The Journal of Laryngology & Otology
April 2001, Vol. **115,** pp. 289–292

Diathermy epiglottectomy: endoscopic technique

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Abstract

Endoscopic epiglottectomy is usually performed using a surgical laser. Epiglottectomy may be indicated for the treatment of benign or malignant lesions and for the relief of airway obstruction caused by a floppy epiglottis. We present four patients who had endoscopic partial epiglottectomy using monopolar diathermy to treat a floppy epiglottis. All the four patients were male in their sixth and seventh decades with snoring and/or obstructive sleep apnoea syndrome (OSAS) due partly or wholly to a floppy epiglottis. Diathermy epiglottectomy is easily carried out using the laryngoscope, laryngeal instruments and curved rotating microdissection monopolar scissors (used in laparoscopic surgery). This was found to be safe and effective with minimal morbidity. It requires no elaborate preparation and could be performed in hospitals that have no laser facilities. It may be performed in conjunction with other procedures e.g. uvulopalatopharyngoplasty (UPPP) if necessary.

Key words: Diathermy; Larynx; Surgical Procedures, Operative

Introduction

The epiglottis participates in protecting the airway during swallowing. Partial or complete removal has been found to have little or no ill effect in an otherwise normal upper aerodigestive tract because of the presence of other protective mechanisms.[1,2] Respiration, deglutition and phonation can take place almost normally even if the epiglottis is removed or destroyed.[3] Indications for removal include benign or malignant lesions, relief of airway obstruction e.g. before definitive therapy for neoplasm and improved visualization of the glottis in the follow-up of cancer patients.[1] Another uncommon indication in the adult is the large flaccid or floppy epiglottis causing snoring, obstructive sleep apnoea syndrome (OSAS), inspiratory stridor or difficulty with decannulation following tracheostomy during recovery from coma.[1,2,4–6] Epiglottectomy is usually performed using either conventional laryngeal instruments or surgical laser.[1,2,5] To our knowledge, endoscopic diathermy epiglottectomy has not been reported previously.

Patients and methods

Four patients with floppy epiglottis causing snoring and/or OSAS were reviewed. The diagnosis was confirmed by sleep nasendoscopy and they all had partial epiglottectomy using diathermy scissors.

Diagnostic evaluation and findings

Patients were sedated with intravenous midazolam in the operating theatre. Flexible fibre-optic sleep rhinopharyngolaryngoscopy was carried out to evaluate the entire upper airway as patients with snoring/OSAS may have airway obstruction at various levels including the uvula-soft palate complex, the tonsils, the base of the tongue and the epiglottis.[5–7]

In all the four patients, a flaccid epiglottis was found which prolapsed posteriorly and inferiorly with inspiration obstructing the laryngeal inlet. In addition, three of them had palatal fluttering, (confirming that patients with OSA or simple snoring may have multiple levels of airway obstruction all of which must first be identified by sleep nasendoscopy and managed, surgically or otherwise, to achieve the best results.[5,6]

Operative technique

General anaesthesia with muscle relaxant is used and cuffed endotracheal intubation with adequate seal to prevent leakage of anaesthetic gases is carried out. A broad lumen laryngoscope is carefully inserted with the tip in the vallecula allowing the epiglottis to fall into view. A Lewy laryngoscope holder resting on a Mayo table is attached to the laryngoscope. The tension is adjusted until the view is adequate.

Standard laryngeal instruments and curved rotating 'take apart' monopolar microdissection scissors (made by Karl-Storz and employed in laparoscopic

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Accepted for publication: 17 November 2000.

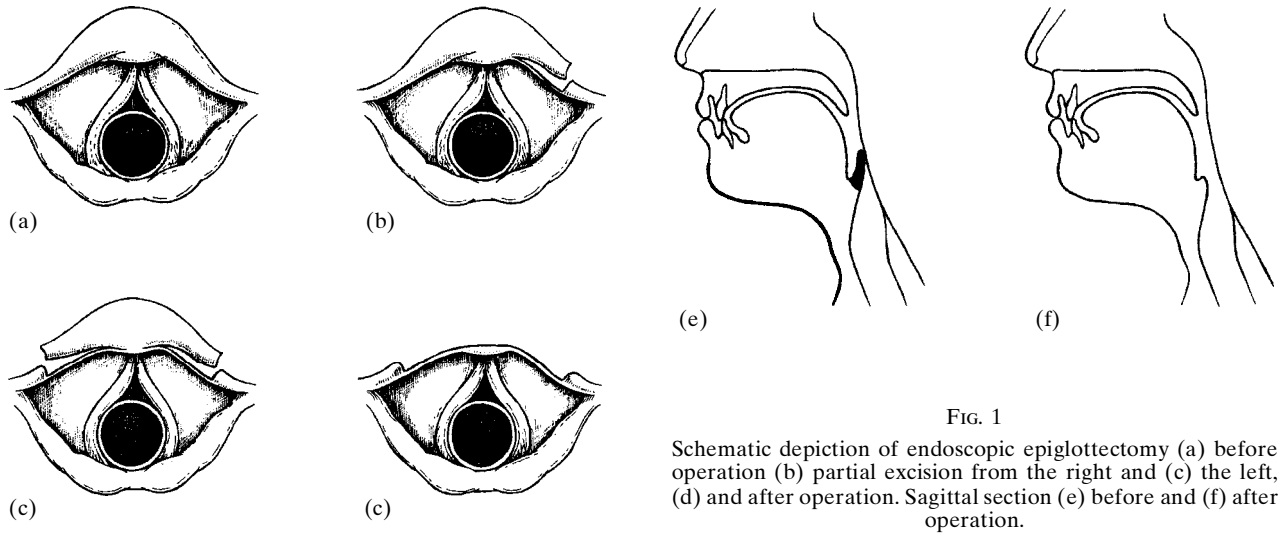

FIG. 1
Schematic depiction of endoscopic epiglottectomy (a) before operation (b) partial excision from the right and (c) the left, (d) and after operation. Sagittal section (e) before and (f) after operation.

surgery) are used. The end of the diathermy scissors is suitably rotated to cut from the right or the left. Excision of the epiglottis usually starts on the right side. The epiglottis is put on traction using the laryngeal grasping forceps. The right pharyngo-epiglottic (lateral glossoepiglottic) fold is first coagulated and then divided to control the major blood supply to the operative site. The epiglottis is then divided just above the floor of the vallecula (the level of the hyoid bone) by first coagulating and then cutting until around half way. The diathermy scissors are then rotated to cut the left half of the epiglottis in the same way. Approximately 3 mm of suprahyoid epiglottis is left behind (Figure 1).

An operating microscope is not used, as the diathermy scissors cannot be manoeuvered with the microscope in place. This does not present a problem, as the view is adequate without it. By coagulating first before cutting, a completely dry operative field is ensured throughout the procedure. Healing occurs by re-epithelialization without primary closure.

Case reports

Case 1

A 64-year-old male presented in July 1996 with many years' history of snoring. He was not troubled by this, however his wife found the noise increasingly difficult to tolerate. There was no history of weight gain or sleep apnoea. He had sleep nasendoscopy in March 1997, which revealed 'intermittent coarse sounding snoring caused by palatal flapping' and 'a more consistent finer noise created by epiglottic collapse'. Diathermy epiglottectomy and uvulectomy (the patient had a previous tonsillectomy) were carried out in July 1997 with complete resolution of his snoring. There has been no recurrence of his symptoms after three and half years.

Case 2

A 65-year-old man presented in July 1997. He complained of poor sleep, frequent awakening and day time tiredness. He had previously undergone UPPP for snoring and moderate sleep apnoea. This helped his snoring but his sleep apnoea persisted for which he needed continuous positive airway pressure (CPAP) therapy. In September 1997 sleep nasendoscopy was carried out which revealed a floppy epiglottis and partial epiglottectomy was performed in April 1998. Two months after epiglottectomy repeat sleep studies indicated a '50 per cent' improvement in his sleep apnoea score and some improvement in his sleep problems. However, two years later, there was no subjective improvement in his sleep problems and he was still using the CPAP machine.

Case 3

A 50-year-old man presented in October 1996 with many years' history of severe snoring. There was no history suggestive of sleep apnoea. He underwent sleep nasendoscopy in May 1997, which revealed heavy palatal snoring with fluttering and a floppy epiglottis, which flipped backward occluding the laryngeal inlet. Partail epiglottectomy and UPPP were carried out in July 1998 with complete resolution of his symptoms. A follow-up after 21 months revealed no recurrence of his snoring.

Case 4

A 53-year-old man presented in April 1998 with a long-term history of severe snoring. There was no weight gain and no history suggestive of sleep apnoea. He underwent sleep nasendoscopy in August 1998, which revealed heavy palatal and epiglottic snoring with fluttering noticed at both levels. He had UPPP and diathermy epiglottectomy in February 2000. Post-operative follow-up at two months revealed significant reduction in his snoring.

Results

Post-operative management

Simple analgesia e.g. co-codamol is usually adequate for pain control. It may be necessary to add non-steroidal anti-inflammatory drugs (NSAIDs) e.g. diclofenac if any other procedure e.g. UPPP is also

https://doi.org/10.1258/0022215011907479 Published online by Cambridge University Press

carried out. Prophylactic oral antibiotics were used to prevent infection, which may worsen pain. Peri-operative steroid administration was not used and post-operative ventilation was not required. Post-operative voice rest was not necessary and patients had no complaint regarding their speech or voice.

The first patient vomited approximately 200 ml of stale blood four hours after the operation. We were not sure whether the source of the bleeding was the uvula stump or the epiglottic remnant as flexible endoscopy revealed no active bleeding at the time. Patients were allowed to eat as soon as the effect of the anaesthetic agents wore off and they were discharged home once oral intake was deemed adequate. Three of the four patients were discharged the day after surgery and the fourth stayed for two days after surgery.

Two of the patients had complete resolution of their pre-operative symptoms at post-operative intervals of 45 and 21 months and one had partial resolution at two months, sufficient to make his snoring tolerable. The fourth had some subjective improvement of his symptoms and 50 per cent objective improvement of his sleep apnoea score at two months after his operation, but two years later there was no subjective improvement. One patient had occasional aspiration of liquid, which is still present two years after operation.

Discussion

A floppy epiglottis is most commonly associated with a previous history of neurological insult. Woo[2] described eight cases of epiglottic prolapse. Six of them had severe central nervous system (CNS) insults and there was difficulty with decannulation following tracheostomy during recovery from coma due to epiglottic prolapse. It was not clear, however, whether the epiglottic prolapse was due to loss of central neural control or prolonged intubation. Three of the six had partial epiglottectomy using carbon dioxide (CO_2) laser with good results. One underwent total laryngectomy because of associated severe aspiration and the remaining two were managed conservatively with gradual improvement over the following six to 12 months. A floppy epiglottis may also occur months or even years after resection of the floor of the mouth and laryngeal fracture as in the other two cases described by Woo[2] and after radical neck dissection and radiotherapy.[4]

All the four patients in our study however had no apparent causative factor for the development of a floppy epiglottis. There was no evidence of previous neurological insult, surgery of the floor of the mouth or neck, or neck trauma. Their floppy epiglottis could therefore be said to be 'idiopathic'. Harries and Randall[8] described a similar case of 'idiopathic' floppy epiglottis in a 73-year-old with life-long intermittent laryngeal obstruction, that could occur at any time during the day and at night.

Epiglottectomy is usually performed by using the carbon dioxide (CO_2) laser.[1,2,5] Compared to diathermy, laser facilities are quite expensive and not always available. Laser epiglottectomy may require the use of a metal endotracheal tube, which increases the risk of laryngeal damage. Also to avoid the risk of fire, Zeitels *et al.*[1] used a foil-protected rubber endotracheal tube and interposition of a wet swab between the tube and the epiglottis all of which adds bulk and restricts the operative field. These are not necessary in diathermy epiglottectomy. It was therefore not necessary in our cases to reposition the laryngoscope as described by Zeitels *et al.*[1]

Patients with snoring and OSAS may have airway obstruction at multiple levels. All the sites must be accurately diagnosed and managed in order to achieve the best result. To identify the site or sites of noise production in snoring, Quinn *et al.*[6] carried out sleep nasendoscopy in 50 adult snorers in whom OSAS had been excluded by an overnight sleep study. Palatal flutter snoring only was found in 70 per cent; and was combined with epiglottic, tonsillar and tongue base snoring in 10, eight, and two per cent respectively. The epiglottis was the sole site in two per cent thus implicating the epiglottis in 12 per cent of adult snorers with no evidence of sleep apnoea. The epiglottis was seen to collapse on itself or against the posterior pharyngeal wall and vibrate during inspiration. This is similar to the sleep nasendoscopic findings in our patients.

Similarly, three of our patients who had no history suggestive of sleep apnoea were found to generate snoring noises at multiple sites i.e. the uvula-soft palate complex and the epiglottis. Both sites were treated at the same operation with satisfactory results. Sleep studies were not carried out in these patients as there were no symptoms suggestive of sleep apnoea during consultation and none was noticed during sleep nasendoscopy. Moreover, sleep study facilities were not readily available. The only patient with a history suggestive of sleep apnoea had sleep studies before and after his epiglottectomy. The gold standard, however, is to carry out polysomnography before performing any surgery for snoring.[9,10]

Catalfumo[5] in 1998 presented 12 patients who had UPPP but still suffered obstruction due to a floppy epiglottis and needed partial epiglottectomy. In the same study 11.5 per cent of patients who had already had UPPP were found to have a floppy epiglottis that caused significant obstruction at the supraglottic level. Our only patient with OSAS had previously undergone UPPP before presentation and sleep nasendoscopy revealed a floppy epiglottis for which partial epiglottectomy was carried out albeit with little or no improvement. We cannot explain the reason for the failure as the patient refused further investigations or treatment. We suspect however that he has a third site of airway obstruction, which was not picked up during the sleep nasendoscopy, probably the tongue base. Polysomnography studies have shown that by performing partial epiglottectomy with other procedures such as UPPP, the cure rate of OSAS could be increased from 50 per

https://doi.org/10.1258/0022215011907479 Published online by Cambridge University Press

cent to about 60–65 per cent.[5] Until now, this multiple level approach may not be possible in hospitals with no laser facilities.

All our patients had partial epiglottectomy for a floppy epiglottis. We postulate that diathermy could be used also for total epiglottectomy depending on the indication. Laryngoplasty for severe laryngomalacia is currently being performed using the CO_2 laser. McClurg and Evans[11] in their experience with 24 children performed laser laryngoplasty under apnoea by removing the standard endotracheal tube prior to firing the laser. They used continuous pulse oximetry to monitor patients' oxygen saturation and patients were re-intubated before or just as the oxygen saturation began to drop. Up to eight intubations were required to complete the procedure. This is cumbersome and potentially dangerous especially in children. We think that using diathermy will avoid the need for re-intubation.

In conclusion, using diathermy to perform partial epiglottectomy is simple, effective, safe and readily available. Further studies are, however, needed to extend its use to total epiglottectomy, laryngoplasty and other laryngeal surgery where a laser is currently being used.

Acknowledgements

The authors wish to thank Mr M.A. Birchall for reviewing the manuscript, Mr P. Bodenham for the schematic drawing and Mr A.J. S. Oluwasanmi for typing the manuscript.

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Mrs A. Oluwasanmi takes responsibility for the integrity of the content of the paper.
Competing interests: None declared