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Supraglottic transection: results of repair and functional outcome

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Abstract
We present two cases of supraglottic transection, with concomitant neurotemesis of the superior laryngeal nerve. Both cases were repaired primarily and a temporary tracheostomy was used to protect the airway. In both cases subsequent decannulation was achieved within four weeks, following the initial injury. No long-term swallowing or voice disturbance was noted in either case. We recommend that in such cases it is unnecessary to repair the nerves directly, but that careful repair of the wound itself will achieve a functional result.

Key words: Larynx; Wounds and injuries; Laryngeal nerves

Introduction

Complete transection of the laryngopharynx, without fatal damage to the adjacent carotid sheath is a rare emergency, which few otolaryngologists will ever see. In a 27-year series of 139 patients, Schaefer (1992) found no such cases, and over a five-year period Gussack *et al.* (1986) reported only five penetrating laryngotracheal injuries all of which involved the cricothyroid membrane or lower.

Where complete transection occurs above the glottis, then the superior laryngeal nerve will be severed. As the nerve supplies a motor root to cricothyroid and a sensory root to the supraglottis (Durham and Harrison, 1964), difficulties may be experienced in phonation, deglutition and aspiration.

We have treated two cases of complete supraglottic transection in this unit, which we repaired primarily without attempting to find and repair the superior laryngeal nerves. We present these two cases and discuss the implications.

Case reports

Case 1

A 29-year-old woman was brought to the Accident and Emergency Department having been attacked by her husband with a knife. She had sustained severe neck lacerations, and was severely shocked on admission, with an unrecordable blood pressure. She was intubated via the wound, as the vocal folds were visible through it, resuscitated intensively and taken to theatre for exploration of the wounds and repair.

The operative findings were of complete transection of the laryngopharynx at the level of the vestibular folds (see Figure 1). The carotid arteries and internal jugular veins had not been divided.

A formal tracheostomy was performed, haemostasis was secured tying the superior thyroid pedicles bilaterally, and the external and anterior jugular veins. The left internal jugular vein and the origin of the left external carotid artery were both repaired, and the laceration was closed in two layers. No attempt was made to identify and reconstitute the superior laryngeal nerves. A fine bore feeding tube was inserted, and the patient was transferred to the intensive care unit. Over the peri-operative period she received 22 units of whole blood and packed red cells.

She was returned to the ward after three days and was decannulated on the eighth post-operative day. She achieved an adequate oral intake after 16 days, without significant overspill, and was discharged home.

She was reviewed regularly in the outpatient department. Some pooling of saliva was noted in the pyriform fossae on flexible rhinolaryngoscopy and a video-swallow showed some initial delay in deglutition without aspiration. Five months after the attack, a repeat rhinolaryngoscopic examination showed a larynx with a normal appearance, with normal sensation and function and without residual pooling of saliva.

Case 2

A 19-year-old girl presented to the Accident and Emergency Department having fallen onto a fish-tank. She had sustained a severe neck laceration, but was alert and conscious on admission, with a blood pressure of 90 mmHg systolic over 65 mmHg diastolic. She was intubated via the wound, as the vocal folds were visible through it, resuscitated and taken to theatre for exploration of the wound and repair.

The operative findings were of complete transection of the laryngopharynx through the base of the epiglottis, with laceration of the pre-vertebral fascia and muscles (see Figure 2). The carotid arteries and internal jugular veins had not been divided.

A formal tracheostomy was performed, haemostasis was secured tying both the anterior and external jugular veins, and superior thyroid vessels bilaterally. The laceration was closed in two layers. No attempt was made to identify and reconstitute the superior laryngeal nerves. A fine bore feeding tube was inserted, and the patient was transferred

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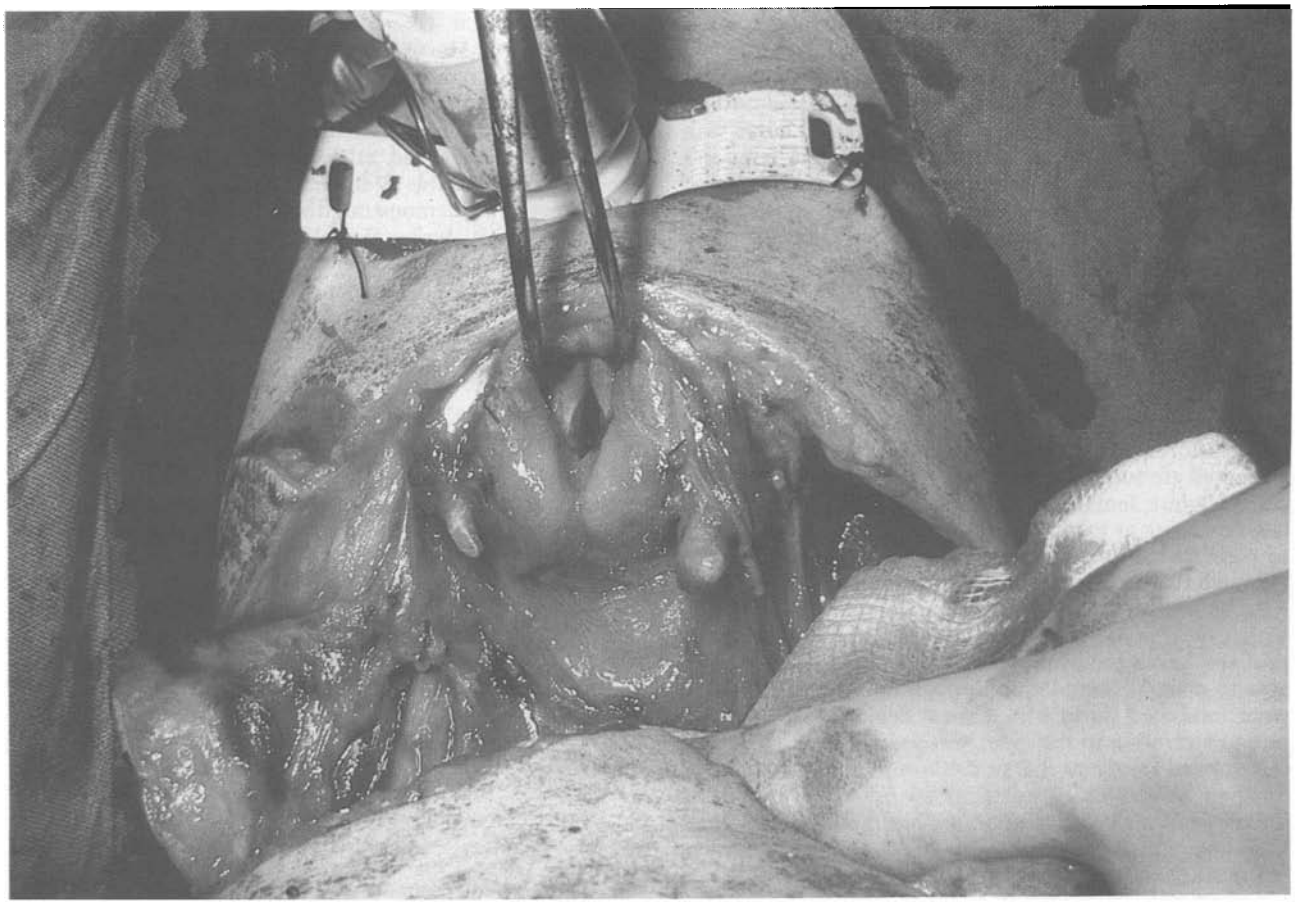

FIG. 1
Exposed glottis in *Case 1*.

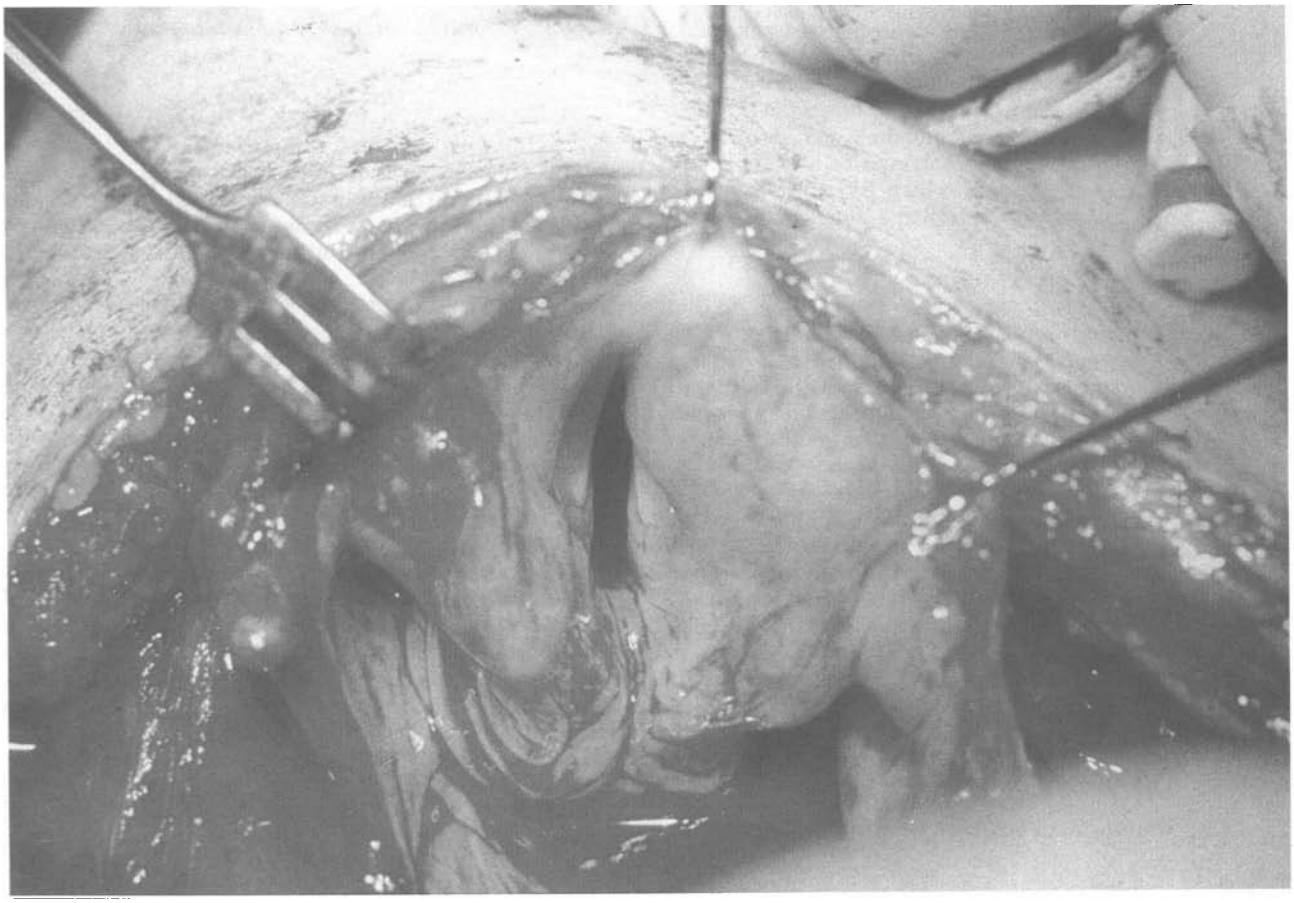

FIG. 2
Exposed glottis in *Case 2*.

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to the intensive care unit. Over the peri-operative period she received four units of packed red cells.

She was returned to the ward after two days and was commenced on oral intake after 11 days. She achieved an adequate oral intake after 17 days, and was sent home with her tracheostomy *in situ*. She returned 10 days later and was decannulated uneventfully. There was no evidence of subsequent laryngeal loss of sensation, and a cough reflex was present on direct contact with the supraglottic mucosa during flexible rhinolaryngoscopy.

Discussion

Penetrating injuries of the supraglottis are unusual; indeed according to Harris (1972), supraglottic injuries are 'almost always caused by a blunt force ' . . . thus avulsing the structures above the true vocal folds'. The two cases presented are something of a rarity. Interestingly, both our patients were female. Female patients have been postulated as being at increased risk of supraglottic injury, due to their longer and more slender necks (Schaefer, 1991) although this association has not been proven.

In both cases the supraglottis was completely transected with exposure of the glottis through the wound. This probably saved the lives of both our patients, as they were able to maintain ventilation through the wound until they were intubated through it. *Case 1* nearly exsanguinated, due to laceration to the great vessels, and most victims of this sort of injury probably die from similar injuries or more severe haemorrhage. *Case 2* was more fortunate in that none of the great vessels were lacerated, only some of their branches.

Interruption of the internal branch of the superior laryngeal nerve is known to cause disruption of sensation to the supraglottis, creating difficulties with deglutition and an increased risk of aspiration; whilst division of the external branch supplying the cricothyroid muscle may result in a lower pitched voice, with a decreased range which is often coarse or husky, and fatigues easily (Durham and Harrison, 1964).

Bearing in mind the priorities in this sort of emergency surgery, once the patient has been stabilized, it would be theoretically feasible to dissect the damaged superior laryngeal nerves and attempt direct re-anastomosis. In neither case was this attempted, and subsequent functional recovery, (as demonstrated by sensory stimulation by direct contact during flexible rhinolaryngoscopy), vindicated that decision.

Therefore we recommend that once the airway and haemorrhage are controlled, a careful reapproximation of the mucosal laceration is sufficient to enable the subsequent return of normal function.

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