Initial Assessment and Evaluation of Traumatic Facial Injuries

Tuan A. Truong, MD¹

¹ Division of Plastic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, Texas

Address for correspondence: Tuan A. Truong, MD, 6701 Fannin Street, CC 610.00, Houston, TX 77030 (e-mail: Tuan.truong@bcm.edu).

Semin Plast Surg 2017;31:69–72.

Abstract

The care of the facial trauma patient continues to evolve in the ever-changing face of medicine. Patients can be reassured that their care is managed by a variety of specialists knowledgeable in the assessment and management of complex facial injuries. Thanks in part to advances in imaging modalities, bone fixation techniques and technology, and a wider array of reconstructive procedures, the foundation upon which the reconstructive ladder of facial injuries rests continues to expand. The overall goal of repair is a return to a preinjury state of form and function.

Keywords

- ▶ facial trauma
- ▶ initial assessment
- ▶ facial evaluation

Trauma is the leading cause of death in individuals under the age of 40. Although there has been greater acceptance and enforcement of traffic safety measures, automobile-related trauma is still the leading cause of facial injuries.^{1,2} The increase in interpersonal violence has resulted in injuries with unique characteristics and secondary complications. This has led to a modification in the frequency of certain injury patterns, particularly with the rise in extreme action sports and martial arts.^{3,4} In addition, there has been a rise in gunshot wounds that can lead to both bony and soft tissue injuries. With almost 2 million head injuries annually in the United States, alcohol is a contributing factor in almost 50% of the cases. It is reported that 11% of these patients suffer some form of maxillofacial injury that requires operative intervention.⁵

Initial Management

Facial injuries are rarely life-threatening; yet there should be high suspicion based on the mechanism and energy impact of the injury. Thus it is easier to begin with indicators to alert the astute practitioner toward these events. Initially, every exam of a trauma patient should follow a systematic approach, typically utilizing the ATLS (Advanced Trauma Life Support) protocol. Facial injuries in particular should have the examiner on the lookout for airway compromise, uncontrolled hemorrhage and aspiration, as well as concomitant neurologic injury. Undiagnosed, these conditions can have disastrous outcomes.

Airway

Airway compromise can occur as a result of direct injury, edema, hemorrhage, or even foreign bodies (▶ **Fig. 1**). Making it more complicated is the fact that up to 5% of facial trauma patients has injuries to the cervical spine.^{6,7} When there is a question regarding the need for intubation, there should be a low threshold for securing the airway. Blind intubation, either orally or nasally, carries with it a risk for exacerbating an already delicate situation. Fiberoptic or GlideScope (Verathon) intubation by a skilled practitioner may avoid further complications and can provide immediate confirmation of tracheal placement.

In the case of impaired visualization and a quickly deteriorating patient, emergent cricothyroidotomy or tracheostomy is an option, albeit a less superior one (▶ **Fig. 2**). Tracheostomy in the controlled environment of an operating room has much better outcomes, but either procedure has become more rare due to the advances in technology and routes for airway control.

Hemorrhage

Profuse hemorrhage can occasionally be the result of maxillofacial injuries. After ruling out other possible sources during the primary survey, it can be addressed in a timely fashion. Typically, these injuries are the result of upper midface fractures or nasoethmoidal fractures in which sinus vessels are transected. Anteroposterior packing will control the bleeding in most cases. The need for intermaxillary

Fig. 1 Self-inflicted gunshot wound to the chin.

fixation should be considered for LeFort fractures when there is profuse bleeding and failure to control hemorrhage with packing alone.

Of course, bleeding could also stem from the base of the skull, in which case, once the patient is stabilized enough, angiography should be performed with appropriate embolization of the offending vessels. If all of these measures fail, ligation of the external carotid and/or superficial temporal artery can tamponade blood flow to the internal maxillary and nasal branches.⁸

Neurologic Injury

The mechanism of injury for facial injuries is typically caused by a large amount of force. Because there are a multitude of organs and structures that may be involved, interdisciplinary care has become the standard. Some injuries take precedence over others when discussing the timing of repair. In one series of over 1,000 patients with facial fractures, almost 80% were associated with some form of traumatic brain injury.⁹

Generally, head injuries are not a contraindication to the repair of facial trauma, based on the assumption that the neurologic trauma is stable and not worsening. The timing of fracture repair is delayed until the neurologic injury is stabilized and serial clinical neurologic examinations are

Fig. 2 Emergent cricothyroidotomy during initial assessment.

not needed.¹⁰ Difficulty arises with an unconscious patient, as it is notoriously difficult to predict when there is any improvement. Delay of early operative intervention (< 2 weeks) may make repair difficult.¹¹

In addition to brain injuries, 3 to 5% of patients with facial trauma are found to have a cervical spine injury.^{6,7} Until the C-spine is cleared radiologically and clinically, precautions must be made during the perioperative period. This is especially important during transport and positioning for surgery.

Evaluation

A thorough evaluation of a patient's injuries is essential when making the determination to proceed to surgery. As part of the primary survey, a brief but detailed history may be obtained, including the timing and mechanism of the injury, and any previous treatment. Furthermore, any previous history of adjacent trauma should be ascertained. The initial consultation, after the primary survey has been completed, should encompass the following details:

- The location and extent of injuries
- The total of facial structures injured
- The bony fracture or loss
- The soft tissue loss
- Dentoalveolar injuries and occlusion¹²

The full extent of some injuries may not be obvious during the initial assessment; serial exams may be necessary as hemorrhage, swelling, or other bodily injuries are identified. A more detailed examination may be performed in a delayed setting as new information unfolds.

The examination should begin in a systematic fashion; an overall inspection of the face will reveal any asymmetry, contusions, swelling, or hemorrhage. Frequently, asymmetry may be hidden due to facial edema. Exposure is critical, so debris must be cleared first. Palpation of the entire face will delineate any step-offs or instability from the underlying skeleton. Again, a top-down approach will make the examination more efficient and focused. The practitioner should not be distracted by the obvious injuries as this could mask less obvious but more significant problems. Soft tissue injuries should be noted, and any vital structures within range tested; for example, a deep cheek laceration should prompt a test for Stensen's duct. Similarly, cranial nerves should be examined for any deficits.

Next, a complete ocular exam should be given. Previous visual disturbances can be ascertained if the patient is cooperative. Visual acuity, anterior chamber inspection, visual field testing, pupillary reflexes, light perception, and extraocular movements can be tested quickly and efficiently. If there is any concern for ocular injury, an ophthalmologic consultation is recommended. Difficulty arises when the patient cannot or will not cooperate. Documentation is key, as postinjury states may be difficult to discern from postoperative complications.

Canthal attachments should be assessed for stability, and the nose and septum should be palpated and inspected for

irregularity and signs of fracture. Motor and sensorium to the face should be evaluated. The oral cavity should be inspected for malocclusion, as well as any lacerations, foreign bodies, or dentoalveolar damage. The mandible should be examined and palpated for any step-offs or injury.

Once the evaluation is completed and any emergent issues identified and stabilized, radiographic images are performed. The gold standard is quickly becoming high-resolution computed tomography (CT) scans using 1-mm cuts with the ability to format in three dimensions (► **Figs. 3–5**). The facial skeleton and its myriad of fractures can be visualized in an easy-to-see and understand manner, which makes CT scans an ideal teaching adjunct for describing these complex injuries.

Fig. 3 Right orbital roof fracture.

Fig. 4 Right orbital roof fracture.

Fig. 5 Postoperative view of right orbital roof fracture.

As part of the history, preinjury photographs are invaluable in the decision-making process, as is proper photo documentation of the extent of current damage. They may prove to be quite beneficial in the treatment of secondary deformities, and as such, photographic consent should be obtained on a routine basis.¹⁰ This is quite easy now with the widespread adoption of smartphones and the electronic medical record.

Diagnosis/Planning

Once the history, physical examination, radiographs, and appropriate consultations have been completed, a complete list of facial injuries can be created. A treatment or surgical plan is outlined, with clinical judgment a crucial factor in the determination of the indications for and timing of surgery. This analysis should focus on the method of airway protection, exposure of the injured pieces, the mobilization and reduction of fracture fragments, the method of bony fixation, the need for additional bone grafting, and the repair of soft tissue injuries and resuspension to the bony skeleton.¹² Using techniques gained from other aspects of craniofacial surgery, incisions can be placed so that the resultant scars are well-hidden. Existing lacerations are also used to expose the fractures.

An open discussion with the anesthesia team before starting the case will decrease delays. The type of airway that is needed should be assessed, as well as its security for the duration of the operation. Any need for blood transfusion as well as intravenous access should be a part of the analysis. All of the necessary equipment and staff should be readily available prior to the start of the operation; the evolution of intraoperative teams of experienced anesthesiologists, nursing staff, and surgical technicians—surgical teams—have provided improved outcomes as patients can be managed more efficiently, safely, and cost effectively.

Conclusion

Facial injuries can be a devastating ordeal for patients and families. The vast improvement in prehospital care has resulted in typically more-severe craniomaxillofacial injuries being managed by the plastic surgeon. The management of facial fractures has evolved so that a multidisciplinary team is best equipped to deal with ongoing issues. The challenge arises in the patient with concomitant injuries as to the appropriate timing and execution of the operative plan. Of course, the plan begins with an adequate initial evaluation and diagnosis. Good communication with the patient and family is crucial to success. It is important to relay the severity of the injuries as well as the prognosis, as they may have a misunderstanding as to what can be accomplished. Close follow-up is necessary to offset any potential complications and unintended sequelae.

References

- 1 Murphy RX Jr, Birmingham KL, Okunski WJ, Wasser T. The influence of airbag and restraining devices on the patterns of facial trauma in motor vehicle collisions. *Plast Reconstr Surg* 2000;105(2):516–520
- 2 Major MS, MacGregor A, Bumpous JM. Patterns of maxillofacial injuries as a function of automobile restraint use. *Laryngoscope* 2000;110(4):608–611
- 3 Goldenberg DC, Alonso N, Ferreira MC. Facial Trauma. Guyron B, Eriksson E, Persing JA. *Plastic Surgery: Indications and Practice*. Philadelphia, PA: Saunders Elsevier; 2009:619–643
- 4 Brown MS, Ky W, Lismann RD. Concomitant ocular injuries with orbital fractures. *J Craniomaxillofac Trauma* 1999;5(3):41–46, discussion 47–48
- 5 Girotto JA, MacKenzie E, Fowler C, Redett R, Robertson B, Manson PN. Long-term physical impairment and functional outcomes after complex facial fractures. *Plast Reconstr Surg* 2001;108(2):312–327
- 6 Merritt RM, Williams MF. Cervical spine injury complicating facial trauma: incidence and management. *Am J Otolaryngol* 1997;18(4):235–238
- 7 Marik PE, Varon J, Trask T. Management of head trauma. *Chest* 2002;122(2):699–711
- 8 Manson PN. Assessment and management of facial injuries. Weinzwieg J. *Plastic Surgery Secrets Plus*. 2nd ed. Philadelphia, PA: Mosby Elsevier; 2010:275–281
- 9 Martin RC II, Spain DA, Richardson JD. Do facial fractures protect the brain or are they a marker for severe head injury? *Am Surg* 2002;68(5):477–481
- 10 Hollier LH, Kelley PK. Soft tissue and skeletal injuries of the face. Thorne CH. *Grabb and Smith's Plastic Surgery*. 6th ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2007:315–332
- 11 Benzil DL, Robotti E, Dagi TF, Sullivan P, Bevivino JR, Knuckey NW. Early single-stage repair of complex craniofacial trauma. *Neurosurgery* 1992;30(2):166–171, discussion 171–172
- 12 Orloff G. Management of Facial Fractures. Thaller SR, Bradley JP, Garri JL. *Craniofacial Surgery*. New York, NY: Informa; 2008:289–314