Use of ATLS Protocol for the Management of Poly Trauma Patient with Maxillofacial Injuries

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Abstract

The management of a poly trauma patient requires a collaborated, multidisciplinary approach in order to get a favorable patient outcome. Knowledge of type of problems these patients encounter is critical to ensure that life threatening problems are timely recognized and treated and minor injuries are not ignored. The article highlights the management of a poly trauma patient using ATLS protocol and also throws light on the area of specific involvement of the medical team. ATLS protocol although regarded as a gold standard for the management of a trauma patient, but strict adherence to this protocol may not be always possible in case of a patient with facial trauma. An Oral and Maxillofacial surgeon needs to be aware of these probable problems and should be aware of how to manage them if the need arises.

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Introduction

Maxillofacial trauma is one of the most challenging area of specialty of oral and maxillofacial surgery. Despite lots of advancements in the fields of imaging, hardware and our understanding of healing of tissues, initial management of poly trauma patient remains an aspect which has to be very well understood by oral and maxillofacial surgeon. When oral and maxillofacial surgeon looks at a trauma patient he just can't focus on face, attention should also be paid on any other associated injuries of long bones, abdominal injuries or any head injury, which can be potentially life threatening[5].

This again reinforces the concept of knowing the mechanism of injury, which warrants the screening for following injuries. [10]

1) High velocity impacts
2) Falls from heights
3) Patient's with pelvic fracture or long bone injuries [6]

If a surgeon has knowledge about the algorithm for assessment and initial management of a maxillofacial trauma patient, he can manage the life threatening condition with confidence. Advanced Trauma Life Support (ATLS) is the simultaneous assessment and treatment of multiple trauma patients. It is based on the initial identification, through assessment and management of a trauma patient. It focuses specially in identification of life threatening injuries. From the time it was formulated in 1978, Advanced Trauma Life Support (ATLS)[1,2,3] system of care has been accepted as gold standard in the initial management of the multiply injured patient and its protocol is now taught in over 40 countries worldwide.

The approach is basically based on three followed principals of:

1. ABCDEs of assessment (Airway maintenance with cervical spine protection, Breathing with ventilation, Circulation with hemorrhage control, Disability; neurological status and Exposure /Environment)
2. "primum non nocere" (First do no harm) and
3. Management of life threatening injuries within the golden hour.

The aim of the following paper is to outline the acute assessment of a poly trauma patients, with a special attention towards a maxillofacial trauma patient.[6]

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Initial evaluation and management

In a trauma setting the management of a seriously injured patient involves a coordinated effort of multidisciplinary team with simultaneous assessment and management of various life-threatening conditions. The management of a patient after being bought to hospital is divided into following phases[7]

1. Primary survey
2. Adjuncts to primary survey and resuscitation.
3. Secondary survey (head to toe evaluation and history)
4. Adjuncts to secondary survey
5. Continued post resuscitation monitoring and reevaluation.
6. Definitive care.

A through history of the accident and circumstances leading to the accident may provide important information regarding the pattern of injury and type of injury. A through medical history should also be elicited, but most of the time obtaining a medical history is not possible in a trauma patient due to severity of injury and altered level of consciousness. In such a condition a history must be obtained from the bystander or relatives accompanying the patient.

The following key points should be obtained (ATLS pneumonic is AMPLE)

- Allergies
- Medications
- Past illness
- Last meal
- Events/Environment of injury

The ATLS system divides the initial assessment into primary and secondary surveys. The primary survey aims to identify the immediate life-threatening conditions, which require urgent attention. The secondary survey aims to identify other injuries that will require treatment but are not life threatening immediately. The pneumonic for the primary survey is given by the letters ABCDE.

- Airway maintenance with cervical spine control
- Breathing and ventilation
- Circulation with hemorrhage control
- Disability: Neurological status
- Exposure/environment control

Airway with cervical spine immobilization

If a patient is unable to maintain their own airway, irreversible cerebral damage can occur in as less time as 4 minutes because of cerebral hypoxia. Hence it is of utmost importance to secure an airway in the first step. If there is difficulty in gaining an airway, an emergency cricothyroidotomy should be done as a temporary measure. In about 10% to 15% of poly trauma patient's there will be associated spinal injury of 55% occurs in spinal area (7). Any injudicious manipulation of the cervical spine area to secure the airway can cause more harm than benefit to the patient. Thus, an equal importance must also be given to in line stabilization of the cervical spine by applying traction on either side of head by hand while trying to secure the airway.

If there is no evidence of airway compromise or once the breathing is spontaneous attention must be directed towards management of other concomitant injuries.

Lungs are vital organs for maintaining oxygenation of body tissues as well as removing carbon dioxide from the body and helping to maintain acid base balance.

Six causes of life threatening respiratory compromise are. [7]

- Upper respiratory obstruction
- Tension pneumothorax
- Open pneumothorax
- Flail Chest
- Massive pneumothorax
- Cardiac tamponade

Initial treatment consists of removing mechanical problems, providing high flow oxygen and providing ventilator support if needed. In patients with spinal injury a possibility of spinal shock should always be considered. It is seen in patients who have accord injury above the level of the thoracic sympathetic outflow.

The effect seen is hypotension and bradycardia. It is the bradycardia that acts as a differentiating point between spinal shock and hypovolemic shock. Treatment of spinal shock involves a proper use of Intravenous fluids combined with vasopressors to increase the resting vascular tone.

ATLS protocol says that in patients with trauma above the clavicle a possibility of cervical spine injury must be considered hence all

patients with maxillofacial trauma must be considered in this group.

Hence a maxillofacial trauma patient must be managed by

- Cervical collar, until clinical and radiological examination proves otherwise.
- Detailed neurological examination inclusive of examination of cranial nerves
- Detailed assessment for CSF rhinorrhea.[4]

Circulation

For the maintenance of adequate tissue perfusion and oxygenation an adequate circulating blood volume is of utmost importance which in turn requires a normally functioning heart. In vast majority of trauma patients, the main reason for circulatory compromise is acute blood loss leading to hemorrhagic shock. Some other causes of shock that should be considered are.

- Cardiogenic shock
- Tension pneumothorax
- Neurogenic shock
- Septic shock

Hemorrhagic shock: While some bleeding may occur from obvious source, most of the times the exact source cannot be determined. The common sites for major occult blood loss are:

- The chest in case of hemothorax
- The abdomen from a ruptured viscera
- The pelvis from an unstable pelvic fracture
- From multiple closed long bone fracture

The cardinal sign of hemorrhagic shock is tachycardia and cutaneous vasoconstriction in healthy young adults hypotension occurs when blood loss is in the range of 1500-2000ml. The initial fluid bolus to be given is 1-2 liters for adults and 20ml/kg for a child. This should be followed by blood transfusion fully cross matched blood is preferred, but in urgent situation type specific (ABO and Rh matched blood can be used). In life threatening hypotension O negative packed cells can be used. The return of blood pressure and pulse to normalcy signifies improvement in condition. Return of urine output to 0.5ml/kg/hr suggests that adequate renal perfusion has been restored. [7]

Disability (Neurological status)

The aspect of brain injury is assessed next. A reduction in patient's level of consciousness may be due to impending brain injury. The assessment of brain injury is made by examining the pupillary size and reactivity and by assessing whether the patient is alert, responds to verbal stimuli, responds to pain or is unresponsive.

Unequal pupillary responses may be a sign of trauma to the eye (*traumatic mydriasis*) or a more serious condition like expanding *intracranial hematoma.* [11]

Glasgow coma scale is a very good indicator for assessing the patient's condition of patient following a head injury. It gives a score out of 15 based on patient's best motor, verbal and eye response. A score of 15 indicates a fully alert and cooperative patient, and a score of 8 or less is usually suggestive of serious cranial trauma. [12]

A decreased level of consciousness, in the absence of any head injury component represents an inadequate cerebral perfusion, prompting a reassessment of A, B and C.[7]

Exposure/Environment

To make sure a through whole body examination is done, all the clothing from the person's body must be removed. Once the clothing is removed, the patient must be covered with a blanket to prevent hypothermia. Additional steps that can be undertaken to prevent hypothermia are administration of warm I.V fluids and maintaining a warm environment in the resuscitation room. [7]

During the resuscitation it should be kept in mind that problems of higher priority should always be dealt first. Frequent reassessment of the patient must be done during the resuscitation process, as the condition of the patient is constantly changing and it should not worsen.

Maxillofacial surgeons are an integral part of a trauma team, especially for those patients in whom facial injuries are evident. Their involvement is especially relevant during the management of. [8]

- Airway
- Hypovolemia in facial bleeding
- Craniofacial injuries
- In the assessment of eye.[5]

A history of alcohol consumption should also be elicited, as the alcohol levels are unlikely to go down in the next 12 to 24 hours and it is associated with bleeding. If the patient's consciousness is of concern, intubation is also necessary, a CT scan of the brain is also indicated. [9]

Conclusion

1) The management of a poly trauma patient requires a multidisciplinary approach.
2) Initial assessment of a poly trauma patient should be done keeping in mind the ATLS protocol, and life threatening injuries should be prioritized and managed first
3) Oral and Maxillofacial surgeon is an integral part of the trauma team , during the golden hour after trauma his advice and intervention is of utmost importance
4) Maxillofacial surgeon managing a multiply injured patient should always maintain a high degree of suspicion for other associated injuries.
5) Specific injury patterns are now well known to be associated with high-velocity mechanism of injury.
6) Definitive repair procedures will depend upon the patient general status and other associated injuries which require early intervention

From the point of view of Oral and Maxillofacial Surgeon, although ATLS protocol is the gold standard for the management of a trauma patient, strict adherence to its protocol in a maxillofacial trauma patient does has its set of problems. With the advances in technology and trauma mechanism, a multidisciplinary approach should be followed for the management of a poly trauma patient.

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