

INTRODUCTION

Facial and neck trauma can result from a large number of mechanisms including physical altercations, MVCs, sports injuries, and falls.

Face and neck trauma often results in more superficial soft tissue injuries such as contusions or abrasions, however some mechanisms are more significant and can involve damage to underlying structures including the skull, facial bones, esophagus, airway, and neurovascular structures. Whenever there is trauma sustained to the face or neck, neurological trauma (i.e. brain or spine injury) should be considered as well.

This Guideline focuses on injury to the soft tissue of the face and neck and the bony structures of the face. For assessment and management of injuries affecting the head and cervical spine, refer to the Neurological Trauma Clinical Practice Guideline.

SAFETY

Ensure that the cause of the trauma is of no threat to the other responders on scene. Activate the appropriate resources if required.

Facial trauma leads to an increased likelihood of airborne blood when compared to other types of trauma. Appropriate PPE (e.g. eye protection) should be used to protect from direct or indirect contact with blood.

ASSESSMENT

A trauma assessment should be conducted as outlined in the General Major Trauma Clinical Practice Guideline if appropriate. Non-life-threatening injuries should be managed only after the critical concerns are dealt with.

Manual cervical spine immobilization should occur for patients with facial or neck trauma until the patient is fully immobilized or need for immobilization can be ruled out using the Canadian C-Spine Rule (Figure 1).

The mechanism of injury and amount of energy involved in the trauma must be thoughtfully considered, even in the absence of obvious injury. The mechanism represents the amount of energy transferred through the individual, and is a

significant indicator of the potential for life-threatening injuries, even when they are not immediately apparent (e.g. patient ambulating at the scene after highway speed rollover).

Facial trauma assessment

Facial injuries pose a risk of airway compromise due to hemorrhage, inability to clear the airway or mechanical obstruction due to a fractured jaw, expanding hematoma, or broken teeth. The clinician should monitor airway patency closely.

During history taking, the clinician should also pay attention to the tone and clarity of the patient's speech. Stridor, gurgling, or hoarseness may indicate damage, obstruction, or swelling of the airway.

The clinician should ask about symptoms related to the eyes (visual changes and/or double vision), ears (hearing impairment), nose (breathing difficulties), and face (pain and/or numbness).

On assessment the clinician should inspect and palpate the face for any soft-tissue injury, penetrating objects, tenderness, crepitus, swelling, deviations of the nose, change in alignment of the teeth (malocclusion), inability to open or close the mouth, and facial asymmetry. Bruising around the eyes (raccoon eyes) or over the mastoids (Battle Sign) suggest basilar skull fracture. Evidence of broken teeth, foreign material in the oropharynx, swelling in the mouth, and fluids draining from the nose or ears should all be noted. The skull should be palpated for tenderness, deformity, or depressed areas.

Facial trauma can cause damage to a number of muscles or cranial nerves that control eye movement, pupillary dilation, facial sensation and expression, and chewing. Assess the pertinent cranial nerves (see Figure 2).

If there is trauma to the nose, look in both nares for the development of a septal hematoma; document if the patient can breathe through each nare independently.

Fracture of the facial bones is another result of trauma. The clinician should assess for injury to the mandible and midface.

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Due to its prominent position on the face, the mandible is a common site for facial fractures. Malocclusion or an inability to open or close the mouth may be indicative of a fracture, or result from swelling around or dislocation of the temporomandibular joints (TMJ). Both mandible fractures and TMJ dysfunction can lead to difficulty with airway maneuvers such as jaw thrusts or mouth opening. Mandibular trauma should be seen as an important predictor of difficult airway management. See Figure 3 for the common sites of mandible fractures.

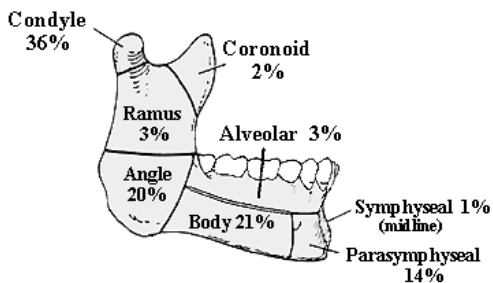


Figure 3: Common sites of mandibular fractures.

When referring to midface fractures, there are three common patterns that can occur with facial trauma, known as LeFort fractures. Midface fractures often occur as a combination of more than one category (see Figure 4). It is important to note that any force strong enough to cause a midface fracture should lead the clinician to suspect and assess for secondary injury to the brain, airway, and/or c-spine.

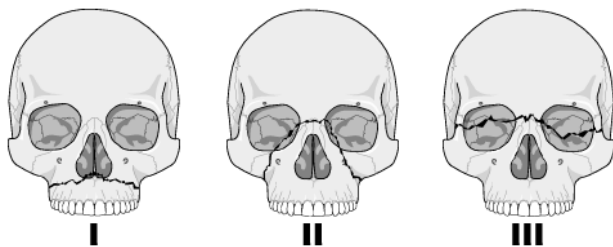


Figure 4: LeFort fracture patterns

A LeFort I fracture is a horizontal fracture of the maxilla, which may lead to the maxilla being depressed downward toward the tongue.

A LeFort II fracture extends inferolaterally and may be associated with significant hemorrhage.

A LeFort III fracture dissociates the bones of the midface from the remainder of the skull.

Both basic (e.g. OPA insertion, BMV, suction) and advanced (e.g. intubation) airway management can be difficult in patients with midface fractures as these injuries may lead to airway compromise due to distortion of the anatomy and/or blood in the airway.

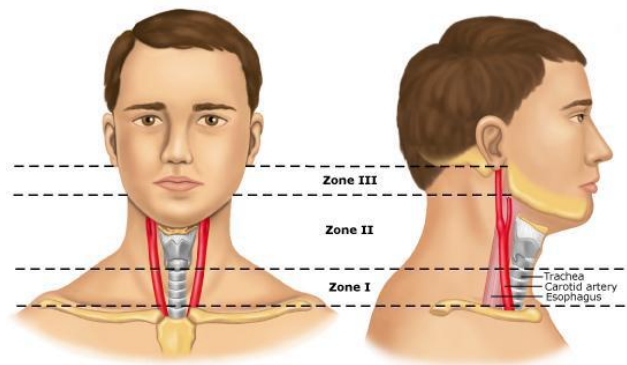
For additional guidance on managing trauma specific to the eyes, ears, nose and teeth, refer to the EENT + Dental Emergencies Clinical Practice Guideline.

Neck trauma assessment

Neck injuries can be caused by blunt or penetrating trauma and the clinician should always assess for corresponding head and cervical spine injuries. Penetrating neck injuries are also associated with a larger number of possible injuries to the underlying structures.

With any neck injury, listen for a hoarse voice or vocal changes, which may indicate damage to the airway structures. The clinician should assess for any bruising, bleeding (findings may be subtle, such as the taste of blood in the mouth), swelling, pain, or indication of penetrating injury.

The neck is divided into 3 zones and emergency department staff often follows different care pathways, depending on what zone the penetrating injury is in. Clinicians should be familiar with the 3 zones and what structures are associated with each (see Figure 5 and Table 1).



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Figure 5: Zones of the neck

Zone	Anatomical Area	Associated Structures
I	From the sternal notch and clavicles inferiorly to the cricoid cartilage superiorly	<ul style="list-style-type: none"> • Trachea • Lung apices • Common carotid, vertebral, and subclavian artery • Major vessels of the upper mediastinum • Spinal cord • Esophagus • Thyroid • Thoracic duct
II	From the cricoid cartilage inferiorly to the angle of the jaw superiorly	<ul style="list-style-type: none"> • Pharynx • Larynx • Trachea • Common carotid and vertebral artery • Internal jugular vein • Spinal cord • Vagus and laryngeal nerve • Esophagus
III	From the angle of the jaw inferiorly to the base of the occiput superiorly	<ul style="list-style-type: none"> • Floor of mouth / skull • Carotid and vertebral arteries • Jugular veins • Spinal cord • Cranial nerves IX-XII • Salivary glands

Table 1: Anatomical structures associated with the zones of the neck

In the case of a penetrating neck injury, look for the following signs:

- Cerebral ischemia
- Airway obstruction
- Air bubbles from the wound
- Severe active bleeding
- Expanding hematoma
- Shock unresponsive to IV fluids
- Decreased/absent radial pulse

The presence of any of these demonstrate a need for the patient to go to the OR, therefore it is critical to relay any of these findings to the receiving facility.

It is also important the clinician detail if the injury was anterior or posterior to the sternocleidomastoid (Figure 6). With injury to the anterior triangle, airway involvement is likely whereas with penetrating injury to the posterior triangle, vascular injury is likely.

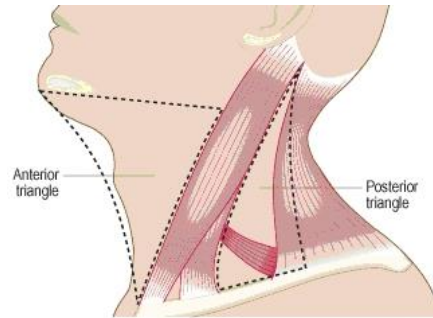


Figure 6: The anterior and posterior triangle of the neck.

During assessment, the clinician should also look for:

- Dyspnea
- Dysphonia/dysphagia
- Subcutaneous air
- Non-expanding hematoma
- Oropharyngeal blood
- Hemoptysis/hematemesis
- Focal neurologic deficit

Any of these findings may represent involvement of the airway, esophagus, or neurovascular structures, and should therefore be relayed to the receiving facility and noted in the PCR.

MANAGEMENT

As per the General Major Trauma guideline, interventions (such as airway management) should occur as concerns are identified following the ABCDE approach. C-spine control should be maintained until ruled out as per the Canadian C-Spine Rule (Figure 1) or the patient is immobilized.

All external bleeding should be controlled with ongoing airway reevaluation. If there is an impaled object, stabilize the object in place (**PEP white**) unless it is causing airway or respiratory compromise.

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An IV should be initiated. When obtaining peripheral IV access in the presence of a neck injury, attempt to initiate the IV on the limb on the opposite side of the wound if possible. If signs of shock are present due to facial or neck hemorrhage, administer normal saline in 250 mL boluses to target a systolic blood pressure of 100 mmHg.

Analgesia should also be administered early in patient management if indicated.

Facial trauma

In general, prehospital management of facial injuries should focus on ensuring a patent airway, controlling any hemorrhage and maintaining c-spine control if indicated. In some circumstances, airway management may be difficult due to bleeding in the oropharynx or broken facial bones. For this reason it is important to anticipate challenges and prepare back-up strategies. If a basal skull fracture or LeFort fracture is suspected, the use of nasally introduced adjuncts (e.g. nasopharyngeal airways, nasogastric tubes, nasal suctioning, or nasal intubation) is contraindicated.

Always remember that patients who have sustained a mechanism of injury significant enough to cause facial injuries, may also have co-existing brain or c-spine injuries. A complete neurological assessment is indicated in all of these patients, and managed as per the Neurological Trauma Guideline.

Patients with facial injuries should be transported in a position of comfort which also allows drainage from the oropharynx if there is a concern for airway patency. If the patient requires spinal immobilization, ensure the patient is still able to maintain their airway.

Neck trauma

Prehospital management of neck injuries should focus on airway management, hemorrhage control, and c-spine immobilization if indicated.

Immediate airway management is required if the patient has:

- Decreasing mental status
- Direct laryngotracheal trauma
- Hypoventilation
- Hypoxia
- Expanding hematoma

Extraglottic devices (e.g. King LT) must not be used for airway management as there is a risk of dislodging a clot and/or worsening the injury.

Facial or Neck Trauma – Special Populations

Pediatrics

Assessment and management of the pediatric patient with facial or neck trauma is generally the same as it would be for an adult. Keep in mind that young children are primarily nose breathers therefore any trauma to the nose can lead to respiratory distress more so than it may in a primary mouth breather.

Geriatrics

Due to anatomical changes (e.g. kyphosis), land marking for neck injuries is problematic in the geriatric population.

Basal skull or LeFort fractures can be subtle in this population due to lack of teeth and degenerative changes.

TRANSFER OF CARE

When transferring care to the receiving facility, it is important to explain the mechanism of injury and any information known about the object or forces involved. Inform staff of any pertinent assessment findings, amount of blood loss if known, and what treatments were provided on scene or on route.

If there is penetrating injury to the neck, relay information regarding the zone of injury and if there are any signs of airway or neurovascular compromise.

If the patient is immobilized ensure the staff knows what time the patient was placed on the backboard.

CHARTING

In addition to the mandatory fields it is important to document the following in the ePCR text fields:

- ✓ Scene findings including mechanism of injury
- ✓ Time of injury
- ✓ Initial presentation

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- ✓ Assessment and reassessment of interventions and patient care
- ✓ Pertinent negative findings
- ✓ Treatment provided
- ✓ Decisions and assessment around c-spine clearance

Ma OJ, Cline DM, Tintinalli JE, Kelen GD, & Stapczynski JS. (Eds.). (2004). *Emergency Medicine Manual* (6th ed.). New York, NY: McGraw-Hill

Stiell IG, Wells GA, et al. The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA*. 2001 Oct; 286(15): 1841-8.

Key Points

Monitor for possible airway compromise

Control any hemorrhage

Conduct a neurological exam for coexisting brain or c-spine injury

KNOWLEDGE GAPS

It is difficult to determine the prevalence and incidence of facial and neck injury with respect to how many are intentional vs non-intentional.

EDUCATION

Traditionally, the focus of education regarding neck injury has been around c-spine injury. It is important for clinicians to be aware of other important structures that may be involved when the neck is injured.

QUALITY IMPROVEMENT

In the setting of major trauma, scene times should be limited, and if at all possible, procedures should be done en route to definitive care unless required for a life-threatening condition. Analgesia should be administered to patients with pain due to face or neck trauma unless contraindicated.

REFERENCES

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Demetriades D, Salim A, et al. Neck Injuries. *Curr Probl Surg* 2007;44(1):13-87.

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Figure 1: Canadian C-Spine Rule*

For all alert (GCS=15) and stable trauma patients where cervical spine injury is a concern

1. Any high-risk factors?

Age \geq 65 years
OR
Dangerous mechanism*
OR
Paresthesias in extremities

If YES – Immobilize; If NO – Move to #2

*Dangerous mechanism:

- Fall from elevation \geq 3 feet/5 stairs
- Axial load to head
- High speed MVC, ejection, rollover
- Motorized recreational vehicle
- Bicycle struck or collision

2. Any low-risk factor which allows safe assessment of range of motion?

Simple rear end MVC**
OR
Ambulatory at any time
OR
Delayed onset of neck pain
OR
Absence of midline C-spine tenderness

If NO – Immobilize; If YES – Move to #3

** Simple rear end MVC excludes:

- Pushed into oncoming traffic
- Hit by bus/large truck
- Rollover
- Hit by high speed vehicle

3. Able to actively rotate neck 45° left and right?

If unable – Immobilize; If able – Clear c-spine

* Stiell IG, Wells GA, et al. The Canadian C-spine rule for radiography in alert and stable trauma patients. JAMA. 2001 Oct; 286(15): 1841-8.

Figure 2: Cranial Nerve Assessment

Cranial Nerve	Function	Assessment
I (Olfactory)	Sense of smell	Ask your patient to smell an alcohol swab
II (Optic)	Vision; pupil reactivity to light	Have the patient read some text (one eye at a time)
III (Oculomotor)	Eye movement and pupil size and reactivity	Check size and shape of pupils as well as reactivity to light; have patient look up, down, laterally and diagonally
IV (Trochlear)	Eye movement (downward and lateral)	Have the patient look down and in toward the nose
V (Trigeminal)	Chewing, facial and mouth sensation	Ask patient to clench their teeth and move their jaw laterally against light pressure; test sensation of the forehead, cheeks and jaw
VI (Abducens)	Eye movement (lateral)	Have the patient move their eyes from side to side
VII (Facial)	Facial movement, taste, eyelid and lip closure	Ask the patient to smile and raise their eyebrows
VIII (Vestibulocohlear/Acoustic)	Sense of hearing and equilibrium	Assess hearing in both ears by rubbing your fingers together on both sides of the patient's head independently
IX (Glossopharyngeal)	Gagging and swallowing (sensory); taste	Ask the patient to swallow
X (Vagus)	Gagging and swallowing (motor); speech phonation	Same test as with Cranial Nerve IX
XI (Spinal accessory)	Shoulder movement and head rotation	Have the patient shrug their shoulders then turn their head side to side (avoid this if neck/spinal injury possible)
XII (Hypoglossal)	Tongue movement and speech articulation	Have the patient stick out their tongue and move it internally from cheek to cheek

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PEP 3x3 TABLES for FACIAL & NECK TRAUMA

Throughout the EHS Guidelines, you will see notations after clinical interventions (e.g.: **PEP 2 neutral**). PEP stands for: the Canadian Prehospital Evidence-based Protocols Project.

The number indicates the Strength of cumulative evidence for the intervention:

1 = strong evidence exists, usually from randomized controlled trials;

2 = fair evidence exists, usually from non-randomized studies with a comparison group; and

3 = weak evidence exists, usually from studies without a comparison group, or from simulation or animal studies.

The coloured word indicates the direction of the evidence for the intervention:

Green = the evidence is supportive for the use of the intervention;

Yellow = the evidence is neutral;

Red = the evidence opposes use of the intervention;

White = there is no evidence available for the intervention, or located evidence is currently under review.

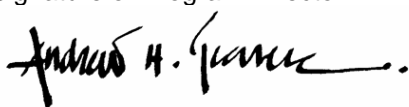
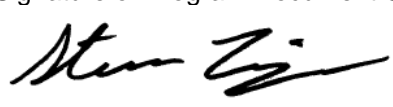
PEP Recommendations for Facial & Neck Trauma Interventions, as of 2014/03/14. PEP is continuously updated. See: <http://emergency.medicine.dal.ca/ehsprotocols/protocols/toc.cfm> for latest recommendations, and for individual appraised articles.


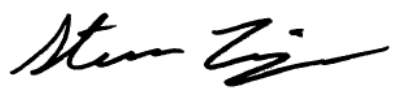
Note: there are currently no PEP recommendations for Facial & Neck Trauma

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