

Penetrating laryngeal injury: two case reports from Bosnia

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Abstract

Penetrating injury to the larynx is uncommon. We present two cases resulting from the recent Bosnian conflict. It is possible to achieve good laryngeal function by appropriate conservative management once the airway is secured. Progress should be monitored by repeated endoscopic examination and imaging techniques.

Key words: Larynx; Wounds, penetrating; Bosnia

Introduction

Penetrating laryngeal trauma is rare and few clinicians have observed it. The present conflict in former Yugoslavia has resulted in a number of injuries to United Nations personnel. Some of these have involved the face and neck areas unprotected by existing body armour. We report, two cases of acute laryngeal trauma which were managed conservatively, after evacuation, with good functional outcome.

Case reports

Case 1

Whilst serving in the former Yugoslavia a 19-year-old soldier sustained a low velocity gunshot wound from close range, to the left side of his neck. He was transferred to the British army surgical facility at Vitez, where he was restless and experienced difficulty in breathing due to laryngeal trauma and bleeding within the pharynx compromising his airway. Initially his blood pressure was 80/50 but before intravenous access could be established the patient underwent cardiac arrest. External cardiac massage was performed and the patient was intubated and ventilated. Venous access was established and the patient was resuscitated with a return of spontaneous cardiac output. Further examination revealed an entrance wound below the left angle of the jaw with an associated exit wound above the superior angle of the right scapula. Chest X-ray demonstrated no pneumothorax or foreign body and limited views of the neck and cervical spine showed no significant abnormality. Under anaesthesia extensive damage to the posterior wall of the pharynx and larynx was found. There was brisk venous bleeding, which was controlled by a throat pack and both skin wounds were excised. The tracts were irrigated with hydrogen peroxide and the posterior wound packed with fluffed gauze. The anterior wound was closed with interrupted nylon sutures. Tracheostomy was performed using a 9 mm cuffed Portex tube and a nasogastric tube was inserted. Antibiotic cover was commenced intravenously using benzylpenicillin (600 mg), ampicillin (500 mg), flucloxacillin (500 mg) and metronidazole (500 mg).

The patient remained ventilated and was transferred to the Intensive Care Unit at Queen Elizabeth Military Hospital, Woolwich the following day. During the transfer there was increased difficulty in maintaining ventilation, exacerbated by a fall in air pressure due to the flight and on arrival in the UK his arterial

oxygen saturation was noted to be low. A repeat chest X-ray revealed no new pathology and the patient was taken to theatre as he was in acute respiratory distress despite a functioning tracheostomy. A clinical diagnosis of tension pneumothorax was made and bilateral size 38 intercostal chest drains were introduced with immediate improvement in the clinical signs. Subsequent pharyngolaryngoscopy revealed a jagged, 5 cm laceration to the posterior pharyngeal wall involving the adjacent vertebrae together with the post-cricoid region and right pyriform fossa. The left arytenoid was noted to be damaged and there was venous bleeding. The vocal folds and the subglottic area were intact. Once adequate haemostasis had been achieved external exploration was considered unnecessary and the patient was returned to the Intensive Care Unit with his progress being monitored by repeated endoscopic examinations. Post-operatively the patient's oxygen saturation deteriorated once more and the clinical signs together with serial chest X-rays confirmed the diagnosis of Acute Respiratory Distress Syndrome for which he required ventilation and continuing intensive care with intermittent inotropic support for a period of 14 days. Subsequently the patient made good progress and ventilatory support was successfully withdrawn with almost a perfect return of laryngeal function. Further endoscopic examination showed a stable laryngeal framework. Weakness of the right forearm resulting from a brachial plexus injury persisted and he later received rehabilitation. The patient returned to complete recovery in eight weeks.

Case 2

In the vicinity of Vitez, Bosnia, a 21-year-old soldier was providing top cover in an armoured personnel carrier, when five mortar rounds exploded close to the vehicle. He received a single injury from a piece of shrapnel to the left side of the neck and was immediately evacuated to the British army surgical facility at Vitez. Upon arrival he was found to be fully conscious but having difficulty in clearing his airway of blood and to have air escaping from the wound to the neck. Two intravenous infusions of antibiotics were commenced and he received augmentin (1.2 g) and benzylpenicillin (600 mg). Under anaesthesia an endotracheal tube was inserted and it was evident that there was damage to the left wall of the larynx and the epiglottis. A lateral X-ray of the neck (Figure 1) showed a group of small metallic foreign bodies to the left of the midline and a totally disorganized



FIG. 1

Plain cervical X-ray demonstrating a disorganized laryngeal framework with multiple shrapnel fragments both within the larynx and the paralaryngeal tissues.

laryngeal framework. A 2×0.5 cm wound was excised and extended in line with the skin creases of the neck. There was contamination of the ragged torn strap muscles, some of which required excision. Much of the left lamina of the thyroid cartilage was fragmented, with pieces detached and there was a large hole through into the larynx and upper trachea which admitted a finger with ease. Further exploration revealed a ragged 2 cm longitudinal opening into the upper oesophagus but no pieces of shrapnel were found here. The oesophagus was closed with interrupted Vicryl sutures after passing a nasogastric tube past the defect into the stomach. The loose fragments of thyroid cartilage were removed and the mucosa was repaired with Vicryl. A Yates drain was left adjacent to the area of repair and the muscles were approximated with Vicryl prior to closure of the skin with staples. A 10 cm cuffed Portex tracheostomy tube was inserted via a second collar incision and the patient was transferred to the Queen Elizabeth Military Hospital, Woolwich.

Upon arrival in the UK the patient was found to be stable and afebrile. There was a serous discharge from the wound in the neck, associated with surrounding surgical emphysema. Antibiotics were continued, as were intravenous fluids with free nasogastric tube drainage. The wound drain was removed on the fourth day. A barium swallow performed on the 12th day demonstrated no leakage. A CT scan of the neck (Figure 2) revealed distortion of the vestibular folds, with some associated laryngeal cartilaginous damage. The vocal folds were noted to be intact. Pharyngolaryngoscopy was performed, which showed the left supraglottic region to be disorganized, with bruising and oedema, together with swelling of the post-cricoid region. It was decided to manage the patient conservatively and repeat endoscopy revealed the laryngeal swelling to be regressing with healthy closure of the external wound. The patient made a good recovery and the tracheostomy tube was removed with subsequent return to a normal voice. He returned to active duty in Bosnia after one month.

Discussion

The surgical management of penetrating laryngeal trauma

represents a significant clinical challenge with few published guidelines (Bent *et al.*, 1993). In an area of military conflict it is unlikely that such injuries will be seen in isolation and additional trauma may further complicate patient care. Management rests upon securing the airway which may be compromised by disruption of the laryngeal structures or by bleeding into the larynx and trachea. Intubation or tracheostomy may be appropriate although it has previously been stated that intubation may be hazardous with a risk of further damage to the airway (Schaefer and Close, 1989). Both of our patients were successfully intubated in the first instance and this was preferred in view of the need for urgent resuscitation in one case and the lack of patient co-operation in the second. In both cases a tracheostomy was fashioned to secure a safe airway for evacuation. Careful attention must be given to both the airway and the monitoring of respiratory function during transportation, especially in non-pressurized aircraft.

After establishing a reliable airway attention was directed to necessary resuscitation including the management of associated injuries. Immediate surgery was performed in both cases to assess and treat life-threatening injuries and to allow stabilization prior to early evacuation. The long-term goal in penetrating laryngeal injury is the achievement of a normal airway and good voice production. Humidification of inspired gases, prophylactic antibiotics and consideration of corticosteroids to reduce glottic oedema and subsequent scarring of the larynx should be instigated early (O'Keefe and Maw, 1992). The surgical management consists of exploration of the larynx with repair and depends on findings at direct laryngoscopy and computerized tomography (Myers and Iko, 1987). Surgical repair is mandatory for the reduction of displaced fractures and the suturing of cartilage fragments.

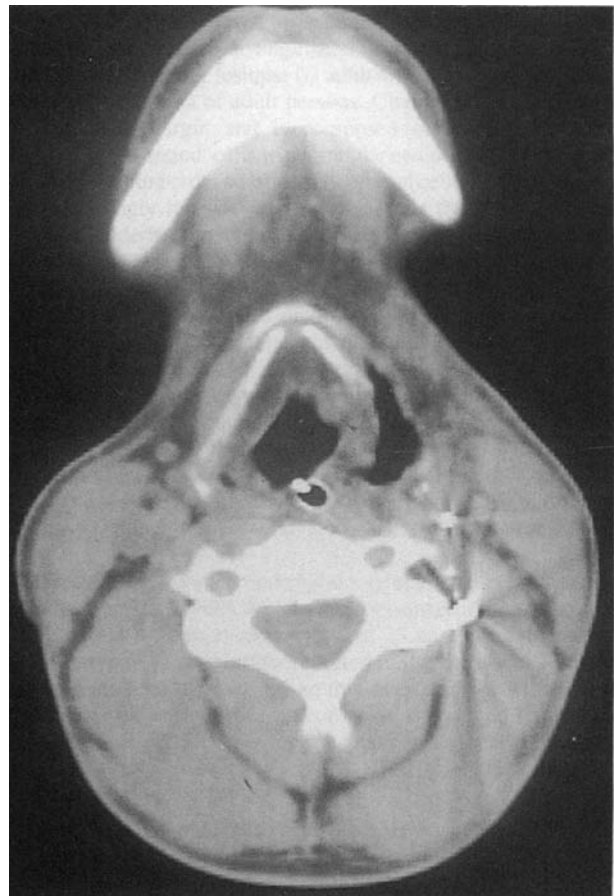


FIG. 2

CT scan of the neck showing a shattered left laryngeal framework together with associated paralaryngeal air.

Stenting may be required when the laryngeal framework is unstable. In general access to the larynx is gained through the wound itself with further extension as required (Cherian *et al.*, 1993). Alternatively a transverse skin incision is made corresponding to the level of the thyrohyoid membrane for supraglottic injuries, the midpoint of the thyroid cartilage for glottic injuries or the cricothyroid membrane for primarily subglottic injuries.

Lesser degrees of injury such as mucosal tears, oedema and non-displaced fractures may be better managed conservatively with repeated endoscopy to monitor progress. Management plans for the uncommon presentation of penetrating laryngeal injury are best instigated on an individual patient basis. Improved imaging techniques and their wider availability allow a more accurate diagnosis and good functional outcome may be achieved with conservative management in selected patients.

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