

# Endolaryngeal Surgery of Bilateral Vocal Cord Abductor Paralysis\*

S. L. SELLARS, M.A., F.R.C.S., *Senior Lecturer, Department of Otolaryngology, Medical School, University of Cape Town*

## SUMMARY

The treatment of bilateral recurrent laryngeal nerve palsy is discussed and the method of endolaryngeal arytenoidectomy and cordopexy is described in detail. Two cases successfully treated by this method of surgery are presented.

*S. Afr. Med. J.*, 45, 1337 (1971).

Bilateral abductor paralysis of the vocal cords is uncommon and invariably demands surgical treatment. The aetiology is varied, but by definition the condition results from recurrent laryngeal nerve neuropathy on both sides. The palsies may occur coincidentally or, as is more common, one after a variable interval follows the other, which may until that time have existed unnoticed. Those following thyroid surgery and those associated with upper respiratory tract viral infections are the commonest.<sup>1,2</sup> The majority of other causes tend to overshadow the palsy in clinical importance.

The aim of surgical treatment, irrespective of the procedure selected, is to improve the airway without loss of the voice. The effects tend to be more serious when the onset is sudden than when this is gradual and the resulting airway may be so poor that tracheostomy becomes an essential and life-saving measure. The voice remains minimally impaired if subsequently a speaking-valved tracheostomy tube is used, but the patient must then suffer the inconvenience and hazards of a permanent tracheostome. The airway provided by this measure may in itself be inadequate for a normal active life.

The establishment surgically of a satisfactory airway through the normal channel requires separation of the paralysed vocal cords, and it is acknowledged that this is best performed by arytenoidectomy and cordopexy. Extralaryngeal surgical procedures to correct this deformity by lateral fixation of the vocal cord, with or without excision of the arytenoid cartilage, have been well documented,<sup>3-7</sup> and of these the Woodman procedure has remained the operation of choice when radical surgery is indicated.<sup>1</sup> The same results can be achieved by an endolaryngeal approach. In the Thornell method<sup>5</sup> the arytenoid cartilage is dissected free submucosally, and completely excised via a 1-1½ cm long oblique incision of the arytenoid mound. In the Kleinsasser method<sup>6</sup> the arytenoid is similarly excised but the incision is carried forwards two-thirds of the length of the vocal cord and a strip of the cord bulk is included in the excision. In both cases the defect is closed

with sutures, although Thornell<sup>5</sup> describes the use of an acrylic mould to eliminate suturing.

Spontaneous recovery of neuromuscular function may take place and is probably more the rule than the exception. This would seem a reasonable assumption in non-progressive lesions and in cases where the continuity of the nerve has not been disrupted. This form of surgery should therefore not be attempted until adequate time has been allowed for complete recovery of nerve function. The time interval suggested varies from author to author, 6 months being the shortest. A foreshortened time interval is unjustified (I have witnessed one palsy case recover 18 months after onset) and it is suggested that at least 18 months, if not longer, should be allowed before surgery is contemplated. In the meantime a tracheostomy can be utilized.

## OPERATIVE TECHNIQUE

In bilateral vocal cord abductor paralysis it is usual to find that one cord moves less on adduction than the other. For the sake of good postoperative voice production the more powerfully adducting vocal cord should be left undisturbed and the less mobile one is therefore the cord to be surgically transfixed. Pre-operative evaluation of this aspect of cord movement on phonation is essential. A tracheostomy in these cases is a prerequisite to the administration of a general anaesthetic and to the controlled ventilation of a paralysed patient. If this has not previously been done, it is best performed under local anaesthesia immediately before endolaryngeal surgery.

The pharynx and larynx are anaesthetized by topical application of 2% lignocaine. The largest suitable Kleinsasser laryngoscope is inserted and fixed by the Reichert's chest piece attachment, thereby freeing both the surgeon's hands. In view of the prolonged operating time the Reichert's chest piece is supported over the chest on a Mayo table and thus the weight of the laryngoscope is not taken by the patient's thorax. The larynx in the region of the proposed surgery is further anaesthetized by injection of about 4 ml of a solution of 1% lignocaine and 1/200 000 adrenalin into the submucosa of the specific arytenoid mound and of the false and true vocal cords. This injection assists haemostasis.

The procedure is carried out under the Zeiss operating microscope using a lens of 400 mm focal depth. Magnification of image is × 6 or × 10 depending upon the surgeon's preference. A wedge of mucosa 0.8 cm long overlying the arytenoid mound is excised. The incision is made with laryngeal microscissors on the medial aspect of the

\* Date received: 14 June 1971.



arytenoid mound and is carried laterally along the aryepiglottic fold medial to the corniculate and cuneiform cartilages. The base of the wedge resection overlies the arytenoid cartilage medially (Fig. 1). The arytenoid carti-

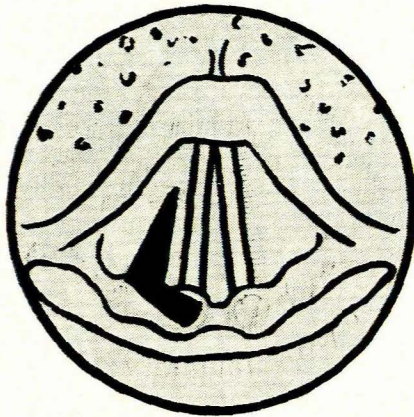


Fig. 1. Endoscopic view of the larynx showing the two areas of excision of the left supraglottic mucosa.

lage exposed across its upper surface is grasped with cupped forceps and dissected free from the muscle attachments posteriorly and laterally with microscissors. The arytenoid is finally freed by dissecting the medial side of the cartilage off the mucus membrane with a laryngeal knife and by severing the attachment of the vocalis process with the vocal cord.

Bleeding during this procedure is minimal, but if excessive it can be controlled by local pressure application of wool pledgets soaked in 1/1 000 adrenalin or by electrocoagulation. It has been suggested that the use of electrocoagulation in the arytenoid cartilage bed may enhance the lateral fixation. The author feels that the resulting fibrosis after electrocoagulation is an unknown quantity and may lead to uncontrolled glottic distortion and stenosis. Diathermy is therefore avoided where possible. The newly positioned cord should, with satisfactory healing, remain in its original surgically corrected position.

A further wedge of mucosa overlying the posterior half to two-thirds of the ventricular band is excized full thickness into and including the mucosa of the ventricle (Fig. 1). The mucosal defect of the ventricle and ventricular band is closed by interrupted 4/0 atraumatic silk sutures, which are placed so as to draw the posterior half of the vocal cord laterally and upwards. Three sutures are sufficient and another is required to close the arytenoid mound incision (Fig. 2). Correct positioning of these sutures is difficult but is essential for satisfactory closure of the defect and prevention of subsequent fibrosis. The technique has been well described by Langnickel and Koburg.<sup>10</sup>

On completion of the operation the new rima glottis should measure 6 mm across its posterior aspect if a satisfactory conclusion is to result.<sup>11</sup> The laryngeal airway deteriorates rapidly during the first few postoperative hours on account of local oedema. This may not settle for

many days, as seen by indirect laryngoscopy. Intravenous fluids are infused for 2 days and the patient is kept at nil by mouth during that time. Antibiotics are administered prophylactically. Absolute voice rest is encouraged for the first week.

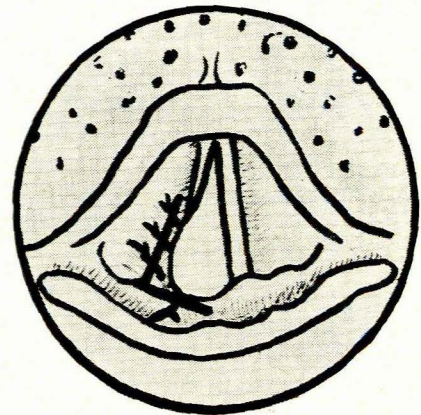


Fig. 2. Endoscopic view of the larynx showing the sutured wounds and reposition of the left vocal cord.

Check laryngoscopy under general anaesthesia is best performed after 2 weeks, and all sutures should then be removed. Any wound granulation is similarly dealt with at that time but it may be necessary to repeat the endoscopic removal of granulations at a later stage before final closure of the tracheostome. The systemic use of steroids to reduce postoperative oedema has been advocated, but as the tracheostome can be maintained without difficulty this seems unnecessary. The tracheostome is allowed to close when the glottic airway is judged adequate, 4-6 weeks after operation.

## CASE REPORTS

### Case 1

A 55-year-old White female had undergone a partial thyroidectomy in 1950, following which she developed dysphonia and dyspnoea. The voice partially returned after 3 months but the dyspnoea remained. Over the past 2 years her breathlessness had become steadily worse, especially with each bout of upper respiratory tract infection, and the necessity of a tracheostomy seemed imminent. Mirror examination of the larynx showed both cords to be paramedian in position with a very narrow glottic airway. There was bilateral adductor movement on inspiration and the left vocal cord and arytenoid moved on phonation. Abduction was absent on both sides.

On 29 September 1970 a tracheostomy was performed under local anaesthesia and this was immediately followed by an endolaryngeal excision of the right arytenoid cartilage and a cardopexy as described above. Apart from a mild bronchospasm the postoperative course was uneventful. Direct laryngoscopy 2 weeks postoperatively showed an oedematous right supraglottis and a fibrous polyp in the region of the posterior third of the right vocal cord. This and half the sutures were removed. A repeat direct laryngoscopy was performed after a further 2 weeks, when a residual polyp was completely excised and the 2 remaining sutures were removed. The tracheostomy tube was removed the next day.



The airway continued to improve for a further 2-3 weeks and reached a point where the patient was and still is able to lead a normal life without respiratory distress. Her exercise tolerance is far greater than at any time over the past 20 years. The voice deteriorated considerably during the first few post-operative weeks, but later returned to its pre-operative quality and volume.

## Case 2

A 51-year-old Coloured male had developed increasing laryngeal stridor and dyspnoea over a period of a few months. A bilateral abductor palsy of the larynx was diagnosed and a tracheostomy was performed on 28 June 1967. At that time the patient was diagnosed as a neurosyphilitic with aortic incompetence. On 19 January 1971 he underwent endolaryngeal arytenoidectomy and cordopexy as described. Considerable technical difficulty was encountered due to the patient's prominent front teeth. At direct laryngoscopy 3 weeks later all sutures were removed and the glottic airway was seen to be improved.

He failed to return to hospital 2 weeks later for removal of the tracheostomy tube. This was done only 3 months after surgery when he finally returned. The laryngeal airway was adequate for his requirements and his voice was then better than pre-operatively.

## DISCUSSION

Endolaryngeal surgery has in recent years made considerable technical advance. This is the direct result of application of the operating microscope to this form of surgery. Its use has added a new dimension to the operative repertoire of the modern laryngologist, so that surgical procedures previously impossible, impractical or performed by other means are now attempted with success. The condition and surgery under discussion illustrate the usefulness of microsurgery on this organ.

Relief from the effects of bilateral recurrent laryngeal nerve palsy is undoubtedly desirable. If an alternative to perpetual dyspnoea with or without a permanent tracheostomy is available it would seem eminently sensible that a proven surgical treatment should not be withheld, provided the patient is fit enough to withstand inhalation anaesthesia. The advantages of this procedure as opposed to the more widely used Woodman's operation are few, since both aim to achieve the same result. However, with the former there is no skin incision; soft tissue damage is minimal; the corrected cordal position is under constant view; one surgeon only is needed; and the cordopexy is more thorough. In cases where laryngoscopy is difficult such as with micrognathia or large teeth, this form of surgery may be impossible. Where doubt exists, preliminary trial laryngoscopy should be undertaken. The decision as to whether this surgery should be attempted or not, depends to some extent on the cause of the paralysis. It should never be performed in inoperable carcinoma.

I wish to express my gratitude to Dr J. G. Burger, Senior Medical Superintendent of Groote Schuur Hospital, for permission to publish.

## REFERENCES

1. Ballantyne, J. (1965): *Diseases of the Ear, Nose and Throat*, 2nd ed., pp. 672 - 675. London: Butterworths.
2. Williams, R. G. (1959): *J. Laryng.*, **73**, 161.
3. Kelly, J. D. (1941): *Arch. Otolaryng.*, **33**, 293.
4. King, B. T. (1939): *J. Amer. Med. Assoc.*, **112**, 814.
5. Berendes, J. (1949): *Arch. Ohr., Nas., u. Kehlk.-Heilk.*, **155**, 586.
6. Kressner, A. (1949): *Ibid.*, **155**, 459.
7. Woodman, de G. (1946): *Arch. Otolaryng.*, **43**, 63.
8. Thornell, W. C. (1959): *Diseases of the Nose, Throat and Ear*, 2nd ed., p. 647. Philadelphia: W. B. Saunders.
9. Kleinsasser, O. (1968): *Micro-laryngoscopy and Endolaryngeal Microsurgery*. Philadelphia: W. B. Saunders.
10. Langnickel, R. and Koburg, E. (1970): *H. N. O. (Berl.)*, **18**, 239.
11. Ellis, M. (1966): *Clinical Surgery, Ear, Nose and Throat*, p. 244. London: Butterworths.