Türk Otolarengoloji Arşivi
Turkish Archives of Otolaryngology

# Problems in the Treatment of Bilateral Abductor Vocal Cord Paralysis

*Bilateral Abduktor Kord Vokal Paralizi Tedavisindeki Sorunlar*

E. Altaş, Y. Sütbeyaz, A. Öztürk, RM. Karaşen, S. Kalkandelen

***Özet***

**Bilateral abduktor kord vokal paralizinin (BAKVP) yol açtığı dispne her zaman acil KBB yaklaşımına gereksinim duyar. BAKVP'nin alışılagelmiş tedavi metodları ideal değildir. Çünkü, bu metodların gecikmiş dekanulasyon, aspirasyon, kötü ses gibi bazı fonksiyonel sorunları vardır. Bu nedenle, bu konudaki çabalar larinks kaslarını reanime edebilen, denervasyon atrofisini önleyebilen ve vokal kord abdüksiyonu sağlayabilen daha fizyolojik bir rehabilitasyona doğru yönlendirilmelidir. Bu konu ile ilgili çalışmalar en ideal tedavi tekniğini geliştirmek için devam ediyor. Biz alışılagelmiş bir teknik olan Woodman aritenoidektomiyi trakeostomi ile birlikte 1992'den beri kullanıyoruz. Bu metodla yedi hastanın kliniğimizde tedavisi ve bunlardan beşinin takibi yapıldı. Ancak, bu beş hastadan birinin dekanulasyonu gecikti, dördünün kötü ses sorunu ve ikisinin de aspirasyon sorunu oluştu. Bu çalışmada, alışılagelmiş operasyonlarla ortaya çıkan fonksiyonel sorunlar ve bu sorunları önlemek için yeni ideal bir operasyon tekniğine duyulan gereksinim vurgulanarak tartışıldı.**

***Anahtar Sözcükler:*** **Kord vokal paralizisi, aritenoidektomi, dispne.**

Türk ORL Arşivi, 1998; 36(1-2): 11-14

***Abstract***

**The dyspnea caused by the bilateral abductor vocal cord paralysis (BAVCP) always needs emergency management in ENT. Conventional methods of treatment for BAVCP are less than ideal, these methods have some functional problems such as delayed decanulation, aspiration and voice worsening. Consequently, efforts should be directed towards a more physiologic approach to rehabilitation, that can reanimate the muscles of the larynx, prevent denervation atrophy, and restore vocal cord abduction. The studies about this concept continues for developing of the most ideal treatment technique. We use a conventional technique, Woodman's arytenoidectomy with tracheostomy, from 1992. Seven patients were treated by this method and five of the seven patients were followed up in our clinic. But, decanulation of one patient was delayed. Voice worsening and aspiration problem were developed in 4 patients and in 2 patients subsequently.**

**In this study, these functional problems of conventional operations and the accented necessity of a new ideal technique for functional operations were discussed.**

***Key Words*****: Vocal cord paralysis, arytenoidectomy, dyspnea.**

Turk Arch ORL, 1998; 36(1-2): 11-14

## Introduction

BAVCP due to recurrent laryngeal nerve injury compromises both abductory and adductory function of the vocal fold. In clinical presentation of BAVCP, both folds are paralized in the paramedian position, severely restricting ventilation, but allowing for nearly-normal voice production. Any type of subsequent laryngitis may precipitate an acute respiratory obstruction. The loss of abduction often requires emergency tracheotomy to create a functional airway.[1]

Enver Altaş, MD; Yavuz Sütbeyaz, MD; Aziz Öztürk, MD;
R. Murat Karaşen, MD; Sadettin Kalkandelen, MD
*Atatürk University, Faculty of Medicine, Department of ENT*

The most common cause of BAVCP is thyroidectomy.[2,3] The reported incidence of recurrent laryngeal nerve paralysis (RLNP) from thyroidectomy ranges 0.7%-2.3%.[4] In the patients of benign goiters, permanent RLNP were rare: 0.5 per cent. But, among patients with thyroid cancer, bilateral RLNP occured three times.[5] Grossmann's theory states that interruption of the recurrent laryngeal nerve alone results in a vocal cord paralyzed in the paramedian position.[6] The trauma to the vocal cords due to endotracheal intubation may explain the other causes of BAVCP.[7,8]

Various surgical techniques have been used for the treatment of BAVCP including endolaryngeal arytenoidectomy, laser arytenoidectomy, extralaryngeal arytenoidectomy via laryngofissure of the lateral pharyngeal approach, nerve-muscle transposition i.e. phrenic nerve graft, laryngeal muscular tenotomy and electrical pacing.[8-17] The first three procedures have proved over time. Effectiveness of the latter three procedures are still controversial.[8-11] The extralaryngeal approach is probably the most frequently used approach for the treatment of BVCP. This approach has the advantage of wider exposure.[12] In 1946, Woodman described a lateral pharyngeal approach to perform an arytenoidectomy.[2] At the present time, we are using a conventional technique, Woodman's arytenoidectomy by the lateral pharyngeal approach with tracheostomy.

In this retrospective study, we aimed to present the functional problems of classic operations and accented necessity of the new technique-functional operations.

## Material and Method

A retrospective chart review of seven patients who surgically for BAVCP between May 1992 and February 1996 at the Atatürk University, Medical School, Department of ENT&Head and Neck Surgery was undertaken. Six of them had a previous subtotal thyroidectomy (86%) and one of them had a previous near-total thyroidectomy (14%). All of the patients were female. The patients had a mean age of 36 years (15 to 65 years). Each patient had an initial tracheostomy to relieve obstruction. No one was operated on immediately after the tracheostomy. A general anesthetic was administered through a metal tracheostomy tube. Laryngoscope was inserted transorally and the larynx was exposed endoscopically. Vocal cord lesions such as ulcer, edema, granulation tissue were not observed in the larynx.

In five of them, Woodman's arytenoidectomy by the lateral pharyngeal approach was performed. The body of the arytenoid cartilage was removed and fixed its vocal process laterally to the thyroid cartilage. The other two of them had not accepted arytenoidectomy operation. The postoperative medication included methylprednisolone (32mg/d) and a broad-spectrum bacteriocidal antibiotic (amoxicilin-clavulanic acid 1500 mg/d). To prevent inflammation from gastroesophageal reflux, omeprazole (20 mg/d) was used. Postoperatively, the patients were followed up 2 to 20 week with fiberoptic laryngoscopy to observe the healing. One of them was not tolerated the decanulation and second time operation was made to the cross arytenoid. When the patient's airway appeared patent and plugging of the tracheostomy was tolerated, the tracheostomy tube was removed. All patients in this study were followed up for at least one year postoperatively.

## Results

As shown at the Table 1, we evaluated postoperative problems of the surgical therapy of BAVCP such as aspiration, voice worsening, i.e. hoarseness, and exercise tolerance. In addition, exercise tolerance was observed as excellent, good, and worse.

## Discussion

Various surgical techniques have been used for the treatment of to BAVCP. Unfortunately, open or endolaryngeal endoscopic resection of one or both vocal cords usually failed because granulation and scar tissue later narrowed the airway.[2,13,14,16] Endolaryngeal endoscopic arytenoidectomy and endolaryngeal laser arytenoidectomy procedures involve opening up to posterior glottic chink so as to provide a good airway.[18]

Endolaryngeal laser cordectomy, with or without arytenoidectomy is relatively easy to perform and is without serious complications, if the dysphonia is excluded.[19] The $CO_2$, KTP, and argon laser may be used to perform these arytenoidectomies.

**Table 1.** The documentation of our cases.

| Before Treatment of BAVCP | | | | After Treatment of BAVCP | | | | |
|---|---|---|---|---|---|---|---|---|
| **Patient No.** | **Age, sex, date of application** | **Preoperative diagnosis, thyroid operation** | **Complaints** | **Operation for cord paralysis** | **Aspiration and its duration (wk)** | **Voice worsening** | **Time to decanulation (wk)** | **Exercise tolerance** |
| 1 | 20, Female, 1992 | Benign goiter, Subtotal thyroidectomy | Dysphonia | Tracheostomy+ Woodman's operation | No | No | 2 | Excellent |
| 2 | 32, Female, 1995 | Thyroid Ca, Near-total thyroidectomy | Dyspnea | Tracheostomy | No | Yes | Not done | Not done |
| 3 | 43, Female, 1995 | Benign goiter, Subtotal thyroidectomy | Dysphonia+ Dyspnea | Tracheostomy+ Woodman's operation | Yes, 14 | Yes | 20 | Worse second operation to cross arytenoid |
| 4 | 16, Female, 1995 | Benign goiter, Subtotal thyroidectomy | Dysphonia+ Dyspnea | Tracheostomy+ Woodman's operation | No | Yes | 2 | Good |
| 5 | 45, Female, 1992 | Benign goiter, Subtotal thyroidectomy | Dysphonia+ Dyspnea | Tracheostomy+ Woodman's operation | Yes, 2 | Yes | 8 | Good |
| 6 | 65, Male, 1996 | Benign goiter, Subtotal thyroidectomy | Dysphonia+ Dyspnea | Tracheostomy+ | No | Yes | Not done | Not done |
| 7 | 33, Female, 1996 | Benign goiter, Subtotal thyroidectomy | Dysphonia+ Dyspnea | Tracheostomy+ Woodman's operation | No | Yes | 6 | Good |

The procedure of laser arytenoidectomy requires that the surgeon have expertise with the laser. He or she must have the dexterity to work with the laser and microscope through a laryngoscope.[18]

Another technique is reinnervation. Either the phrenic or the ansa cervicalis nerve is anastomosed to the abductor branch of the recurrent laryngeal nerve.[1,20,21] Although this technique has been successful in animals, only Rice had a patient who appeared to show reinnervated abduction.[2]

In addition to reinnervation techniques, other methods of re-energizing, i.e. electrical pacing the paralyzed muscle have been investigated. Posterior cricoarytenoid muscle is stimulated by electrical stimulation. The abduction was appropriately timed with aspiration by a simple pacing system effectively modulate stimulation with patient respiration.[3] However, clinical trials with devices have been limited by delays in developing satisfactory implantable devices.[2]

By the use of selective tenotomy of the interarytenoid and thyroarytenoid muscles, the arytenoid and vocal cord can be made to move away from the midline and thus open the glottis. This has allowed a drastic reduction in the amount of arytenoid, that must be removed and prevents both aspiration and arthritis of the joint with subsequent stiffness. The procedure can be performed by endoscopic or microscopic open procedure. Rontal M. et al[8] treated all eight patients by this method. They decannulated by 6 weeks postoperation, returned to full function, not had aspiration, and have no worsening of their voices. But, this procedure is in the experimental stage. In addition, the interarytenoid and thyroarytenoid muscles have been cut off and the physiological structure of the larynx have been destroyed. Woodman's operation is extralaryngeal arytenoidectomy via external pharyngeal approach. It remains a popular procedure for managing BAVCP, and it produces a satisfacto-

ry airway when the posterior comissure is between 4 and 6 mm, but when it is greater than 6 mm, a worse voice results.[2] Dyspnea in the postoperative stage after Woodman's operation was observed in only one patient. Exercise intolerance was observed after decanulation in the patient. His glottic chink was 4 mm. Therefore, second time Woodman's operation was made to cross arytenoid. Voice worsening was observed in four patients. Their glottic chink were greater than 6 mm. One patient was decanulated at 20 weeks postoperatively. Both arytenoid were removed by second time operation in the patient whose exercise intolerance was observed after decanulation. Aspiration was observed in two patients. Second time operation was performed one of them, previously.

## Conclusion

Unfortunately, present treatments for laryngeal paralysis ignore the reestablishment of the anatomy and physiology of natural neural control and lead to the problems such as dyspnea (exercise intolerance), dysphonia (hoarseness or voice worsening), and aspiration.

We suggested that best treatment for laryngeal paralysis is reestablishment of the anatomo-physiology of RLN. For this purpose, decompression of RLN, end-to-end anastomosis of RLN or neural greft may be made at once application. Otherwise, denervation atrophy in the laryngeal muscles and denervation artritis in the laryngeal joints may be developed.

### References

1. **Rice DH.** Laryngeal reinnervation. *Laryngoscope* 1982; 92: 1049-59.
2. **Willatt DJ, Stell PM.** Vocal cord paralysis. In: Otolaryngology. Head and Neck. Eds. Paparella MM, Shumrick DA, Gluckman JL, Meyerhoff WL. Philadelphia, Saunders, 1991; 2289-306.
3. **Arslan İ, Ağar N, Öner K et al.** Bilateral abduktor kord vokal paralizilerinde rekürrent laringeal sinir diseksiyonun önemi. *GATA Bülteni* 1993; 35: 1-7.
4. **Shindo ML, Sinha UK, Rice DH.** Safety of thyroidectomy in residency: A review of 186 consecutive cases. *Laryngoscope* 1995; 105: 1173-5.
5. **Lacoste L, Gineste D, Karayan J et al.** Airway complications in thyroid surgery. *Ann Otol Rhinol Laryngol* 1993; 102: 441-6.
6. **Grossmann M.** Experimentale Beitrage zur Lehre von der "Posticuslähmung". *Arch Laryngol Rhin* 1987; 6: 282.
7. **Ünlü Y, Cantürk M, Cemiloğlu R.** Romatoid artrite bağlı bilateral vokal kord paralizisi. *Erciyes Tıp Dergisi* 1991; 13: 561-3.
8. **Rontal M, Rontal E.** Use of laryngeal muscular tenotomy for bilateral vocal cord fixation. *Ann Otol Rhinol Laryngol* 1994; 103: 583-9.
9. **Gray DJ, Josephson JS, Krespi YP et al.** Airway obstruction. New modalities in treatment. *Med Clin North Am* 1993; 77(3): 539-49.
10. **Zealear DL, Rainey CL, Jerles ML et al.** Technical approach for reanimation of the chronically denervated larynx by means of functional electrical stimulation. *Ann Otol Rhinol Laryngol* 1994; 103: 705-12.
11. **Zealear D, Rainey CL, Netterville JL et al.** Electrical pacing of the paralyzed human larynx. *Ann Otol Laryngol* 1996; 105: 689-93.
12. **Ada M, Korkut N, Kaytaz A et al.** Bilateral abduktor kord vokal paralizilerinde cerrahi tedavi (Thornell). *Türk ORL Arşivi* 1990; 30: 228-30.
13. **Gürsal Ö, Cantürk MA.** Bilateral abduktor paralizisinin cerrahi tedavisinde Thornell modifikasyonu. *Türk ORL Arşivi* 1990; 28: 253-5.
14. **Cura O, Yavuzer A, Ege Y.** Bilateral abduktor paralizilerinde trakeotomisiz aritenoidopeksi (7 vaka üzerinde bir tartışma). *Türk ORL Arşivi* 1990; 28: 214-7.
15. **Kıyak E, Oğuz A, Cevanşir B et al.** Median ve paramedian kord paralizilerinde son uyguladığımız eksternal yaklaşımla glottisi genişletme operasyonu. *KBB Postası* 1991; 1: 34-6.
16. **Özdem C, Ölçer S, Demireller A et al.** Bilateral abduktor vokal kord paralizileri ve tedavisi. *Türk ORL Arşivi* 1990; 28: 58-9.
17. **Johnson JT, Rood SR, Stool SE.** Tracheostomy. *SIPAC* 1988; 1-60.
18. **Johns ME, Rood SR.** Vocal cord paralysis: Diagnosis and management. *SIPAC* 1987; 1-75.
19. **Ossoff RH, Sisson GA, Duncavage JA et al.** Endoscopic laser arytenoidectomy for the treatment of bilateral vocal cord paralysis. *Laryngoscope* 1984; 94: 1293-7.
20. **Crumley R.** Experimentals in laryngeal reinnervation. *Laryngoscope* 1982; 92(Suppl 30): 1-27.
21. **Rice DH, Burstein FD.** Restoration of physiologic vocal fold abduction with the ansa cervicalis nerve. *Arch Otolaryngol* 1993; 109: 480-1.

**Correspondence: Enver Altaş, MD**
*Atatürk Üniversitesi Tıp Fakültesi*
*Kulak Burun Boğaz Anabilim Dalı*
*25240 Erzurum - TURKEY*
*Tel: (0442) 233 11 22*
*Fax: (0442) 218 67 82*