Acute Management of Maxillofacial Trauma: A Review of Literature

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Abstract

Management of trauma has progressed dramatically over the past few decades thereby reducing mortality in the golden hour. Challenges exist, however, one such region is maxillofacial injury in a patient with polytrauma. Because of the regions close to the brain, cervical spine and airway, serious injuries to the maxillofacial area may complicate the early treatment of a trauma patient. In case of maxillofacial injuries, the normal procedures of airway respiration and circulation (ABC) management are also changed or augmented by other approaches. In an often-challenging situation these modifications have their own difficulties and pitfalls.

Keywords: *Advanced Trauma Life Support.*

Introduction

Advanced Trauma Life Support (ATLS), established by American College of Surgeons, is the most commonly recognized quality of care for initial assessment and treatment of critical casualties.

Initial Assessment: The methodology of inspecting, listening, and sensing helps to find out airway obstruction and potential airway complications.[1,2] The approach to airway management, particularly in patients with unconscious trauma, should be complimented with C-spine safety. In high-velocity trauma involving the mandible, the swallowing function is altered due to pain and inadequate reflex control, resulting in difficulty in keeping the airway clear.[3] It is therefore necessary to preserve the airway from blood and vomiting in order to avoid aspiration and further pulmonary complications. Trachea palpation shows any potential failure or deviation. Larynx to stridor should be ausculted. Any tracheal tug or laryngeal stridor is explaining an impending threat to the airway. The "difficult intubation" tray should be accessible at all times with complete equipment to handle, including tracheal tube introducer, supraglottic airway machines, combitubes, endotracheal tubes, tracheostomy collection, and craniotomy kit.[4] Where management by traditional definitive airways is less possible, it is advisable to have an experienced team at hand to create surgical airways for rescue.

Strictly speaking, with constant monitoring of saturation, maxillofacial trauma patients should be given sufficient oxygenation, regardless of the injury. The spinal collars should be applied with great care in order to avoid any inadvertent future movement of the mandible complicating the airway. Unlike other polytrauma, maxillofacial patient's airway is at constant risk. The strategy is therefore a systematic analysis of the airway as delayed airway compromise may occur as a result of tissue displacement, bleeding, and swelling.[2] High-volume suction should be available to clear the mouth and oropharynx from blood and secretions.[5] However, care should be taken not to irritate the oropharynx with suctioning as it predisposes the patient to vomit. Furthermore, at this moment close observation of the patient should provide an idea about the reaction of defensive reflexes such as gagging and swallowing. When airway is clear, the oropharyngeal guedel can be used effectively. The positioning of guedel itself, however, causes retching, laryngospasm and sometimes eventually displaces the tongue thereby further aggravating the airway. The rule is emergency endotracheal intubation, without any protective reflex. Bag-mask ventilation is

the method of choice in patients with a patent airway and an absent spontaneous respiration. A tightly fitted mask with concurrent jaw thrust is always necessary to keep the ventilation running. Nonetheless, obese patients and beard patients have problems thus reducing ventilation effectiveness. In trauma patients, mask ventilation would ideally be a "two-person procedure," one that keeps the mask closely fitted to the mouth, and the other that operates the tube. Similarly, caution should be taken to execute adjunctive airway movements such as chin lift and jaw thrust. In the case of alleged C-spine damage, the head tilt and "sniffing the morning air" positions are absolute contraindications. The treatment strategy for patients with suspected C-spine injury is to keep the patient supine in order to help minimize morbidity of the C-spine as well as to immobilize the cervical spine using strong cervical collars.These collars may reduce exposure to the oropharynx which may be important. Unfortunately, the question that needs to be addressed in this scheme is how efficiently a trauma team can intubate the patient? A research shows, on this basis, that trauma patients with noisy or obstructed airways present. The unsuccessful rate of intubation is an unprecedented 12 percent.[6]In a study conducted by Martin et al., 10.3 percent of 3423 emerging intubations needed several attempts and were rated as "difficult."[7]

Primary Survey

Primary survey is performed to evaluate the system and vital function in question. The treatment plan is based on injuries, vital signs and mechanisms for injury. The primary survey is progressing sequentially on the following: 15

A – Airway with cervical spine immobilization

B – Breathing

C – Circulation with hemorrhage control

D – Disability (neurological status, as expressed by the patient)

E – Exposure of the entire body (looking for occult injury)

Definitive Airway: The definitive airway principle is that maxillofacial trauma is generally much more significant than other parts of the body as opposed to trauma. The key signs are set out in Table 1. The traditional conclusive, clear airway solutions are orotracheal intubation, nasotracheal intubation, and airway surgery. Laryngoscope-aided orotracheal intubation is the most feasible and effective method of treatment. However, if the C-spine is not clear, manual in-line axial stabilization during orotracheal intubation is prudent. While evidence in the literature indicates that some cervical movement is inevitable,[8,9] orotracheal intubation in an unknown cervical spine is comparatively healthy. It is easier to do, faster and induces minimal mobilization of the cervical spine in professional hands.[10] In extreme avulsive facial injury or in laryngeal or tracheal collapse, orotracheal tube positioning is difficult and surgical airway is the alternative. Another successful option is nasotracheal intubation, which can be done in patients without communicated midface or skull base damage. This is especially important in controlling airway obstruction due to lower face injury, and is ideal for patients with insufficient mouth opening. The method are supported by two forms, either blind or fibreoptic. A qualified professional's conventional blind technique is fast, efficient and requires no premedication. At the other hand, the enthusiasm for fibreoptic technique is restricted by the presence of copious secretions or blood in the airway, the sensitivity of the technique and the required increased time. Similarly, laryngeal mask airway (LMA) and combi tube are solutions to a failed or complicated intubation, but not one that is definite. These tools build support by bridging the airways before they enter a definite airway. It doesn't protect the airway from regurgitation and aspiration, however. The combi tube can be used instinctively in emergencies or in prehospital settings with little experience needed and simple placement.[11] Though suggested, retrograde intubation is very time-consuming and required expertise through cricothyroid puncture. Therefore, it is of limited use in emergency situations.[12] The manipulation of the cervical spine should be kept minimal during the airway maintenance technique and whatever approach you adopt, always note the dictum "to do no more harm."

Table 1. Indications of definitive airway in maxillofacial injury

Indications of definitive airway in maxillofacial injury
Absent spontaneous breathing
Comatose patient (glasgow coma scale <9)
Airway injury or obstruction
Persistent oxygen saturation <90%
High-risk for aspiration
Systemic shock (systolic blood pressure <80)
"Cannot ventilate cannot intubate" situations

If non-invasive strategies for securing airways fail, the only alternative left is surgical airways. They are of two types: cricothyroidotomy and tracheostomy.[13] In emergency, cricothyrotomy is the most effective approach and can be done by needle (needle cricothyrotomy) or surgical scalpel (surgical cricothyrotomy).[14] While some schools advocate needle cricothyrotomy, the standard use of it is debatable. The failure rates and insufficient oxygenation prevent its use, and in emergency, surgical cricothyroidotomy is the appropriate method of choice. In most cases, tracheostomy is done as an elective treatment, until cricothyrotomy stabilizes the patient. While percutaneous tracheostomy claims to minimize operating time and surgical complications in good hands, there is no evidence of its daily use in emergency.

Airway management in maxillofacial trauma protocols[2]

- Assess and identify obstructions to the airway.
- Clear the airway, position the patient. Perform chin lift and jaw thrust manoeuvre
- Confirm the nasal and oral passage are clear then use artificial airways and
- Perform bag-valve-mask ventilation. Preferably "two-person technique"
- Oro-endotracheal intubation
- In unsuccessful orotracheal intubation or "cannot ventilate cannot intubate situation" perform surgical airway [Figure 1].

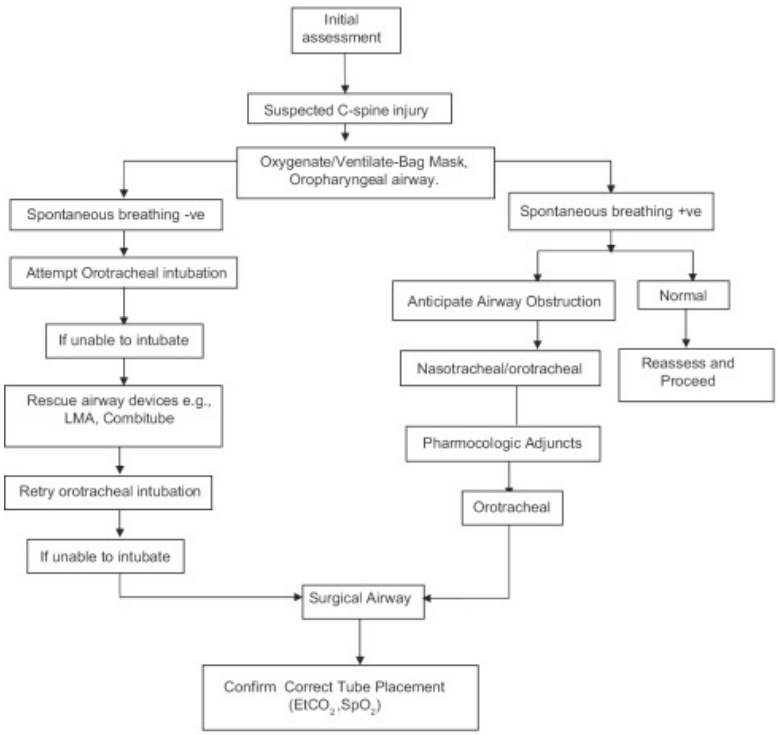

Figure 1. Surgical airway

Breathing: Breathing is evaluated by measuring the patient's respiratory rate, and subjectively quantifying the depth and intensity of inspiration. Breath sounds should be consciously filtered out bilaterally. Pulse oximetry is an obligatory adjunct and end-tidal carbon dioxide monitoring is a beneficial adjunct. Rapid breathing action, and use of respiratory accessory muscles, hypoxia, hypercapnia, and asymmetrical chest wall excursions and diminished or absent breathing sounds all require treatment while proceeding.At this point, pneumothorax tension needle decompression can be completed quickly with conclusive thoracostomy of the tube performed after completion of the primary survey.[15-18]

Circulation and Haemorrhage control: Following the development of airways and the treatment of respiratory issues, priority must be paid to circulation. Maxillofacial injuries are particularly vulnerable to serious haemorrhages and life-threatening haemorrhages can range from 1.4% to 11%. One in ten of the complex facial fractures substantially bleeds. The principal vessels involved are an ethmoid artery, ophthalmic, internal carotid vidian branch, and maxillary artery. Bleeding can be easily controlled in most cases, but rarely extreme epistasis ranging from 2% to 4% of all facial bleeding occurs from the maxillary artery, causing haemorrhage management difficulties.Through careful examination of the pharynx for lacerations and tears, it is important to distinguish bleeding from the skull base fracture and oral bleeds.[19-23]

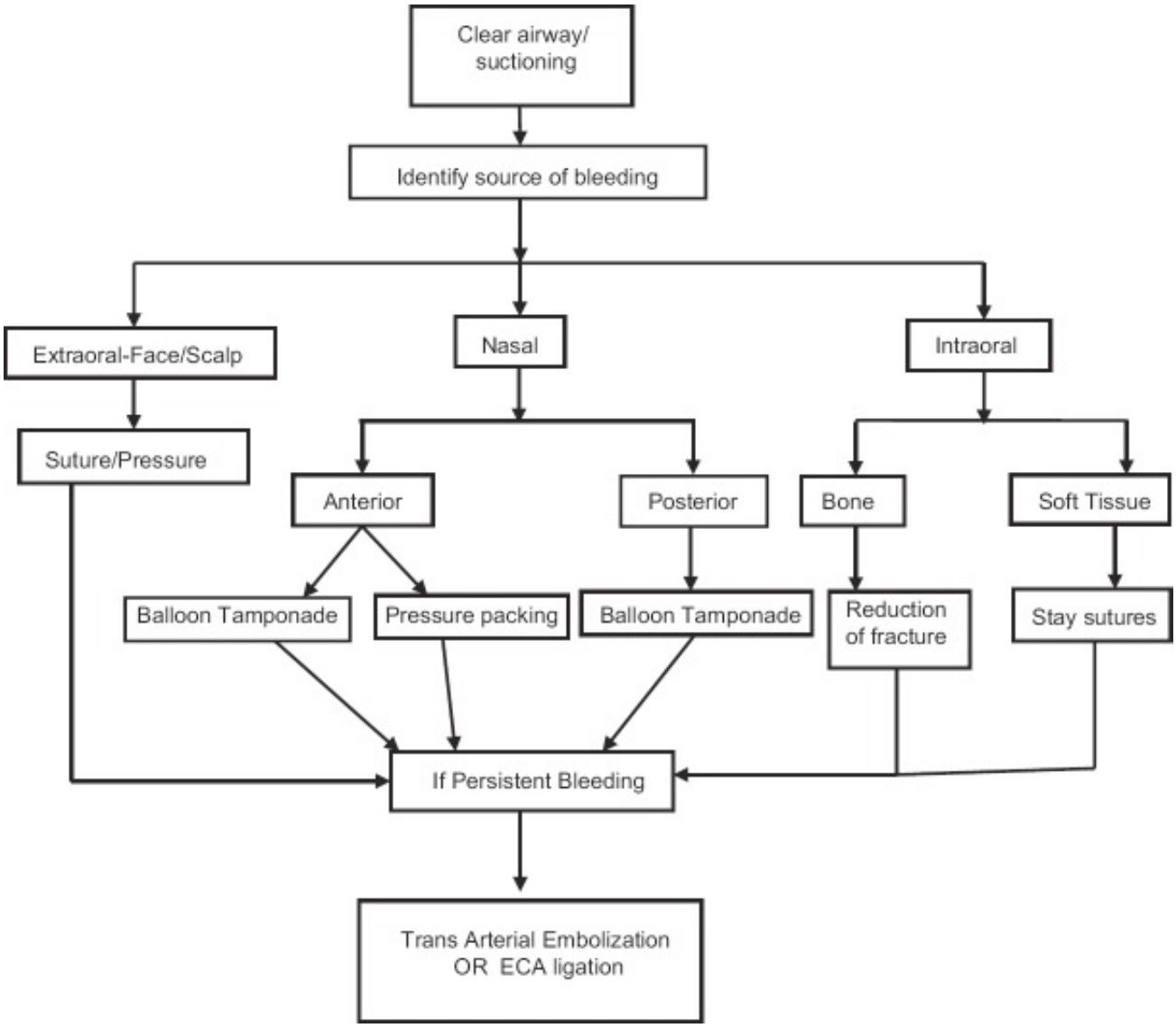

Figure 2. Clear airway/suctioning

Secondary Survey: Upon completion of the primary test, serious life-threatening injuries were treated, and vital signs were stabilized, the provider starts the secondary check that requires a history and full head-to - toe inspection. A history of the injury process is important to obtain, since certain causes of trauma (falls, motor vehicle collisions, car vs. pedestrian accidents, gunshot wounds, etc.) are typically associated with patterns in injury, which may alert the provider to new potential injury. Current medicines are important, particularly for elderly people, because anticoagulants can be a significant cause of excessive bleeding, and b-blockers can decrease cardiac output and suppress tachycardia.[24-27]

The family members, paramedics, or other traumatized patients can be a best source of knowledge in a patient who is unable to respond. A helpful mnemonic for having a brief history is "Complete," which looks at the following important areas: allergies, medications, past diseases/pregnancy, last meal, and injury-related events/environment. The physical exam carefully examines each region of the body to accurately classify all the wounds and reduce the possibility of missed injuries. The systematic analysis starts with the head and skull, and progresses to maxillofacial structures, neck and c-spine, chest, abdominal, perineal region, pelvic and neurological system. Since several of those structures overlap, a detailed and systematic approach should always be taken to ensure completeness.

Cervical Spine and Maxillofacial Trauma: In a complex maxillofacial trauma situation, fracturing of the cervical spine should always be considered, unless otherwise confirmed. The occurrence in all maxillofacial trauma is very small and ranges from 1 percent to 10 percent.[27-34] Due to the proximity of the cervical spine, any force of such magnitude that causes facial fractures can potentially traumatize the c-spine and its ligamentous attachments. In general, without the addition of a radiographic test, the patient can be exempt from spinal injury if the following are shown. Patient with neurological conditions (norm GCS); Not under the consequence o drugs/alcohols/others; Absences of pain in posterior midline cervical spine; devoid debilitating.[35]

Conclusions

The seriousness of all maxillofacial injuries is due to the fact that they pose an immediate threat to life as a result of their proximity to both the airway and the brain. Even so, each situation is unique; therefore, even for the most seasoned of professionals, the management is exacting. No treatment strategy can be defined as sure and flawless in any given scenario. The need of the hour is a multi-pronged strategy involving multi-departmental cooperation. Although new technologies and equipment advances have helped to ease the crisis, the prompt action, sheer skill, and mind presence of emergency personnel and surgeons are what counts.

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