The Internet Journal of Rescue and Disaster Medicine
Volume 2 Number 2

GSW To The Face: "Hunting Camp"

C Perry, B Phillips

Citation

C Perry, B Phillips. *GSW To The Face: "Hunting Camp"*. The Internet Journal of Rescue and Disaster Medicine. 2000 Volume 2 Number 2.

Abstract

CASE REPORT

A forty-four year old male with massive facial trauma from a self-inflicted wound presented to the emergency department.[Figures 1 & 2] A nasal endotracheal tube was inserted in the field for airway protection and its position was confirmed by auscultation. He was then air lifted from his hunting camp to our Level I trauma center. On arrival, a pulse of 80 beats per minute, a blood pressure of 170mmHg over 60 mmHg, and an oxygen saturation of 75% were obtained. An initial arterial blood gas revealed a pH 7.34, oxygen saturation of 67%, with a carbon dioxide level of 47mmHg, and a partial pressure of oxygen of 35 mmHg. A lateral head and neck radiograph revealed a nasal esophageal tube and multiple foreign body fragments.[Figure 3] Several attempts to pass the nasal tube into the trachea were unsuccessful. The patient was then successfully orally intubated using lidociane and sedation without paralysis. Tube position was confirmed with directed laryngoscopy, capnography, and a chest radiograph.

Figure 1

Figure 1: GSW to the Face

Figure 2

Figure 2: GSW to the Face

Figure 3

Figure 3: Facial X-Ray

Subsequent physical examination revealed a left facial nerve palsy of the mandibular, buccal and zygomatic branches. The patient remained hemodynamically stable throughout his emergency department course. Computerized tomography of the head and facial bones revealed loss of left facial bony integrity including fractures of the mandible, zygomatic arch, orbital floor, and maxilla with multiple metallic fragments throughout the soft tissues. There was no intracranial injury demonstrated. An angiogram of the neck confirmed internal carotid vessel integrity while revealing a lacerated facial artery. He was taken to the operating theater for tracheostomy, debridement, and closure of the facial laceration. His mid face fractures were subsequently plated and a mandibular bar was placed to bridge the bone loss of the mandibular body on the left.[Figure 4] The patient required serial debridements and continues to do well while awaiting definitive bone grafts and coverage.

Figure 4

Figure 4: GSW to the Face, Closure

DISCUSSION

There are four main steps in the management of patients with gunshot wounds to the head and neck region. They include securing an airway, controlling hemorrhage, identifying and treating all other life threatening injuries followed by definitive repair of the traumatic facial deformities. Airway management can be difficult in these patients as demonstrated by our esophageal intubation. An urgent airway is required in up to 35% of patients presenting with gunshot wounds to the face. [2] In up to 83% of patients, oral or nasal tracheal airways are initially sufficient. [3] An operative airway is required in the remaining 17% of facial trauma secondary to gunshot wounds. [4] The surgical airway is usually required secondary to coma or occlusion due to edema loss of bony integrity or hemorrhage. Had our patient been obtunded and unable to ventilate while in transit with a nasal esophageal tube his ultimate outcome likely would have been different.

Airway control in patients with severe midface trauma has been well-described in the medical literature. [5] Fiberoptic intubation without paralysis is becoming a more-practical option for these patients. Blind nasal tracheal intubation is contraindicated in patients with basilar skull fractures or severe midfacial fractures and in those with CSF leaks. There are case reports of nasally intubating the cranium in such patients. [6] The next option is an oral tracheal airway; it is imperative that one be prepared for a cricothyrotomy due to the inability to control the airway with mask ventilation in patients with loss of facial integrity. Paralysis without the ability to mask ventilate requires urgent cricothyroidotomy. Needle ventilation of the trachea followed by tracheostomy is another option. A chest radiograph is useful to confirm endotracheal airway placement and to evaluate possible foreign body aspiration. Direct laryngoscopy and capnography as utilized in our patient are also useful in confirming endotracheal placement. After the patient has a secure airway, and equal breath sounds, hemostasis then takes priority. While both angiography and directed surgical control are options for hemostasis, angiography may be the preferred method and is helpful in the evaluation of anterior caudal neck trauma. [7]

After the hemorrhage is controlled either by direct pressure, packing, embolization, or direct operative ligature, the patient is resuscitated and other life threatening injuries are addressed. The secondary physical evaluation of the face takes into account the entry point of the missile, velocity, and the exit point. These factors, if easily discerned, may have some prognostic significance. [8] The laceration size, depth, and location to the neurovascular supply with surrounding tissue injury and loss must be considered. Facial fractures are identified with a thorough and complete examination followed by radiographs. Computerized tomography of the brain, face, and neck will assist in the evaluation of associated injury and quantifying the extent of facial fractures. With gunshot wounds to the head and neck, intracranial parenchymal injury is seen in 17% of patients, and cervical spine injury occurs in approximately 8% of patients. [9] Cervical radiographs are commonly utilized to evaluate the bony integrity of the cervical spine. The most common fractured facial bones associated with gunshot wounds to the face in order of occurrence include mandible, maxilla, and zygomatic arch. [1] About one third of patients will require operative debridement and fixation of facial fractures. [10] Once the extent of injury is fully established, a reconstructive plan can then be offered.

Attempts at immediate definitive construction often fail secondary to loss of mucosal integrity and subsequent septic necrosis of the surrounding bone. Traditionally these wounds were managed with conservative debridement, serial dressing changes, external fixation and delayed reconstruction. This style of management required social isolation of the patient for months, scar contracture and bacterial colonization with bony loss and a contracted skin envelope. Optimal cosmetic form and function can be obtained with more timely reconstruction. Early reconstruction requires the surgeon to account for the increased risks of infection from the tissue destruction associated with missile trauma, as well as potential dead space, retained foreign bodies, and entrapped oral flora. A three-staged approach has recently been championed by Manson. [11] The first step involves anatomic definition of the tissue and bone loss. After this is quantified by physical exam and computerized tomography, conservative irrigation and debridement follow stabilization of the patient. Serial exploration and debridements are expected. The second step is wound stabilization through restoration of bony relationships. The occlusion relationship is established and the height width and projection of the face are restored. The facial integrity is established by dividing the face into two halves. The lower half of the face is made up of the mandible and maxilla, while the upper face is comprised of the maxilla, orbits and zygomatic process. Once the occlusal relationship between the maxilla and the mandible are optimally established, the upper facial fractures are repaired. Establishment of an appropriate skeletal buttress allows maximal preservation of function and cosmesis of the patient. Early reconstruction provides optimal skeletal buttress and skin coverage preservation. The key relationships of the upper half of the face include the periorbital rims, zygomatic arches, and the zygomaticomaxillary struts. Bony loss is often bridged initially with metallic struts attempting prevention of soft tissue contracture or collapse with devascularized bone grafts or fragments from the initial injury. Computerized tomography is often a helpful tool in assuring the three dimensional relationships. Once restoration of the projection, height and width of the face is complete, the wound is re-explored at various intervals (24-36hrs) to debride the devitalized tissue, remove any subsequent hematoma, and insure mucosal integrity. Ideally the integrity of the mucosal lining can be obtained within 5-7 days of the initial injury. Repairing the face by functional and aesthetic units allows for optimal healing. Bony loss in the upper face is treated by skeletal splints and devascularized bone grafts. These devascularized bone grafts require obliteration of dead space, intact epithelial and mucosal coverage for viability. The lower facial structures will often require replacing whole functional units in order to restore mucosal bony and cutaneous functional elements. Microvascular tissue transfers are often utilized in this situation. The initial repair should be done optimally as patients with self inflicted gunshot wounds to the face are unlikely to follow up for additional reconstructive procedures. [12] In patients that do follow up secondary revision may be preformed for debulking, color modification, and scar revision.

CONCLUSION

Although the patient’s outcome was unaffected by the initial failed airway, this case illustrates the importance of ensuring a secure airway for patients with missile injuries to the head and neck region. Capnography confirmation or direct laryngoscopy in the field might have detected the misplaced airway earlier. In our review of the medical literature, up to forty percent of these patients will require an urgent airway and up to twenty percent will require a tracheostomy. It is interesting to note that of the deaths occurring, all were associated with self-inflicted wounds. Once the patient is resuscitated, other injuries must be identified and addressed in the standard ATLS manner. It is important to develop a reconstructive surgical plan after debriding devitalized tissue. Restoration of facial integument, mucosa, and bony integrity in an expeditious manner will help avoid the disfiguring morbidity associated with contracted facial wounds.

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Author Information

Charles W. Perry, M.D.
Dept. of Surgery, University of Arizona

B. J Phillips, MD
Department of Surgery , Kaiser Permanente