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# The McKesson prop—an essential tool for the emergency physician?

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## ABSTRACT

Facial trauma is a commonly encountered presentation to emergency departments. When associated airway compromise occurs, co-existing head and neck injuries serve to produce a challenging clinical situation. We describe two patients who suffered multi-system trauma, with severe maxillofacial injuries that necessitated prompt definitive airway management and mid-face stabilisation in the pre-hospital and emergency department phases of resuscitation. The McKesson prop is a simple yet highly effective tool for use in these injuries.

## INTRODUCTION

Facial trauma as a result of inter-personnel violence, falls, sporting accidents and motor vehicle collisions frequently present to the emergency department and some patients will require prompt intervention to prevent impending airway obstruction. However, in these cases, airway compromise can often rapidly become a major problem following unstable mid-face fracture and associated torrential haemorrhage. This population very often have co-existing injury to the head and neck (10% of unconscious patients with significant facial injury have an associated spinal injury<sup>1</sup>) compounding an already challenging situation. Further potential complications include alcohol intoxication. The incidence of facial trauma from motor vehicle accidents will hopefully decline in Ireland in the future as a result of aggressive government safety campaigns, the use of seatbelts and the presence of airbags.

We present two cases in which an unstable mid-face injury following blunt trauma, with airway compromise, were managed with pre-hospital endotracheal intubation, followed by emergency department mid-face fracture stabilisation through the placement of McKesson props (figure 1) and oral/nasal packing. We review the indications and techniques employed in the placement of the McKesson prop and discuss their potential role for use in the emergency department and pre-hospital environment, highlighting their importance as adjuncts in the resuscitation of the critically injured trauma patient.

## CASE REPORT

### Case 1

A 24-year-old restrained male driver of a jeep was involved in a head-on collision with a tractor. The counterweights on the front of the tractor intruded through the windscreen of the jeep striking the patient directly in the face.

A medical team call-out was activated by the regional ambulance control centre from the Cork University Hospital emergency department. Initial assessment demonstrated that the patient had a Glasgow Coma Score (GCS) of 7, with gross instability of the maxilla and mandible bilaterally. There was significant facial haemorrhage. High concentration oxygen was delivered and intravenous access was secured. Sedation allowed passage of a 7.5 mm endotracheal tube (ETT) but the position could not be confirmed. The ETT was replaced with a laryngeal mask airway through which the patient vomited and which was removed almost immediately. Further doses of midazolam and morphine were administered and following a brief period of assisted ventilation a size 7.5 mm ETT was successfully delivered to the trachea. Tube placement was confirmed clinically and supported by satisfactory oxygen saturations. Persistent haemorrhage into the oro-pharynx continued en route to the emergency department requiring regular suctioning. Two large McKesson props were placed between upper and lower teeth on either side of the patient's mouth shortly after arrival in the emergency department, which immediately tamponaded the haemorrhage.

The patient's other injuries included a traumatic sub-arachnoid haemorrhage, small extradural haemorrhage and fractures to the radius and ulna. After a 5-month hospital stay he was discharged home where he continues in his rehabilitation.

### Case 2

A 35-year-old restrained female driver of a car involved in an oblique collision with a heavy goods vehicle. An immediate care doctor attended the scene in addition to a medical team from the Cork University Hospital emergency department.

The patient was trapped and primary survey demonstrated an initially patent airway but with compound fractures to the left maxilla and mandible. Initial the GCS was 14. The maxilla was visibly unstable with the alveolar ridge on the left displaced to the midline. Extrication was followed by profuse bleeding in the oropharynx. This was initially managed by manual suction with a Yankauer catheter. GCS quickly dropped to 10 and a decision was made to perform a rapid sequence induction. This was successfully done with a thiopentone/suxamethonium combination and following the placement of a cuffed size 7.5 mm ETT, the oro- and hypopharynx were packed with adrenaline soaked gauze. The patient was then transported to the University teaching hospital emergency department. Blood loss from this facial injury continued en route, albeit significantly reduced from that prior to the placement of mouth packs.

**Figure 1** McKesson mouth prop.

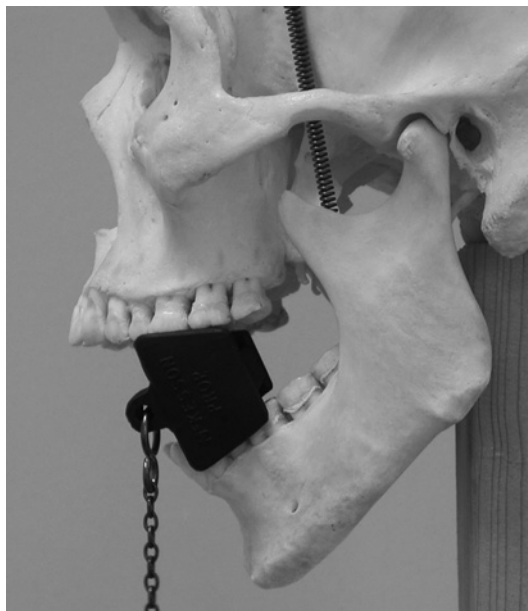
On arrival at the emergency department, the mouth packs were replaced with mouth props (McKesson props) which rapidly served to tamponade haemorrhage from multiple branches of the internal maxillary artery. Co-existing injuries included a fracture to C1/2 and left pneumothorax. CT brain demonstrated small cerebral contusions.

Following a 6-week stay in hospital the patient made a full neurological recovery and was discharged home.

## DISCUSSION

### McKesson prop

The origin of bleeding in maxillofacial trauma is primarily the internal maxillary artery and particularly its interosseous branches.<sup>2</sup> Many of these are inaccessible to direct pressure. The accepted method of controlling mid-face bleeding is packing of nose and post-nasal space.<sup>3</sup> Where the mid-face is very mobile packing of the nose will tend to open the wound and, thus, increase the bleeding. The McKesson prop is a simple, but highly effective tool at tamponading this bleeding. These rubber props are placed between the upper and lower teeth on either side of the mouth; therefore, pushing the entire mid-face towards the skull base (figure 2). The caveat to their effectiveness is the absence of

**Figure 2** Correct mouth prop position.

significant mandibular injury which, for obvious reasons, makes the props less effective. However, the majority of patients requiring the McKesson prop will have a cervical collar in situ producing the necessary counter-force to enhance the effectiveness of the props. In the absence of a collar, some authorities would suggest the use of a bandage wrapped from the head around the mandible.

The mouth props should be supplemented with nasal cavity packing. The pre-hospital use of adrenaline soaked gauze as a 'stop-gap' measure appears justifiable. The use of Foley catheters or the 'Epi-stat' are well-recognised tools in the management of severe nasal cavity haemorrhage.<sup>4</sup> Definitive treatment options for haemorrhage control in maxillofacial trauma include ligation and embolisation of the culprit vessels.<sup>5</sup>

### Anatomical considerations

The middle-third of the facial skeleton consists of two maxillae and nasal bones centrally and two zygomatic bones laterally. The maxillary bones are generally quite thin but thickened laterally passing upwards to the skull base. They absorb the stresses of mastication without difficulty but collapse relatively easily with anterior forces. As the middle-third of the face collapses it is displaced backwards and travels down the natural incline of the skull base obstructing the airway. The mid-face has often been referred as the 'crumple zone' of the cranium, absorbing forces that would otherwise be transmitted to the skull and, thereby, decreasing the risk of brain injury. However, in those situations, with significant posterior displacement of the mid-face, manipulation of the maxilla by grasping the hard palate with the thumb and index finger and pulling it forward often remains the only way of manually clearing this obstruction.

The origin of bleeding in severe maxillofacial trauma is primarily from the internal maxillary artery (a branch of the external carotid artery) and, moreover, its interosseous branches. The course of the maxillary artery passes within the traditional LeFort fracture borders and, in keeping with the degree of comminution of most severe maxillary fractures, identifying the precise source of bleeding is often impossible. This is particularly true of bleeding originating from the interosseous branches within the interosseous canals, as is the case with the middle-third of the maxillary artery in the pterygomaxillary fossa. As the pterygomaxillary fossa is involved in all fractures to the middle-third of the face, this part of the artery is always at risk of bleeding. Consideration must also be given to the lacrimal and zygomatic branches and the anterior and posterior ethmoidal arteries of the internal carotid artery. These vessels form a rich anastomotic network with the maxillary artery and so may

## Prehospital care

complicate the control of bleeding. It must be remembered that these vessels all have extensive venous networks.

Facial fractures themselves are usually not life-threatening.<sup>6–9</sup> However, torrential haemorrhage and the association with injuries to the head and cervical spine can occasionally serve to produce the catastrophic loss of airway integrity through a combination of haemorrhage and an altered level of consciousness. Soft tissue swelling around the oronasal structures, especially in the unconscious patient, may also result in a gradual loss of airway patency. Nasal intubation in these patients is contraindicated for fear of inadvertent misplacement of the tube into the cranium and potential to trigger further haemorrhage.<sup>10</sup>

### Assessment and pre-hospital considerations

Advanced trauma life support guidelines dictate that once the airway has been secured (with cervical spine immobilisation) and ventilation assured, efforts must then be directed toward ensuring an adequate circulatory volume with haemorrhage control.<sup>11</sup> During the primary survey facial fractures likely to compromise the patient's airway can be rapidly assessed with a simple focused examination within seconds. Inspection will identify bleeding into the oral cavity immediately. Palpation of the orbital rims, nose, upper and lower jaws should be performed assessing for mobility and any step deformity. The mid-face may be assessed by placing a finger in the mouth and grasping the upper jaw. Malocclusion of the teeth is highly suggestive of facial fractures and in the conscious patient may be easily determined by asking the patient to close his/her teeth to see if they approximate normally.

Patients who have sustained significant head/facial injury should be subject to full spinal immobilisation having given consideration to the possibility of co-existing vertebral injury. Mouth prop insertion should ideally follow application of a cervical collar and be followed by nasal packing, if required. Using a long spinal board in a Trendelenburg-down position for prolonged periods in the unconscious patient is relatively

contraindicated by the physiological rise of intra-cranial pressure.

### CONCLUSION

Complex life-threatening facial injuries are rare. They often occur with other head or neck injuries providing a challenging situation for emergency physicians. The use of mouth props offers clinicians a simple, effective means of haemorrhage control from serious facial injuries. The skill required to deploy mouth props is easily acquired and they remain relatively inexpensive. All emergency medicine physicians should be familiar with the role and use of McKesson props in the emergency setting.

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**Patient consent** Obtained.

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### REFERENCES

1. **Patton D.** Maxillofacial injuries. In: Gwinnutt, O'Driscoll, eds. *Trauma resuscitation: the Team Approach*. 2nd edn. Bios Scientific, Oxford, UK. 2003:160–76.
2. **Ardekian L,** Rosen D, Klein Y, *et al.* Life-threatening complications and irreversible damage following maxillofacial trauma. *Injury* 1998;**29**:253–6.
3. **Ho KK,** Hutter JJ, Eskridge J, *et al.* The management of life-threatening haemorrhage following blunt facial trauma. *Plast Reconstr Surg* 2006;**59**:1257–62.
4. **Leigh JM.** Primary care. In: Williams JL, ed. *Rowe and Williams' maxillofacial injuries*. Edinburgh: Churchill Livingstone, 1994:82–3.
5. **Ysng WG,** Tsai TR, Hung CC, *et al.* Life-threatening bleeding in a facial fracture. *Ann Plast Surg* 2001;**46**:159–62.
6. **Frable MA,** El-Roman N, Lenis A, *et al.* Hemorrhagic complications of facial fracture. *Laryngoscope* 1974;**84**:2051–7.
7. **Ardekian L,** Samet N, Shosani Y, *et al.* Life-threatening bleeding following maxillofacial trauma. *J Craniomaxillofac Surg* 1993;**21**:336–8.
8. **Buchanan RT,** Holtmann B. Severe Epistaxis in facial fractures. *Plast Reconstr Surg* 1983;**71**:768–70.
9. **Thaller SR,** Beal SL. Maxillofacial trauma: a potentially fatal injury. *Ann Plast Surg* 1991;**27**:281–3.
10. **Arrowsmith JE,** Robertshaw HJ, Boyd JD. Nasotracheal intubation in the presence of frontobasal skull fracture. *Can J Anaesth* 1998;**45**:71–5.
11. **American College of Surgeons Committee on Trauma.** *Advanced trauma life support for doctors ATLS*. 7th edn. Chicago (IL): American College of Surgeons, 2004.