

Experiences with teflon injections in unilateral adductor vocal cord paralysis

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Summary

Six of 16 patients presenting to the University Hospital Kuala Lumpur with unilateral recurrent laryngeal nerve paralysis were treated with teflon injection of the paralysed vocal cord. The results are presented and the role of surgical therapy, in particular teflon injection is reviewed.

Key words · Vocal cord paralysis, Teflon.

Introduction

Unilateral recurrent laryngeal nerve paralysis may be of the abductor type where the voice is fairly normal or it may be of the adductor type which often results in a distressingly breathy voice. Some patients can be managed successfully with voice therapy during a waiting period of at least six months. Surgical therapy will be needed if this initial therapy does not produce adequate voice recovery. Furthermore, professional voice users may demand early voice restoration. The breathy voice arises due to incomplete glottic closure as a result of lateralisation of the paralysed cord. Teflon injection of the vocal cord is a technique which enables medialisation of the affected cord and hence good glottic closure in phonation. Experience with teflon injection in treatment of unilateral adductor type vocal cord paralysis in the University Hospital Kuala Lumpur is presented.

Materials and Methods

Sixteen patients with unilateral recurrent laryngeal nerve paralysis were seen at the Voice Clinic, University Hospital since July 1988. Of these, 10 were managed successfully utilising voice therapy alone and in the remaining six, this was combined with teflon cord injection. These six patients form the subject of this study.

All six patients had the diagnosis of unilateral adductor vocal cord paralysis confirmed on laryngostroboscopic examination with the 90° telaryngoscope and stroboscope attachment. A simple objective parameter to assess the degree of air leakage was performed by obtaining the maximum phonation time. Patient was asked to phonate 'ee' for as long as possible after a maximum inspiration. The averaged time on two separate occasions corresponded to the maximum phonation time. Normals would be able to obtain times of at least 25–30 seconds while this would be accordingly shortened with increasing amounts of air leakage. This was recorded both preoperatively and at the three months postoperative follow-up.

The surgical procedure adopted was that of unilateral teflon injection of the paralysed cord. Following endotracheal intubation with small endotracheal tubes usually 5 or 6mm in diameter and general anaesthesia, a Kleinsasser laryngoscope was inserted and the injections performed under microscopic control. The tissues lateral to the vocal cord at the junction of the anterior and middle thirds was injected with 0.2 to 0.4ml of Teflon paste utilising a Bruning syringe. A second injection was performed lateral to the posterior third of the vocal cord utilising a further 0.4 to 0.6ml.

Absolute voice rest was insisted upon in the first five postoperative days after which patient was allowed minimal voice use for a further two weeks. Voice therapy was subsequently restarted.

The patient was assessed at the three month postoperative follow-up in terms of glottic gap closure on laryngoscopic examination, maximum phonation time and patients' own subjective voice assessment according to four grades. Good, satisfactory, unsatisfactory and poor grades correlated respectively with relatively normal voice, improved phonation with some residual air leakage, considerable air leakage and aphonia.

Results

The clinical data obtained is summarised in Table 1.

There were four female and two male patients. Left sided adductor vocal cord paralysis was diagnosed in four (Figure 1) and right sided involvement in two. All the affected cords were in the paramedian position. Atrophy and bowing with associated glottic gap on vocal cord adduction was variable being marked in patients 1 and 4. There was also a marked vertical level difference between the affected and normal cords in patient 4. Stroboscopic examination showed normal mucosal wave vibrations in all patients.

The paralysis resulted from postoperative causes in five patients. Causative surgery was thyroidectomy (3), parathyroidectomy (1) and thymectomy (1). Patients 1, 2, 5 and 6 had preoperative voice therapy for duration ranging from nine to 13 months but remained dissatisfied with their voice. Patients 3 and 4 had shortened periods of preoperative voice therapy. Patient 3 with inoperable lung cancer wanted to have a good voice during his remaining life expectancy period. Patient 4 was a salesman and he was unwilling to subject to the usual policy of awaiting possible spontaneous recovery of the voice.

Four patients assessed their voice improvement as good. Laryngoscopic examination also detected complete glottic gap closure on adduction with approximately tripling of the maximum phonation time in patients 1, 2 and 3 and doubling in patient 6. One patient was satisfied with her voice improvement with an associated 50% improvement in maximum phonation time. However glottic gap closure was incomplete. One patient was dissatisfied with his voice. This seemed to correspond to minimal change in the maximum phonation time and incomplete glottic gap closure.

Discussion

Recurrent laryngeal nerve paralysis presents according to whether vocal cord affected is unilateral or bilateral. In unilateral involvement, hoarseness is the foremost symptom in adductor type paralysis while abductor type paralysis is often asymptomatic. Bilateral cases tend to have stridor

Table 1
Intracordal Teflon Injection Patients with Unilateral Cord Paralysis
– Clinical Data and Results of Surgery

Case Number	1	2	3	4	5	6
Age						
Sex	F	F	M	M	F	F
Diagnosis	Post thyroi- dectomy	Post thyroi- dectomy	Lung Cancer	Post thyme- tomy	Post thyroi- dectomy	Post parathy- roidectomy
Side involved Right (R)/Left (L)	R	R	L	L	L	L
Duration of hoarseness months (m)/years (y)	2y	18m	4m	9m	3y	14m
Duration of preoperative voice therapy (months)	12	13	2	4	10	9
Maximum phonation time (seconds)						
Preoperative	7	11	8	10	13	14
Postoperative	21	30	24	13	20	26
Subjective voice improvement	Good	Good	Good	Unsatis- factory	Satis- factory	Good
Glottic gap closure	Complete	Complete	Complete	Partial	Partial	Complete

due to upper airway obstruction. Other symptoms noted in either category include aspiration, recurrent chest infections and cough.

The voice in unilateral adductor cord paralysis is characteristically weak, breathy and the patient easily becomes fatigued; a result of excessive leakage of air secondary upon incomplete glottic closure on adduction. The paramedian position of the paralysed cord compounded by the associated cord atrophy in chronic cases results in a residual glottic chink which is visible on laryngoscopic examination.

The rationale for advocating voice therapy and a waiting period of at least six months is to allow for recovery assuming the initial insult to the nerve was a neuropraxia; and also to await compensatory over-crossing of the midline by the normal cord. In our series, these compensatory mechanisms resulted in a final voice which was at least satisfactory in 10 of 16 patients.

Failure of the compensating mechanism and a persistent lateralisation of the paralysed vocal cord are the underlying factors for the persistence of an inadequate voice. A number of surgical

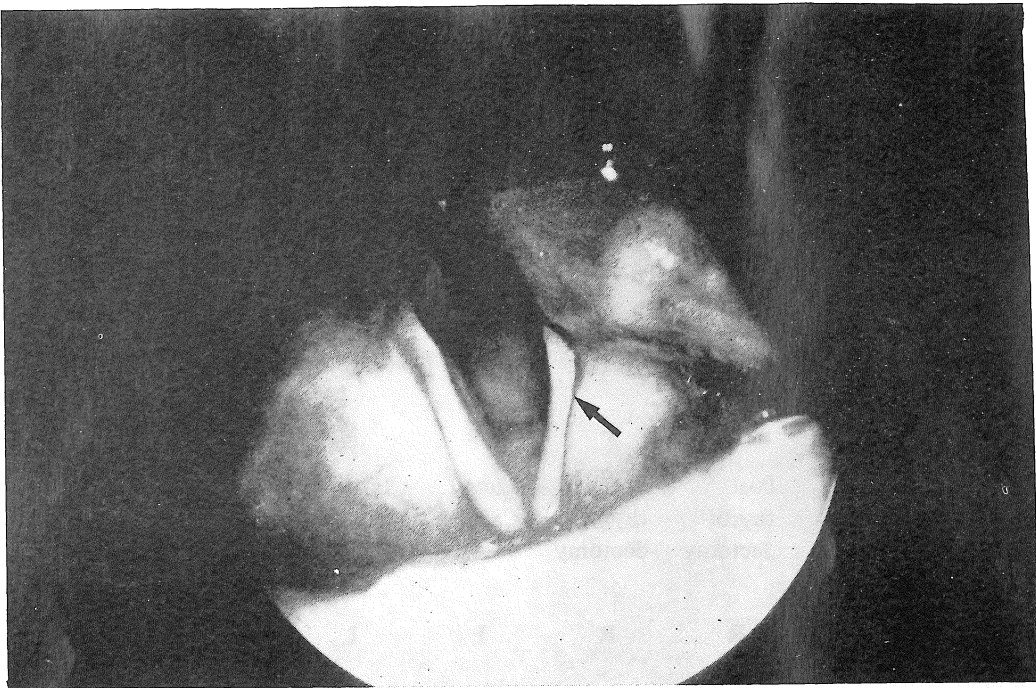


Figure 1: Laryngeal photomicrograph demonstrating left vocal cord paralysis (arrow). Note atrophy, bowing and paramedian position of left cord.

procedures have been advocated, the objective being to medialise the affected vocal cord so as to enable complete closure of the glottic cleft in adduction.

Injection of various substances to provide bulk to the vocal cord and also to mechanically medialise the paralysed vocal cord is a well established and most effective procedure.¹ A number of injectable substances have been utilised for this purpose and include Teflon,¹ collagen,² and silicone.³ Teflon paste injections were utilised in our six patients with total amount injected per cord ranging from 0.6 to 1 ml. Either general or local anaesthesia could be used. Local anaesthesia injection techniques have the advantage of allowing accurate estimation of the amount of medialisation achieved as the patient can be instructed to phonate perioperatively. If general anaesthesia is used a venturi technique without paralysing the patient is desired as there is no endotracheal tube to interfere with cord medialisation. If endotracheal intubation is performed, then small tubes as in our cases should be utilised. The surgical technique is with direct injections through a direct laryngoscope; or by use of percutaneous injections under indirect laryngoscopy or flexible fiberoptic laryngoscopy control.⁴ Five of our six patients had satisfactory or good voice results with marked corresponding improvement in parameter of maximum phonation time.

Case 4 exemplifies that there are limitations to the ability of intracordal injections to correct the glottic closure deficiency. It is felt that this is due to an excessive glottic gap together with a marked vertical level difference between the two cords. Hence alternative procedures to medialise the paralysed cord are needed. These include thyroplasty type 1 as described by Isshiki⁵ and consists of placement of a silastic implant between the thyroid cartilage and inner thyroid perichondrium for vocal cord medialisation. Another procedure is the arytenoid mobilisation procedure. A suture is placed through the muscular process of the paralysed arytenoid and the anterior part of the ipsilateral thyroid lamina. It is tied under tension and this has the effect of rotating the vocal process of arytenoid with the vocal cord medially.

Conclusion

Effective surgical procedures exist for the management of the paralysed unilateral vocal cord when conservative therapy has failed or is unsuitable. Teflon injections are technically simple and are adequate treatment in the majority of patients. When the glottic gap is excessive together with a marked intracordal vertical level difference, alternative laryngoplasty procedures are to be considered.

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