

Management of Concomitant Maxillofacial, Cervical Spine and Laryngeal Trauma-Case Reports

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Abstract

Three cases are presented to stress important points in the diagnosis and management of concomitant maxillofacial, cervical spine and laryngeal trauma. Emergency tracheostomy to control airway, immediate rigid fixation of maxillofacial fractures, early computed tomographic (CT) scans to evaluate the extent of laryngeal and cervical spine injury and the early repair of laryngeal injury will provide better aesthetic and functional results.

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Introduction

In the case of a patient presenting with severe maxillofacial trauma, the first step in the management is to secure the airway and achieve haemostasis. In certain situations, where massive naso-oropharyngeal bleeding obscures the view, obtaining the airway is made more difficult and various manoeuvres may be attempted to secure this. Associated injuries to the larynx and cervical spine complicate the situation and make any attempt to insert an endotracheal tube (ETT) hazardous. In such a case, an emergency tracheostomy should be performed.¹⁻⁴ With the neck secured, emergency exploration and rigid skeletal fixation of all the maxillofacial fractures in such a patient decrease the morbidity and provide for a faster recovery.^{5,6} The cervical region is investigated by a computed tomographic (CT) scan to obtain information about the extent of injury to the larynx and cervical spine.⁷ The decision for conservative or surgical management of the injured larynx depends on the severity of the laryngeal trauma.^{4,7,8}

Case Reports

Case 1

A 35-year-old Malay man met with a road traffic accident and presented to the Accident and Emergency (A & E) Department, National University Hospital,

Singapore with massive bleeding from naso-oropharynx; lacerations of the upper and lower lips and surgical emphysema of the neck (Figs. 1 & 2). On clinical evaluation, the patient had a Le Fort II fracture of the maxilla with midline palatal split, compound comminuted fracture of the mandible, laryngeal injury grade IV (Gussack & Schaefer Classification)^{4,9} and fracture of the cervical vertebrae^{5,7} which were confirmed on X-rays. Emergency tracheostomy was performed under local anaesthesia in the A & E Department to secure the airway. Endotracheal intubation via the oral route was not attempted in view of the severe laryngeal and cervical spine injuries. The compound comminuted fractures of the mandible were fixed with multiple titanium plates and screws. An arch bar was used for alveolar segment realignment. The Le Fort II fracture and midline palate split were immobilised with an arch bar and fronto-zygomatic skeletal suspension wires after normal maxilla-mandible occlusion was achieved (Figs. 3 & 4). The tear in the oral mucoperiosteal layer of the palate was repaired with 4-0 vicryl® suture (Ethicon, USA).

A computed tomographic (CT) scan of the neck performed postoperatively showed a midline and left lateral fracture of the thyroid and cricoid cartilages with disruption of thyro-arytenoid junction and fractures of spinous processes of C5, 6 and 7 (Figs. 5 & 6). The patient

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Fig. 1. Preoperative presentation with complex maxillofacial trauma.

was re-evaluated and a decision was made to perform early primary repair of the larynx by the otorhinolaryngologist. All the fracture fragments were exposed by a transverse cervical incision. The thyrohyoid disruption and fracture of thyroid and cricoid cartilages were repaired with 4-0 vicryl® interrupted sutures. A soft silastic laryngeal stent was used to splint the larynx internally to support the fractured cartilages and maintain the laryngeal lumen. The stent was held in position by a prolene® suture (Ethicon, USA) which was passed through the thyroid cartilage to the skin surface and attached to buttons. The stent was maintained *in-situ* for 6 weeks. The cervical spine fracture was treated by modified cervical collar with an opening for the tracheostomy tube. After 8 weeks, the tracheostomy tube was removed. This patient had an acceptable aesthetic and functional recovery (Fig. 7).

Case 2

A 28-year-old Chinese male presented to the A & E Department after the motorcycle he was riding crashed into a ditch. He had multiple lacerations on his face and neck; one laceration on the neck was about 10 cm in length and was situated between the cricoid and the

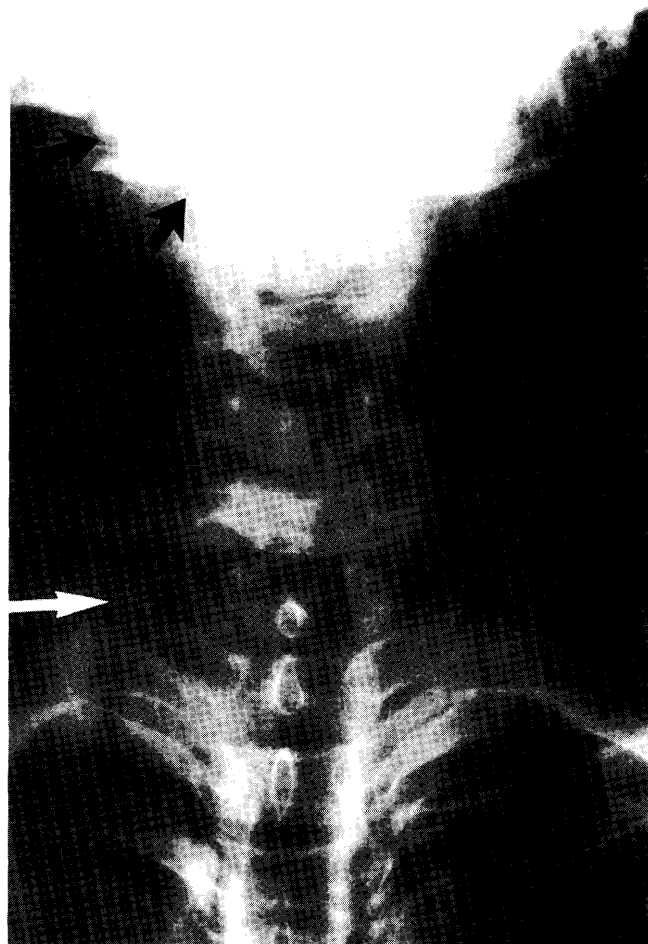


Fig. 2. Fractures of the mandible (upper arrow) and surgical emphysema (lower arrow) in the neck.

first tracheal cartilage. There was deformity of the left facial contours due to comminuted zygomatico-maxillary fractures and tenderness of the lower cervical spine with an associated left brachial plexus palsy. X-rays confirmed fractures of the left zygoma, maxilla and the left transverse processes of C7 and T1.

Bleeding and facial swelling obscured the upper airway, and the patient became comatose in the A & E Department. An attempt was made to intubate the patient with an ETT by the A & E officer but it failed. The neck was explored in preparation for a tracheostomy and the laceration between the cricoid and trachea was found to communicate with the tracheal lumen. A tracheostomy tube was inserted and secured and a cervical collar applied. Emergency fixation of the facial fractures and suturing of the facial and neck lacerations were performed. The tracheostomy tube was removed after 10 days. CT scans confirmed the cervical fractures which were treated with a cervical collar for 8 weeks. Further investigations showed avulsion of the C7 and T1 roots on the left side, which was not amenable to surgical repair. Physiotherapy was advised.

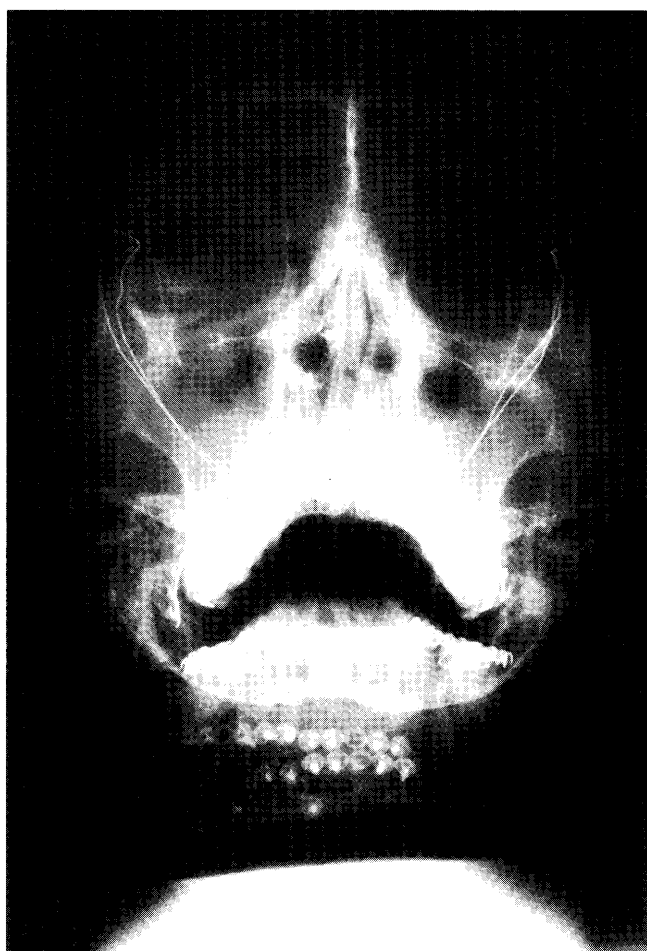


Fig. 3.

Figs. 3 & 4. Rigid fixation of fractures of the maxilla and mandible.



Fig. 4.



Fig. 5.



Fig. 6.

Figs. 5 & 6. Computed tomographic scans showing fracture of the cervical spine and laryngeal cartilages.

Case 3

A 24-year-old Chinese male was admitted to the intensive care unit (ICU) in a comatose state, via the A & E Department after a road traffic accident. He was the front seat passenger of a car that had hit a tree. He sustained fractures to the left zygoma, maxilla and mandibular body and the bodies of C5-6 cervical spine. There were abrasions and bruising of the abdomen with guarding. Peritoneal lavage did not demonstrate any blood and subsequent CT scans of the abdomen did not show any abnormalities. There was subcutaneous emphysema over the neck and laryngeal injury was suspected. The cervical spinal fractures were immobilised with skull tong traction.

The patient's condition deteriorated in the ICU and bearing in mind the cervical spine injuries, an emergency tracheostomy was performed to gain an airway. Assisted ventilation was instituted. Emergency CT scans of the head and cervical regions showed a subdural haematoma over the left fronto-parietal region with cerebral oedema and fracture of the cricoid ring with subcutaneous emphysema. Evacuation of the subdural

haematoma was performed. In view of his grave prognosis, no fixation of the facial fractures was done at that time. Evaluation of the CT scans of the larynx showed that no repair was necessary for the cricoid fracture. He remained in a semicomatose state for 3 weeks. Recovery was slow with only partial return of speech and full muscle power.



Fig. 7. Late postoperative with good functional and aesthetic results.

Discussion

Patients with injuries to the maxillofacial skeleton as a result of a severe impacting force will frequently present with bleeding from the naso-oral cavity. There is less urgency to obtain an airway if he is conscious. Getting a secure airway is the priority in the unconscious patient to ensure adequate ventilation. Inserting an ETT is the usual method. In patients with massive injuries to the maxillofacial skeleton however, torrential bleeding in the oral cavity may obscure the view, and an emergency tracheostomy is a better choice. This is the priority in patients with concomitant injuries to the cervical spine where manipulation of the neck must be kept to a minimum. Coupled with the above, obtaining an airway in a patient who has maxillofacial and cervical spine fractures and associated penetrating or blunt injury to the larynx, tracheostomy is the best choice.

There are many reports in the literature stating that laryngeal injuries are commonly found in patients with severe maxillofacial trauma.^{1-4,8,10} Blunt laryngeal injury is due to the impact of a force from the front associated with hyper-extension of the cervical spine.^{1,8} The larynx

is crushed against the body of the cervical vertebrae and various patterns of fractures of the laryngeal cartilages may result. Often penetrating injuries of the laryngeal region involved a single cut creating a communicating tract between the tracheal lumen and the outside as shown in case 2.

If the patient presents with surgical emphysema of the neck (Grade IV laryngeal injury),⁷ one must consider doing an emergency tracheostomy to secure the airway.^{1-4,10} Gussack⁹ however stated that 67% of his patients did well with endotracheal intubation while 33% required tracheostomy. When associated cervical spine injury is present, an oral endotracheal intubation should not be attempted.

Early exploration and repair of the laryngeal fracture and judicious use of a laryngeal stent provide good primary healing and better functional recovery.^{1,3,4,10}

The location of cervical spine injuries in patients with craniofacial trauma depends on the direction of the impacting force and the mechanism of injury. Frequently, injuries to the C2 and 3 cervical spine are due to direct transmission of force from the facial skeleton to the upper cervical spine.¹¹ If maxillofacial trauma is associated with hyper-extension of the neck, fracture of posterior elements of the lower cervical spine C5-7 is common.¹² If the impacting force is very severe, the patient may present with maxillofacial, laryngeal and cervical spine injuries as per the patients presented.

A CT scan of the neck performed in these patients not only confirms the diagnosis but also provides valuable information about the extent of laryngeal injury and associated cervical spine injury.^{2,4,7,8} This should be done at admission in order that prompt treatment is instituted. Frequently, the cervical spine fracture is treated with a cervical collar if the injury is mild, skull tong traction for more severe injuries and open reduction and internal fixation with bone grafting for unstable fractures. Rigid skeletal stabilisation of the cranio-maxillofacial fractures provides good healing of the bones as well as the soft tissues overlying them.⁶

The patient who presents to the A & E Department with injuries to the cranio-maxillofacial skeleton may not have an increased incidence of injury to the cervical spine.^{12,13} It appears that the pathological biomechanical forces causing each injury are a reflection of the different multiple forces associated with any bad accident. However, this lack of a relationship emphasises the need for a great vigilance for cervical spine and spinal cord injuries in patients with cranio-maxillofacial fractures.

Conclusion

Patients presenting with concomitant injuries to the cranio-maxillofacial skeleton, cervical spine and larynx are rare. In those who do, obtaining an airway is the

priority and emergency tracheostomy is the best method with manipulation of the neck kept to a minimum. CT scans to delineate the injuries to the cervical spine and larynx should be done early for evaluation. Early repair of the larynx if appropriate, and early fixation of the cranio-maxillofacial skeleton give better aesthetic and functional results.

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