixed in paramedian position. Ultimately, diagnosis of idiopathic bilateral abductor vocal cord palsy was made. Lateralization of Left vocal cord (procedure-3) was done on. Decannulation was done on post-operative day 22.

Case 6

Aged 58, female presented difficulty in breathing since last 6 months. The patient was subjected to total thyroidectomy for thyroid carcinoma 9 months back. Lateralization of vocal cord (Procedure-3) with Tracheostomy was done. Decannulation was done after 1 week.

Three different techniques were followed in lateralization of vocal cord of six patients with a sample size of 2 in

each technique. Intra operative time, difficulty in manipulation of the needle and time to remove Tracheostomy tube in postoperative period were noted in each case.

Surgical Procedure

The principle of the technique used is to lateralize the cord by tying a knot with 1-0 prolene. Patients are placed supine. Tracheostomy performed under local anesthesia (if not done previously). General anesthesia induced. Pre-procedure labeling of the following points is done.

- Point “X”-Midpoint of thyroid notch and thyroid cartilage in the midline.
- Point “P”-½ inch posterior-lateral to the point X (on the Contralateral side of the vocal cord that has to be lateralized).
- Point “Q”-¼ inch below point P. (on the contralateral side of the vocal cord that has to be lateralized).

Procedure 1 “Quadruple Prick Method Using Spinal needle and Slit eye-Sewing Needle”

Step 1: A Lumbar Puncture needle is passed from point “Q” and directed to the lower aspect of the opposite vocal cord under laryngoscopic vision and the needle is brought out by passing it beneath the cord. A 2-0 prolene thread was fed after removing the stylet of LP needle. One end of the thread is pulled out on the opposite side; the needle is removed without disturbing the thread. The other end of the prolene is pulled through the laryngoscope into the larynx (Fig. 1).

Step 2: A slit eyed sewing needle is passed from point “P”. Under the laryngoscopic guidance, needle is guided just above the vocal cord and brought out on the opposite side of the neck.

Step 3: The prolene which is pulled through the laryngoscope is hooked on to the slit-eye of the needle, and needle is further guided to completely exit from larynx.

Step 4: A small skin incision is given on the neck at the exit points of the prolene and a knot is tied on the outer aspect of larynx using the two ends of the prolene after adjusting the amount of lateralization which is required. Knot is buried under the skin.

Procedure 2 “Quadruple Prick Method Using only Spinal Needle” [5]

Step 1: A Lumbar Puncture needle is passed from point “Q” and directed to the lower aspect of the opposite

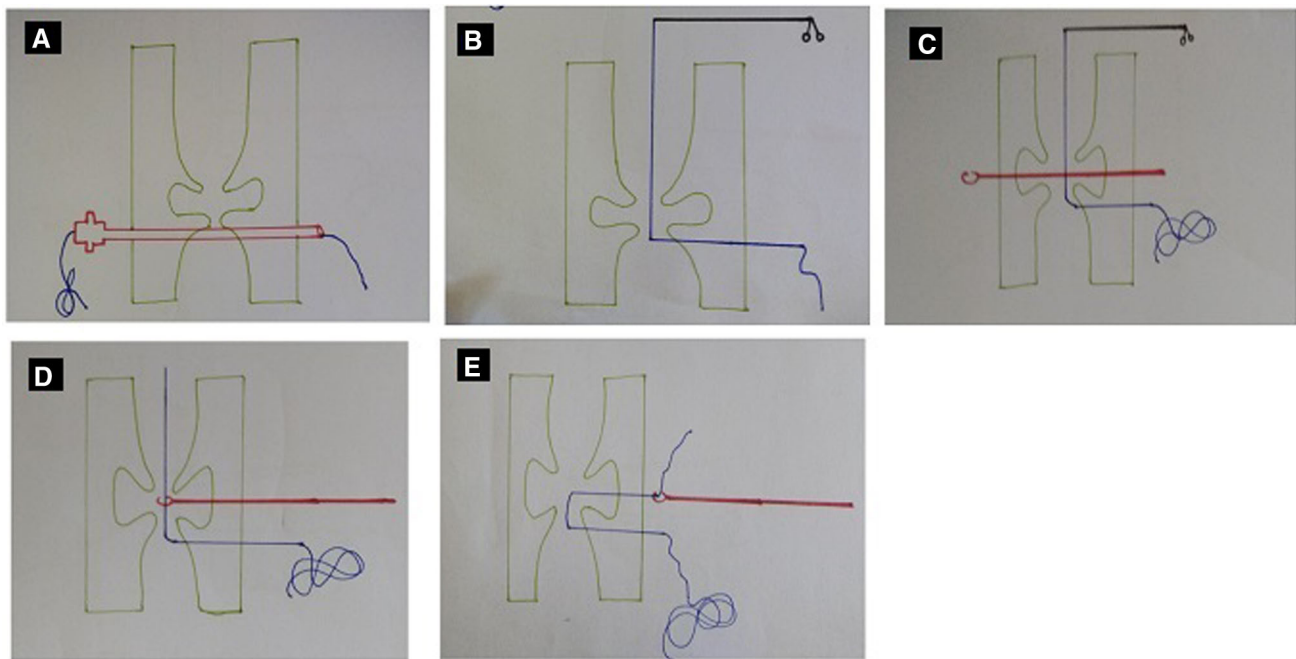


Fig. 1 a–e are the images illustrating step by step of procedure-1; **a** insertion of spinal needle, **b** prolene is pulled into larynx, **c** insertion of slit eyed sewing needle, **d** prolene is hooked onto the sewing needle's slit eye, and **e** needle along with prolene is pulled out of larynx

vocal cord under laryngoscopic vision and the needle is brought out by passing it beneath the cord. A 2-0 prolene thread is fed after removing the stylet of LP needle. One end of the thread is pulled out on the opposite side; the needle is removed taking care not to disturb the thread. The other end of the prolene is pulled through the laryngoscope into the larynx (Fig. 2).

Step 2: Instead of passing a sewing needle, LP needle is passed from point P. With the guidance of laryngoscope, needle is brought out just above the vocal cord.

Step 3: A 2-0 prolene suture is looped and the free ends are inserted into the needle through the back end of the needle, free ends are pulled out on to the outer aspect of larynx via the beveled end of the needle. Needle is withdrawn until the loop is seen inside the larynx and the loop is pulled into the larynx under guidance of laryngoscope.

Step 4: The free end of prolene (Refer step-1), is passed through the loop (refer step-3) and the loop is pulled out along with the free end of the prolene.

Step 5: A small skin incision is given on the neck at the exit points of the prolene and a knot is tied on the outer aspect of larynx using the two ends of the prolene after adjusting the amount of lateralization which is required. Knot is buried under the skin.

Procedure 3 “Triple Prick Method Using Only Spinal Needle”

Step 1: A Lumbar Puncture needle is passed from point “Q” and directed to the lower aspect of the opposite vocal cord under laryngoscopic vision and the needle is brought out by passing it beneath the cord. A 2-0 prolene thread is fed after removing the stylet of LP needle. One end of the thread is pulled out on the opposite side; the needle is pulled back a little without completely removing out from larynx. Prolene is pulled through the laryngoscope into the larynx (Fig. 3).

Step 2: Without further withdrawal, the same needle is guided forward to just above the vocal cord and emerged it out on the neck.

Step 3: A 2-0 prolene suture is looped and the free ends are inserted into the needle through the back end of the needle, free ends are pulled out on to the outer aspect of larynx via the beveled end of the needle. Needle is withdrawn until the loop is seen inside the larynx and the loop is pulled into the larynx under guidance of laryngoscope.

Step 4: The free end of prolene (Refer step-1), is passed through the loop (refer step-3) and the loop is pulled out along with the free end of the prolene.

Step 5: A small skin incision is given on the neck at the exit points of the prolene and a knot is tied on the outer aspect of larynx using the two ends of the prolene after

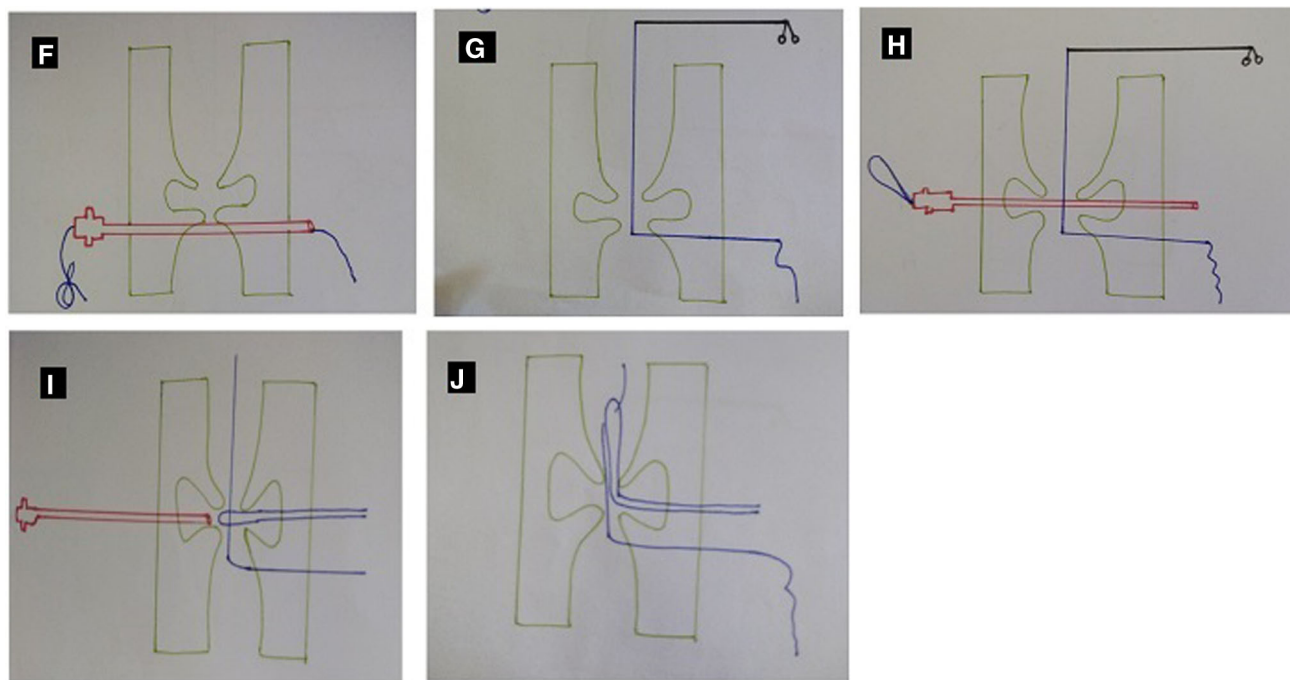


Fig. 2 f-j are the images illustrating step by step of procedure-2; **f** insertion of spinal needle, **g** prolene is pulled into larynx, **h** insertion of spinal needle along with loop of prolene, **i** intra-laryngeal prolene

is passed into the loop of the prolene, and **j** loop along with intra-laryngeal prolene is pulled out of larynx

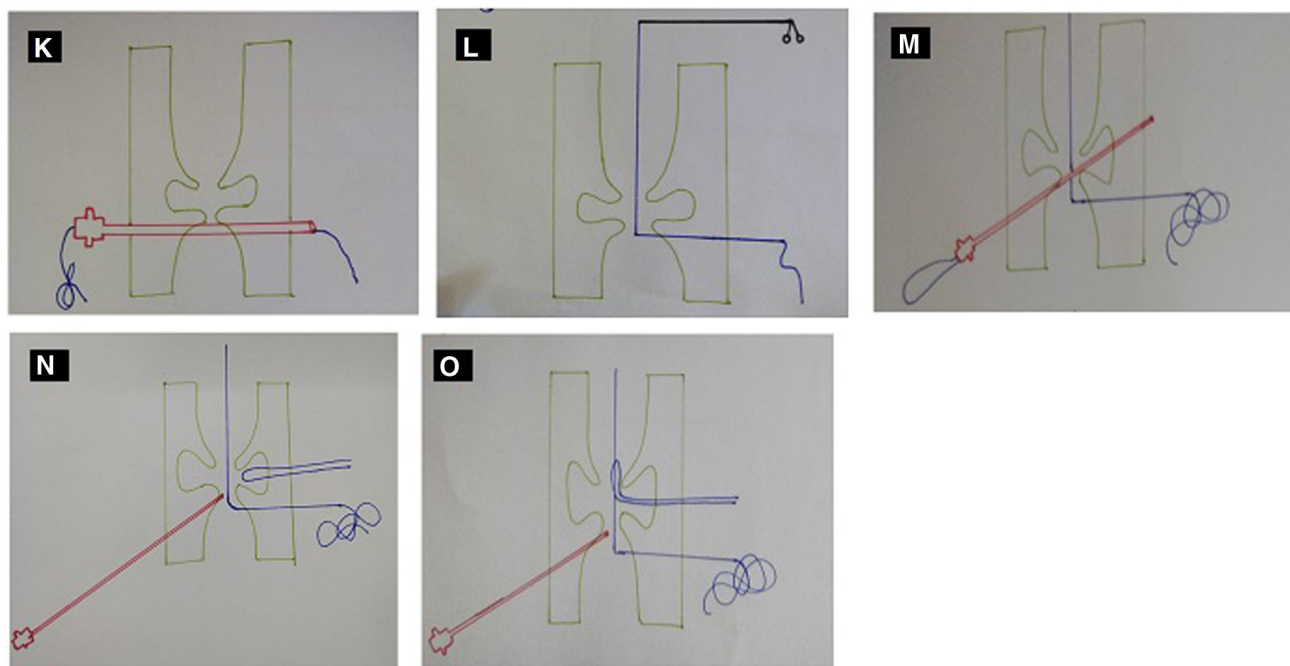


Fig. 3 k-o are the images illustrating step by step of procedure-3; **k** insertion of spinal needle, **l** prolene is pulled into larynx, **m** Same spinal needle is redirected to the upper surface of vocal cord and a loop of prolene is passed through it, **n** intra-laryngeal prolene is

passed into the loop of the prolene, and **o** loop along with intra-laryngeal prolene is pulled out of larynx

adjusting the amount of lateralization which is required. Knot is buried under the skin.

Postoperative management: All patients were put on broad spectrum antibiotics and nebulization was recommended

Table 1 Table showing the characteristics of each patient

Case	Age	Sex	Etiology	Vocal cord position	Procedure
1	17yrs	Male	Idiopathic	Para-median	Quadruple prick method using spinal needle and slit eyed sewing needle
2	55yrs	Female	Post-thyroidectomy	Para-median	Quadruple prick method using spinal needle and slit eyed sewing needle
3	50yrs	Female	Traumatic	Median	Quadruple prick method using only spinal needle
4	35yrs	Female	Post-thyroidectomy	Para-median	Quadruple prick method using only spinal needle
5	4yrs	Female	Idiopathic	Para-median	Triple prick method using only spinal needle
6	58yrs	Female	Post-thyroidectomy	Median	Triple prick method using only spinal needle

Table 2 Table showing the amount of time required to complete the surgery in each procedure

Procedure	Average time (min)	No. of pricks to larynx
“1”	11	4
“2”	9	4
“3”	8	3

with steroids and mucolytic agents. Also, close observation was ensured for any associated complications like dyspnoea, stridor and wound complications. Tracheostomy tube was removed once the patient stabilized.

Results

A total of 6 patients were involved in the study, two in each procedure. Description of the procedure performed as well as the corresponding time taken in each procedure has been tabulated in Tables 1 and 2.

Operating time is the least in procedure-3 in comparison to procedure 1 and 2. Post operation, all the patients recovered well with acceptable voice quality. No complications were reported. All the patients were decannulated postoperatively by day 4 to day 17 with an average of 8 days.

Discussion

Several courses of treatment are available in bilateral abductor vocal cord palsy. Tracheostomy had been an inevitable step. However, there have been cases where the step was dropped and a regular examination followed by flexible laryngoscope particularly in children. The treatment can be classified in a number of ways i.e., permanent and temporary; endoscopic and open; resection and preserving.

The first suture lateralization of vocal cord was described by Kirchner [4] in 1979, where needle insertion is blind

and knot is intralaryngeal. In 1984 Remsen et al. [5] placed the knot on the outer aspect of larynx. In 2004 Mathur et al. [6] described the Quadruple prick method with spinal needle (procedure-2). Our team used the triple prick method which has upper hand due to lesser operating time and intra-operative laryngeal manipulation required as well as reduced risk of trauma to the larynx. In all the cases operated by our team, the knot was placed outside the larynx which proved to be less irritating.

In the study, we gained expertise over 3 different procedures of vocal cord lateralization. The main disadvantage of procedure-1 (quadruple prick method with spinal needle and slit eyed sewing needle) is unavailability of slit eyed sewing needle. Also, it causes more damage to larynx as the slit end of the needle has to be pulled through the larynx. In addition, procedure-1 involves more intra laryngeal manipulations when compared to procedure 2 and 3. Procedure-3 has an edge over procedures 1 and 2 as it causes less trauma to larynx due to less number of pricks to the larynx (three vs four). Consequently, procedure 3 proves to be less scarring.

Other unaccounted benefits of these procedures include accurate positioning of needle and the knot, adjustment of cord lateralization (by loosening and tightening of knot) as well as reversibility (if patient recovers knot can be cut). Laser treatment and cordectomy lack such advantages.

Conclusion

Lateralization procedure of cord discussed in the study is uncomplicated as well as apparent. The procedure holds the predilection on the grounds of associated exclusive qualities against laser, which is a fine technology. The procedure proves to be an economically preferable option in low infrastructure setups. This procedure could be the modality of choice in patients with a expected recovery.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Ernster JA (2006) Vocal fold paralysis, bilateral, eMedicine. Uptaded March 2006
2. Sreenivas K et al (2015) Management of bilateral abductor palsy, a case series. *J Evol Med Dent Sci* 4(44):7704–7709
3. Christopher R et al (2005) Bilateral congenital vocal cord paralysis. *Otorhinolaryngol Head Neck Surg* 133:241–245
4. Kirchner FR (1979) Endoscopic lateralization of vocal cord in abductor palsy of larynx. *Laryngoscope* 89:1779–1783
5. Remsen K et al (1985) Laser lateralisation of bilateral vocal cord abductor paralysis. *Otolaryngol Head Neck Surg* 93:645–649
6. Mathur NN, Kumar S, Bothra R (2004) Simple method of vocal cord lateralization in bilateral abductor cord paralysis in paediatric patients. *Int J Pediatr Otorhinolaryngol* 68:15–20