

Anaesthesia for facial trauma

Joy E Curran

Abstract

This article considers the causes of facial trauma and the differing patterns of injury seen. The relative strengths of the facial bones and Le Fort fractures lines are described. The important airway and other management issues for the initial acute phase and the later second-stage management for surgical treatment of facial fractures are discussed. The concern regarding actual and potential cerebrospinal fluid leak from Le Fort 2- and 3-level fractures is reviewed, and different strategies for airway management put forward. Specific difficulties with endotracheal intubation of patients with facial trauma are examined. The maintenance of anaesthesia and extubation problems are then discussed.

Keywords Airway; anaesthesia; extubation; facial trauma

Royal College of Anaesthetists CPD matrix: 1B02, 1C01, 1C02, 2A01, 2A02, 3A01, 3A02, 3A10, 2F01.

Introduction

Management of facial trauma is obviously important to anaesthetists as it may directly affect the airway acutely and need specialist input when maxillofacial injuries require surgery at a later stage. Four of our five senses are fully located within the facial bones and damage to them will have devastating long-term effects. The cosmetic result is also paramount and there is a high incidence of associated depression and anxiety after this type of trauma.

Aetiology

Most cases of facial trauma are blunt or crush injuries caused by assault or road traffic accidents. The use (or absence) of seat belts, air bags and helmets makes a great difference to the pattern of injuries that is seen. Around 30% of severely injured trauma patients at a level-1 US trauma unit had maxillofacial trauma.¹ As a group, 55–70% of patients with significant facial trauma will have other serious injuries.^{2,3}

The most recent large US review (data from over 1.3 million trauma patients) showed that isolated facial fractures also had a cervical fracture in 4.9–8% of cases and a head injury in 28–80%. When there were two or more facial fractures the rate of cervical spine fracture increased to 7% to 10% and head injury to 65–89%.⁴

Other causes of facial trauma are sports (mainly non-contact sports such as football, cricket and horse riding), home and

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Learning objectives

After reading this article, you should be able to:

- manage the emergency treatment of maxillofacial injuries, stabilizing the airway, breathing and facial bleeding whilst using knowledge of patterns of injury
- manage concurrent head injuries and cerebrospinal fluid leak
- manage anaesthesia for repair of facial fractures and soft tissues

work accidents, and dog bites. Gun and missile injuries cause penetrating trauma.

Most patients are young males; alcohol and drugs play a significant role. Injuries in the elderly are usually secondary to falls with osteoporosis a risk factor.

Patterns of injury of the facial bones

Figure 1 shows the relative strength of the skull and facial bones. Facial fractures follow specific lines of weakness which were first described by Guerin in 1866 and Le Fort in 1901. Facial fractures are still commonly known by Le Fort's classification (Figure 2). A patient may have unilateral or bilateral fractures at different levels. The top level of fracture is usually the most significant, and thus how the injury is described.

Fractures of different areas are associated with particular head and neck injuries, as follows:

- unilateral mandibular injuries – upper cervical spine
- unilateral midface injuries – basilar skull fractures and several intracranial injuries
- upper face – mid lower cervical spine, severe intracranial injuries and increased mortality rate
- bilateral midface – basilar skull fracture and death.⁵

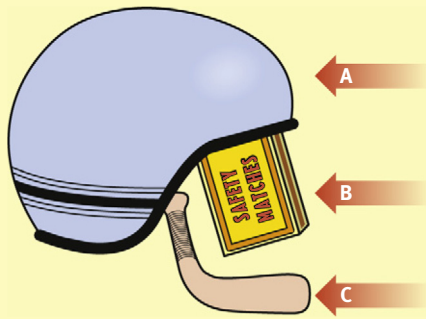
Emergency management

Management of patients with facial trauma must obviously follow the 'ABCs' of resuscitation in the normal way. The cervical spine must be protected until injury has been excluded by plain radiographs or CT scanning. In an emergency situation, oral endotracheal intubation is the route of choice. Work carried out on cadavers looking at the effects of manual in-line stabilization has shown the following:

- traction causes significant distraction that is damaging to the spinal cord if there is instability, and should be avoided
- manual in-line stabilization rather than rigid collar allows less movement during laryngoscopy although the laryngoscopic view is degraded
- the intubating laryngeal mask airway (ILMA) and fiberoptic approaches both produce significantly less movement but take longer to use.^{6,7}

There are a number of rigid video laryngoscopes that have been shown in small studies to improve the success rate of intubation compared to direct laryngoscopy in difficult airways. However, although useful they have not yet been proven to

Strength of the skull and face bones



The 'matchbox' structure of the mid-facial skeleton provides a 'crumple zone' which cushions the effect of impact force B on the brain. Impact force A is transmitted directly to the brain producing the most severe injury. Impact force C is transmitted indirectly to the cranial base via the rigid structure of the mandible (represented here as a bent baseball bat)

Reproduced with permission from: Banks P, Brown A. Fractures of the facial skeleton. Oxford: Butterworth-Heinemann, 2000

Figure 1

improve success rates or decrease cervical movement in cervical spine in-line immobilization.^{8–10}

Tracheostomy performed prior to cervical clearance is required in severe disruption of the laryngeal inlet as an emergency procedure. A recent report of percutaneous tracheostomy in trauma patients showed no immediate complications. A study of patients with known cervical spine damage undergoing elective tracheostomy showed no deterioration in long-term follow-up.^{11,12}

Head injury and reduced consciousness also dictate the need for direct, prompt airway control. The Glasgow Coma Score (GCS) should be regularly monitored and intubation carried out if it falls below 9.

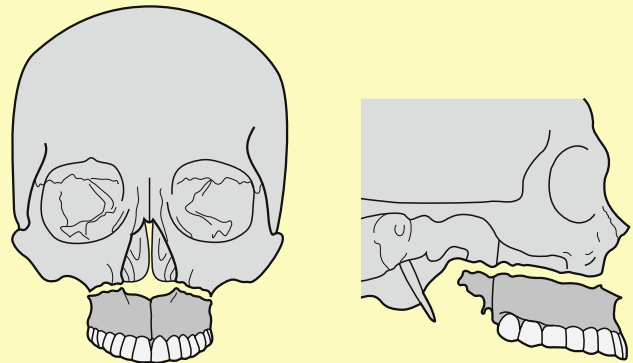
A patient with facial trauma will have other problems affecting their airway – blood, haematoma, foreign bodies (lost or broken teeth, bony fragments and dentures), displaced bone, vomit, tongue injuries and tissue oedema. Around one-quarter of patients with Le Fort fractures present with either airway obstruction or decreased respiration requiring immediate airway control.

A high index of suspicion should be given to the rare possibility of laryngeal trauma. In one study laryngeal fracture occurred in only 37 patients out of 16,465 who had sustained head, neck or facial injuries (from Portland, Oregon between 1992 and 2004).¹³ Of this group, 20 required definitive airway control (tracheostomy 14, endotracheal intubation 5, emergency cricothyrotomy 1). Surgical exploration with or without repair or stenting was carried out in 13, but all were successfully decannulated.

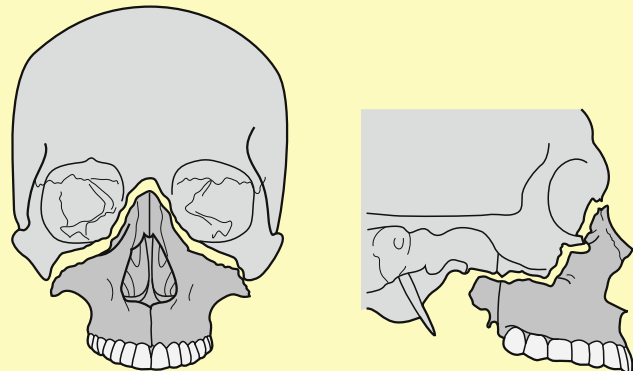
If there is significant facial trauma or oral tracheal intubation is unsuccessful, cricothyroidotomy or tracheostomy may need to be performed. The degree of urgency that is required will

Le Fort fracture lines

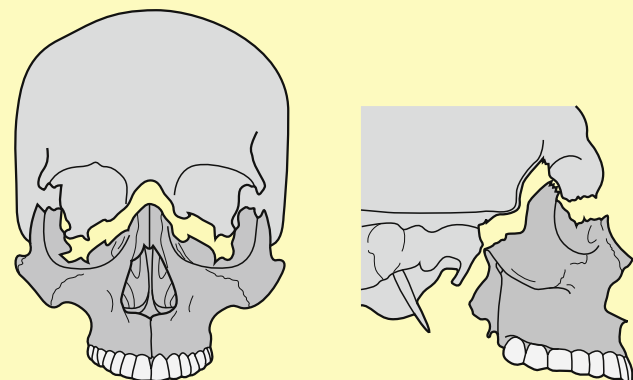
a Le Fort 1 fracture



b Le Fort 2 fracture



c Le Fort 3 fracture



a The Le Fort 1 fracture line passes through the inferior wall of the antrum and allows the tooth-bearing segments of the upper jaw to move in relation to the nose. **b** In a Le Fort 2 fracture the maxilla and nose can move as a block in relation to the frontal bone and zygoma. **c** In a Le Fort 3 fracture the facial bones are able to move separately from the base of the skull. Le Fort 2 and 3 fractures may be associated with a dural tear resulting from fracture of the cribriform plate of the ethmoid bones. In Le Fort 3 fracture the base of skull bones (sphenoid and/or temporal) are involved.

Figure 2

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