311 MDS
Assessment of patient with facial fractures

A schematic approach for the treatment of severely injured patients consists of primary and survey

The primary survey is performed to identify immediately life-threatening injuries.

1. Airway control with cervical spine protection
2. Breathing and ventilation
3. Circulation with hemorrhage control
4. Disability: neurological status
5. Exposure and environment control

The secondary survey consists of obtaining a complete history and examination following the primary survey.

Although often dramatic in appearance, maxillofacial injuries by themselves are rarely life-threatening. Patients with maxillofacial injury often have significant associated injuries which confer increased mortality. These include airway obstruction, head and cervical spine injury, and hemorrhage. A thorough understanding of the basic management principles of the multi-injured trauma patient is therefore essential.

- AIRWAY MANAGEMENT IN THE TRAUMA SETTING

The first priority in treatment of the trauma patient is assessment of airway patency, adequate oxygenation, ventilation, and protection from aspiration. Airway compromise can occur rapidly as a result of facial injury. The upper airway may be obstructed by the tongue or dislodged teeth. Blood, foreign body, or swollen tissues may also compromise the airway. If the obstruction is due to tissue laxity or posterior displacement of the tongue, a simple jaw thrust or chin lift maneuver may quickly overcome the problem. However, if the blockage is due to a foreign body, distorted tissue, or vomited material, evacuating the airway becomes crucial.

At the scene of injury, if intubation is not necessary, the cervical spine should be immobilized. Administration of supplemental oxygen and relief of airway obstruction by manual removal or suction of mucus, blood, and debris from the mouth and oropharynx, followed by insertion of a well lubricated oral airway. This action may

allow time for the transport of injured patients to the hospital. One should remember that a nasal airway is contraindicated if midface fractures are suspected; furthermore, a forcefully placed nasal airway may cause nasal bleeding. Oral airway placement can cause retching and vomiting in the semiconscious patient. This may induce movement of the cervical spine or increased intracranial pressure lead to evacuation of intraocular contents in a patient with open-eye injury.

- SURGICAL AIRWAY

A surgical airway is required when basic interventions or intubation does not succeed (e.g., in cases of severe anatomical distortion of upper airway from middle or lower facial trauma).

- Cricothyroidotomy

Cricothyroidotomy is the surgical airway of choice because it is simple, easy to perform, and relatively safe in the trauma setting. One must first identify anatomical landmarks (i.e., palpation of the thyroid cartilage and cricothyroid membrane). A vertical incision is made from the thyroid cartilage to the cricoid cartilage. The cricothyroid membrane is identified and a 1.5–2-cm transverse incision is made through the membrane followed by introduction of an endotracheal tube into the airway. The complication rate of cricothyroidotomy in the trauma setting approaches 39% and includes minor hemorrhage, hypoxia secondary to prolonged procedure time, misplacement, esophageal perforation, laryngeal fracture, thyroid bleeding, and emphysema. Care must be taken to avoid lateral dissection and low incision. Because of the smaller size and greater soft-tissue compliance of the pediatric airway, as well as the greater importance of the cricoid cartilage in maintaining patency of the tracheal lumen, this procedure is relatively contraindicated in pediatric trauma patients.

- Tracheostomy

Tracheostomy is a poor choice of procedure for emergent airway control. The trachea lies deep in the neck surrounded by an extensive vascular supply and the isthmus of

thyroid gland. Tracheostomy may be required in patients with acute laryngeal trauma in whom placement of a tube through the cricothyroid may complicate existing laryngeal injury.

- BREATHING AND VENTILATION

Four major pathological conditions affecting ventilation should be recognized during the primary trauma assessment: tension pneumothorax, massive hemothorax, and flail chest. Treatment consists of immediate large-bore-needle decompression of the pleural cavity in the second intercostal space, midclavicular line followed by chest tube insertion. Open pneumothorax results from a traumatic defect of the chest wall large enough to permit air to enter into the pleural cavity.

- ASSESSMENT OF CIRCULATORY STATUS AND HEMORRHAGE CONTROL

After proper airway control and respiratory management, initial assessment of the circulatory status is required. The initial diagnosis of shock (inadequate delivery of oxygen to the tissues) is based on clinical signs, not laboratory data. Signs of hypoperfusion lead to immediate investigation into the source of blood loss. Most trauma patients in shock are experiencing bleeding resulting in hypovolemia. Rarely these patients may present to the hospital after trauma with neurogenic, cardiogenic, or even septic shock. Hemorrhage is therefore the most common cause of shock in trauma patients. Thirty-five percent of all trauma-related deaths in the prehospital setting occur from uncontrolled hemorrhage. Profound hemorrhagic shock can be easily recognized because of obvious signs of inadequate perfusion of the central nervous system, skin, and kidneys. Two large bore venous catheters should be placed to achieve efficacious access for fluid resuscitation. The patient’s response to initial fluid resuscitation is the key determinant guiding further therapy. A rough guideline of the total amount required for crystalloid resuscitation is to replace every milliliter of blood lost with 3mL of crystalloid fluid, thus allowing replenishment of plasma volume and accounting for loss to the interstitial and intracellular spaces. The decision to start the infusion of blood is based on the patient’s failure to respond to the

initial fluid bolus. The primary purpose of blood administration is to provide additional oxygen-carrying capacity and to restore circulating volume.

- ASSESSMENT OF NEUROLOGICAL STATUS (DISABILITY)

A rapid neurological assessment is performed as a part of the primary trauma survey. Level of consciousness, pupillary size and reactivity, and motor response are evaluated. Injury to the central nervous system must be excluded as a primary reason for neurological changes concurrent with the restoration of oxygenation and circulation. Hypoxemia and hypovolemia (secondary insults) worsen the morbidity and mortality associated with brain injury. Patients with severe head injury (GCS < 9) should undergo immediate intubation with mechanical ventilation irrespective of respiratory status at that time.

Glasgow coma scale

Action	*Score*
Eye opening	
Spontaneously	4
To speech	3
To pain	2
None	1
Motor response	
Obeys	6
Localizes pain	5
Withdraws from pain	4
Flexion to pain	3
Extension to pain	2
None	1
Verbal response	
Oriented	5
Confused	4
Inappropriate	3
Incomprehensible	2
None	1

- CERVICAL SPINE

Cervical spine injuries occur in 1.5–3% of blunt trauma victims, 25–75% of which are unstable. Patients with clinically significant head trauma may have a greater risk of cervical spine injury, and the incidence increases to 7.8% in trauma victims with a GCS score less than 8. Neurological deficit is present in 30–70% of patients with a significant cervical spine fracture and is most commonly associated with fracture dislocation of cervical spine C5–C7. The diagnostic sensitivity of the combination of cross-table lateral, anteroposterior, and odontoid radiographs of the cervical spine is 92%; however, 7–20% of all cervical spinal injuries occur at the level of C7–T1. The optimal visualization of these vertebrae may be difficult to obtain despite shoulder retraction (swimmer's view) and the use of cervical spine CT scan, which may be needed to rule out cervical spine injury.

- RADIOLOGICAL EVALUATION

The two diagnostic radiological studies that must be performed early in the care of the trauma patient with significant blunt trauma are the anteroposterior view of the chest and pelvis. Abdominal ultrasound has proved to be very sensitive in determining intraperitoneal as well as intrapericardiac fluid and has almost replaced the diagnostic peritoneal lavage. CT scanning is an extremely helpful diagnostic method, particularly for assessing solid-organ injury and retroperitoneal injury. Organ injury scales based on CT findings combined with the patient's clinical condition permit safe, nonoperative management of some injuries.

- Soft tissue injuries

It is important to achieve hemostasis when stabilizing and evaluating the patient who has sustained trauma. Most bleeding will respond to application of a pressure dressing. Occasionally surgical exploration and packing of the wound under general anesthesia may be indicated. In rare instances vessels in the neck may need to be ligated. Lacerations involving the scalp can occasionally be difficult to control with pressure and may require clamping, ligation, or electrocautery. Secondary risk of

infection increases with the lapse of time. Because of the rich vascularity of the face there is no “golden period” for suture repair of facial wounds. In fact healing of facial wounds is unaffected by the interval between injury and repair. Patients who are immunized and have received a booster injection within the last 10 years do not require tetanus prophylaxis if the wound is not tetanus prone. Tetanus-prone wounds are those with heavy contamination from soil or manure, devitalized tissue, or deep puncture wounds. If the wound is tetanus prone and the patient has not received a booster injection within 5 years prior to the injury Treatment of soft tissue injuries involves early reconstructive procedures addressing both the soft tissue and the underlying bony injury in a minimum number of stages. Occasionally it is better to delay soft tissue repair until the facial fractures have been addressed. In patients with large avulsion of tissue, definitive early reconstruction of the tissue loss with regional or microvascular flaps may be required.

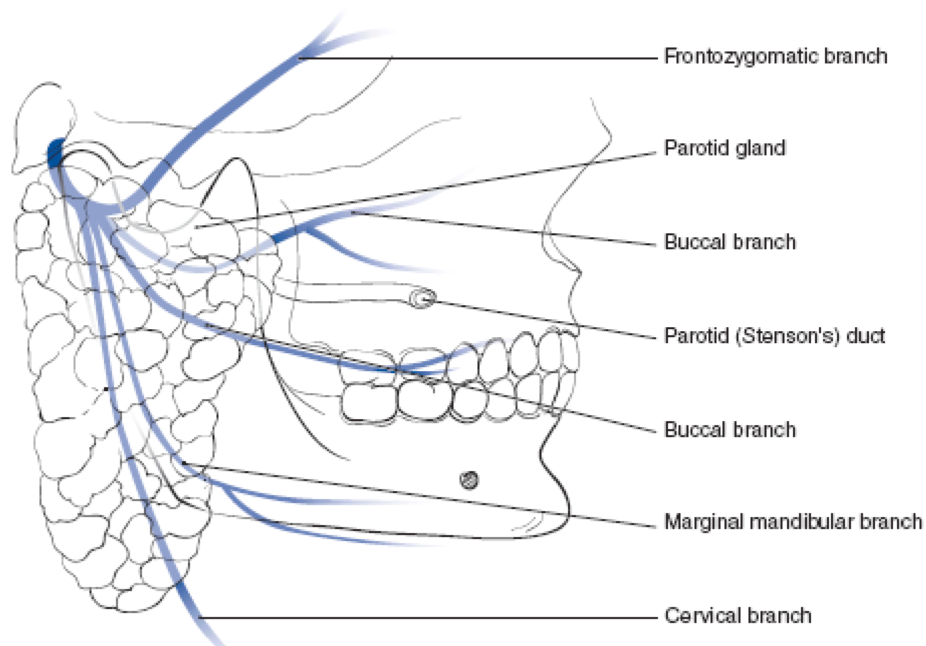

Table 1.1. Synopsis of cranial nerves.

	Name	Type	Principal clinical function (other functions in parentheses)
I	Olfactory	Sensory	Smell
II	Optic	Sensory	Vision
III	Oculomotor	Motor	Movements of eyeball: most orbital muscles. See also IV, VI (parasympathetic: ciliary muscle, accommodation of lens, etc.; iris muscle, pupilloconstriction)
IV	Trochlear	Motor	Movements of eyeball: superior oblique muscle. See also III, VI
V	Trigeminal		
	Va: Ophthalmic	Sensory	Sensation from eyeball, anterior scalp, upper face
	Vb: Maxillary	Sensory	Sensation from nasal cavity and sinuses, palate, mid face, maxillary teeth
	Vc: Mandibular	Mixed	Muscles of mastication, tensor tympani Sensation from chin, temple, oral cavity, tongue, temporomandibular joint (TMJ), mandibular teeth, ear, proprioception from muscles of mastication
VI	Abducens	Motor	Movements of eyeball: lateral rectus muscle. See also III, IV
VII	Facial	Mixed	Muscles of facial expression, stapedius (middle ear) (parasympathetic: lacrimal, nasal, palatine, submandibular, sublingual glands) (taste: anterior tongue)
VIII	Vestibulocochlear	Sensory	Hearing, balance
IX	Glossopharyngeal	Mixed	Sensation from oropharynx, posterior tongue, carotid body and sinus (taste: posterior tongue) (muscle: stylopharyngeus) (parasympathetic: parotid gland)
X	Vagus	Mixed	Muscles of larynx, pharynx (phonation, swallowing) Sensation from larynx, hypopharynx, heart, lungs, abdominal viscera (taste: epiglottic region, hypopharynx) (parasympathetic: cardiac muscle; muscles and glands of foregut and midgut: intestinal activity)
XI	Accessory	Motor	Muscles: sternocleidomastoid, trapezius
XII	Hypoglossal	Motor	Tongue muscles and movements