

Severe laryngeal fracture treated by supracricoid laryngectomy

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Abstract

Objective: To report a rare case of severe laryngeal fracture treated by supracricoid laryngectomy. Previously, a few cases of major laryngeal trauma treated by reconstructive laryngectomy have been briefly described. This paper aims to comprehensively document a rare case of severe laryngeal fracture for which this difficult treatment choice represented an acceptable option.

Methods: A 33-year-old woman sustained very serious blunt laryngeal trauma. The complexity of the laryngeal injuries led us to opt for supracricoid laryngectomy, rather than to attempt laryngeal repair.

Results: The post-operative course was normal. The patient's post-operative voice was breathy but functional. No airway stenoses occurred.

Conclusion: For severe laryngeal fractures, reparative procedures and stenting constitute the standard treatment. However, in selected and especially critical cases, a primary partial or reconstructive laryngectomy is justifiable.

Key words: Larynx; Wound And Injuries; Fractures; Cartilage; Laryngectomy

Introduction

External laryngeal trauma is a rather rare occurrence, and comprises a wide range of injuries of varying severity. Treatment of the most severe cases may be a challenge, firstly in achieving emergency airway control, and secondly in performing the best treatment procedures aiming to limit possible vocal and respiratory sequelae. Currently, there are still some controversial aspects of the management of such trauma (discussed below in a concise literature review). For the most severe forms of external laryngeal trauma, meticulous reparative procedures and laryngeal stenting (after control of the airway) are considered standard treatment. In this paper, we present a rare case of a serious laryngeal fracture for which, exceptionally, we performed a primary supracricoid laryngectomy, rather than an attempted laryngeal repair.

The literature contains a few previous reports of reconstructive laryngectomy for primary treatment of major laryngeal trauma; however, these descriptions are brief.

This report aims to offer detailed documentation of a rare case of severe laryngeal fracture for which reconstructive laryngectomy represented an acceptable option.

We also discuss several other aspects of the management of this case.

Case report

A 33-year-old woman was brought to our attention from the emergency room after sustaining a direct impact of the anterior neck against a sidewalk, caused by a moped traffic accident.

The patient was conscious and had moderate stridor, painful dysphagia and marked dysphonia, with a barely

perceptible voice. On physical examination, there was cervical swelling with subcutaneous emphysema and diffuse ecchymoses.

Flexible fibre-optic laryngoscopy revealed diffuse laryngeal haematoma and mucosal lacerations with exposed cartilaginous fragments. Arytenoid mobility was difficult to assess but seemed to be preserved on at least one side. There was also a suspected laceration of the posterior wall of the pharynx.

Computed tomography scanning of the neck revealed multiple displaced fractures of the thyroid cartilage and widespread cervical emphysema. The cricoid cartilage appeared intact (Figure 1). There were no associated traumatic vertebral, chest or brain injuries.

When the patient's medical history was taken, no noteworthy items were reported apart from chronic use of psychoactive medication.

The patient was taken to the operating room within a few hours. A skilled anaesthetist was able to perform orotracheal intubation, using a small tube, without any difficulty.

Firstly, an exploratory examination was conducted via microlaryngoscopy and rigid oesophagoscopy. This confirmed the presence of a longitudinal laceration of the posterior wall of the oro- and hypopharynx reaching the vicinity of the upper oesophageal sphincter, probably caused by the impact of the posterior margin of the thyroid cartilage.

Next, open exploration of the larynx was conducted. This revealed massive mucosal injuries. The thyroid cartilage presented multi-fragmentary, displaced fractures with involvement of the anterior commissure. Both true vocal folds had multiple lacerations and were disconnected, but the arytenoid cartilages were not dislocated. The cricoid

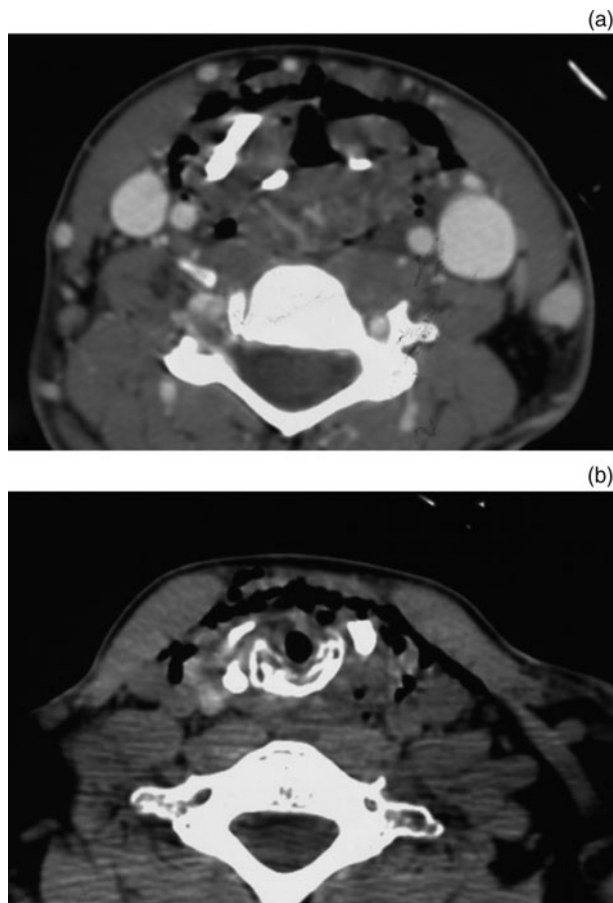


FIG. 1

Axial computed tomography neck scans showing multiple displaced fractures of the thyroid cartilage and cervical emphysema.

cartilage was seen to be intact, in keeping with radiological appearances, as was the hyoid bone.

The pharyngeal laceration was repaired by direct suture. The complexity and multiplicity of the laryngeal injuries led us to opt for a supracricoid laryngectomy with crico-hyoido-epiglottopexy, performed with techniques that were, on the whole, similar to those generally used in oncological surgery. Finally, a subisthmic tracheotomy was performed.

The patient's post-operative course was uneventful. Arytenoid cartilage motility was shown to be preserved bilaterally, and swallowing ability was regained without significant difficulty. The nasogastric tube was removed after 10 days, and the tracheal cannula after 14 days.

The patient's post-operative voice was breathy but functional, in line with what might be expected after supracricoid laryngectomy. No airway stenoses occurred.

Laryngeal endoscopy was performed three months post-operatively, as shown in Figure 2.

Discussion

External blunt laryngeal trauma is a rare occurrence. The most severe forms can be life-threatening due to the risk of respiratory failure; in these cases, the handling of the respiratory airway is an absolute priority to be dealt with promptly. Other important aspects relate to the possible sequelae of scarring and impaired motor function. They latter may have a negative impact on respiratory and speech functions, and may require further treatment in addition to the primary intervention.



FIG. 2

Laryngeal endoscopic view, three months post-operatively.

In the recent literature, authors have attempted both to compare experiences and to develop a more coded approach to the management of such injuries, involving staging systems, general protocols and decision-making algorithms.¹⁻⁴ Nevertheless, controversies still exist.^{3,5}

The best technique of airway management is subject to debate; orotracheal intubation can be difficult or even impossible. Furthermore, it can create false passages or worsen injuries, especially in cases of laryngotracheal separation.⁶ Nevertheless, some authors report high success rates with orotracheal intubation performed by an expert clinician using a small tube.^{3,7}

However, in any instance in which the injuries are severe, the patient is unstable or it is felt that intubation would be dangerous, it is widely agreed that a tracheotomy under local anaesthesia is preferable.

In our patient, we opted for orotracheal intubation to achieve initial airway control, since our anaesthetist had extensive expertise and had worked with our department consistently for three decades. Under other conditions, we would probably have chosen to perform a preliminary tracheotomy under local anaesthesia.

As regards treatment, laryngeal fractures which are displaced or which involve more extensive damage require surgical repair, after control of the airway. According to reports published over the past two decades, it seems clear that a reparative procedure conducted promptly (i.e. during the first 24 to 48 hours) has a greater probability of success and fewer sequelae, compared with more delayed intervention.^{2,8-12} The available surgical procedures must be adapted to each individual case; they include accurate mucosal, ligamentous and cartilaginous sutures, and, if necessary, mucosal flaps or grafts. In cases of severe trauma, it is commonly believed that surgical repair must be followed by the placement of a stent for internal containment and stenosis prevention. However, the presence of such a stent has some disadvantages, including the risk of granulations, ulcers and infection. In addition, there is still no general agreement as to the best type of device and, above all, the optimum duration of stenting. Different authors have reported optimum durations ranging from 10 days to six to seven weeks, with a trend towards early removal at two weeks. Subsequent surgical procedures are often necessary to improve functional results.^{3,10}

In our patient, the complexity of the injuries would have made any attempt to restore laryngeal integrity very difficult, and we were aware that a conservative intervention

would have led to less than ideal functional results. Such an approach would also have entailed a risk of synechiae and the need to maintain a stent. This latter requirement may have been poorly compatible with the psychological profile of the patient, who had a less than ideal capacity for co-operation and adaptation – important qualities in the case of prolonged follow up.

These considerations led us to choose supracricoid laryngectomy as the primary treatment, which would at least allow for a single, acceptable intervention with stable results. In our patient, both the integrity of the cricoid cartilage and the absence of dislocations of the arytenoid cartilages simplified matters in terms of procedures and functional recovery.

The patient was informed pre-operatively of her situation and the possible management options, and of the need for realistic expectations regarding vocal function, whatever the management decision.

In the literature, vocal and airway outcomes are defined by subjective criteria and are often reported as 'good', 'fair' and 'poor'. According to these definitions, our patient's post-operative voice was fair (i.e. altered but functional) and her airway good (i.e. without restriction).

- **External blunt laryngeal trauma is rare, with a wide range of severity**
- **For the most severe forms, reparative procedures and laryngeal stenting are considered standard treatment**
- **A rare case is described of severe laryngeal fracture treated by supracricoid laryngectomy**

On reviewing the literature, we found some previous descriptions of reconstructive laryngectomy used for the treatment of either laryngeal injuries or their sequelae. In some of these cases, the choice was made because of delayed intervention, when the likelihood of successful reparative surgery seemed even lower.^{12,13} However, a few cases of primary reconstructive laryngectomy were also briefly described.¹²

Such management must be considered the exception rather than the general rule. The occurrence of severe laryngeal destruction not followed by immediate death is a very rare event. Generally speaking, reparative procedures should be preferred whenever the skeleton and the soft tissues of the larynx are sufficiently preserved.

However, we believe that primary partial or reconstructive laryngectomy is a reasonable option for selected,

especially critical cases. In such circumstances, this approach enables a single surgical intervention, with stable results and voice outcomes unlikely to be disappointing compared with those of attempted laryngeal repair.

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