Advanced Trauma Life Support (ATLS)

Advanced trauma life support (ATLS) is the protocol to manage the emergency situation in trauma afflicted persons. It consists of primary and secondary survey both of which aim to restore the person back to his possible healthy life. But in primary survey we maintain life even at the risk of something giving up but in secondary survey, now we examine the subject from head to toe and take the history related to circumstances or events to further confirm the suffering and to deal with it.

The aim of ATLS is to access, identify and immediate management of the patient's situation.

So just for understanding, advanced trauma life support (ATLS) is classified as;

1. Primary Survey
2. Secondary Survey

1. Primary Survey

Primary survey follows a protocol named as ABCDE protocol, each alphabet of which denotes a step to perform.

A  Airway & Cervical Spine
B  Breathing & Ventilation
C  Circulation & Control of Hemorrhage
D  Disability & Neurological Examination
E  Exposure

Let's come to each of described step in a brief manner. So first comes A for airway and cervical spine.

A – Airway & Cervical Spine

As the patient comes to you in the emergency, first of all you have to check his airway whether it is patent or not? Simply ask him a simple question i-e ask him about his name. If he replies it in the normal voice, his airway is patent. You should consider his voice tone, his speech manner, or anything ambiguous. Suppose voice may not be nasal in character in normal person. So if his voice is predominantly nasal, you should check his throat for some injury or foreign body.

Patient tells his name clearly  Airway is patent

Patient is not able to tell his name, so his airway is compromised. We have to check his oral cavity for any foreign body which may be the cause of obstruction in the airway. The management is just to remove the foreign body immediately.

Patient is unable to say his name  Airway is compromised

If there is no obvious obstruction or foreign body in the oral cavity and the patient has still his airway...
compromised, we suspect of injury to airway passage which may be of any type. But now the first aim to manage such a situation is to restore his airway. Certain procedures help us in restoring airway in such an emergency situation.

- **Head tilt / chin lift**
- **Jaw Thirst**
- **OPA (oropharyngeal airway)**
- **NPA (nasopharyngeal airway)**
- **ETT (endotracheal tube)**
- **LMA (laryngeal mass airway)**

**Head Tilt / Chin Lift**

We tilt the head of the patient backward or simply lift the chin upward. The stretches the neck and helps in opening of air track of the patient.

**Jaw Thirst**

This is another approach to make the airway patent. We put both of our hands behind the jaw of the patient with our finger along the posterior border of the mandible and palm supporting the side of mandible. Then we exert the thrusting pressure in the forward direction. This relieves our airway problem to a lot.

Always always suspect of cervical injury especially in the head injuries patient until unless it is proven.

So in such patients, we do not apply head tilt / chin lift and jaw thirst procedures because these may even worsen the patient condition. We simply put the *neck collar* around the patient's neck and seek other procedures to perform.

**OPA (Oropharyngeal Airway)**

This instrument is simple placed in the oral cavity in such cases where the problem is in the oral cavity. This instrument can not be so helpful in normal patient with intact gag reflex as it may cause the instrument to be thrown outside.

**NPA (Nasopharyngeal Airway), ETT (Endotracheal Airway) and LMA (Laryngeal Mass Airway)** are the other valuable approaches to maintain airway in injured patients.

Tracheostomy procedure is not the part of ATLS instead we perform cricothyroidectomy procedure.

**B – Breathing & Ventilation**

Second approach in TLS is the assessment of breathing and ventilation. We simple observe the patient breathing and note down any distinction in the normal breathing pattern. The patient may be over exhausted or breathing heavily. His respiration may be fast or too slow. He may even exert extra effort to breathing.
In such a situation, we search for any injury or fracture to the chest area which would be the cause of abnormal breathing.

Normally three things are required for intact breathing, *normal chest wall, working diaphragm* and the *functional lungs*. Any damage or injury to any of these structures results into difficult breathing or even no breathing.

Certain important injuries which disrupt breathing pattern and ventilation are tension pneumothorax, hemothorax, and cardiac tamponade

**Tension Pneumothorax**

Tension pneumothorax is a life threatening condition which requires immediate management. It is the injury to the pleura which results accumulation of air or gas in the pleural cavity escaping from bronchus which cannot go back. The presence of air in pleural cavity creates tension (positive pressure) and resistance against the expanding lungs and even compresses it resulting into that side of lung collapse.

Normally the pleural cavity is a air tight compartment with negative pressure.

Two approaches are there to deal with tension pneumothorax. First one is valuable the emergency environment which is known as *needle thoracostomy* (ostomy – making a hole). On the effected side in the mid clavicular line and in the second intercostal space, we insert a needle to make a hole in the pleural cavity and connects it with a drain.

In emergency, we can use the syringe needle, any pin available and even something pointed to make a hole to save the patient's life.

Second approach to deal with such type of condition is the insertion of chest tube which mostly is not possible in emergency situation in such a short time.

One point must be cleared, the needle thoracostomy provides us with some more time and it is not the definite ultimate procedure. It is followed by tube thoracostomy or chest tube insertion ultimately.

After insertion of tube, it is connected to under water seal apparatus.

**Hemothorax**

The other term used is hemopleura. It is the presence of blood in the pleural cavity or in other words a pleural effusion containing blood. The approach is to drain the blood as soon as possible.

The important thing is to differentiate b/w hemothorax and tension pneumothorax in emergency situation as management varies for both.

Trachea deviates to opposite side due to mediastinal shift which occurs both in tension pneumothorax and massive hemothorax but not in simple pneumothorax. Then we record note on the chest wall. It becomes hyper-resonant in pneumothorax due to presence of huge amount of air and dull in hemothorax due to presence of bloody effusion.

*Tracheal is deviated to either side ➔ tension pneumothorax & massive hemothorax*
Cardiac Tamponade

It is the presence of blood in the pericardial cavity. Three points help to evaluate this condition in the emergency. Neck vein engorgement, decreased blood pressure and muffled heart sounds. Three of these symptoms form Beck's triangle.

The management is to drain the blood out of the cavity by the needle or syringe, procedure called pericardiocentesis. Insert a needle just below the xiphisternum with inclining angle of 45° and towards the left direction. After insertion, we connect it with a drain.

C – Circulation & Control of Hemorrhage

To access the circulation, thee parameters are noted, color change, temperature and pulse. We must know the normal of these parameters so we can access any change in these. Normal color of skin varies but in disturbed circulation, skin become pale and cold. As for pulse, it is slow, regular and of full volume in normal persons. In the patient of shock, pulse become fast, weak and thready.

The approach is to maintain dropping circulation not just by re-hydration or transfusion of blood but primarily controlling the hemorrhage. We perform triple S i-e stop bleeding, stabilize the circulation and splint the bone if reduced.

Hemorrhage may be externally visible and easy to handle and in some instances internal hemorrhage may occur which require proper attention to be diagnosed to deal with it.

D – Disability & Neurological Assessment

After stabilizing the patient's life, now we have to know the extent of any suspected disability and neurological assessment. For accessing the level of consciousness, we use GCS (Glasgow Coma Scale) score system.
Glasgow Coma Scale (GCS)

GCS score ranges from 3 to 15, with 15 being the best and 3 the worst achieved. GCS comprises three parameters: best eye response, best verbal response, and best motor response.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Response</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Eye Response (E)</td>
<td>Eyes open spontaneously</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Eye opening to verbal command</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Eye opening to painful stimulus</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No eye opening</td>
<td>1</td>
</tr>
<tr>
<td>Best Verbal Response (V)</td>
<td>Orientated to time, place &amp; person</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Confused but answer to questions</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Inappropriate response (words discernible)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Incomprehensible sounds</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>No verbal response</td>
<td>1</td>
</tr>
<tr>
<td>Best Motor Response (M)</td>
<td>Obeys Commands for movements</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Purposeful movement to painful stimulus (moves hand to pain site)</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>With draws from pain</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Abnormal flexion to pain</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Abnormal extension to pain</td>
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</tr>
<tr>
<td></td>
<td>No motor response</td>
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</tr>
<tr>
<td>Total Score</td>
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<tr>
<td></td>
<td>Comatose</td>
<td>8 or less</td>
</tr>
<tr>
<td></td>
<td>No response</td>
<td>3</td>
</tr>
</tbody>
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**E – Exposure of Body**

Exposure is necessary as to make ascertain that the patient does not have injuries on other body parts without knowing it. Sometimes the patients do not feel the pain or may not have noticed their injuries which latter become obvious. So to rule out, we should properly arrange for full exposure to avoid such circumstances.

After ABCDE protocol in primary survey, we start *adjunct therapy* before going to secondary survey. Two wide bore IV line are maintained followed by infusion of 2 liters of fluids. Ringer lactate may be used for infusion. Tetanus prophylaxis is important in such patients. The pain killers and radiological investigations are done now. In radiology, x-ray AP view of chest, cervical (cross table cervical spine) and pelvis is done.
2. Secondary Survey

In secondary survey, we approach in two ways, first head to toe examination of the patient and second relevant history of the patient.

The history of such a patient follows **AMPLE protocol**, each alphabet of which denotes a set of relevant questions to be asked.

A  Allergy
M  Medication
P  Previous Medical History
L  Last Meal
E  Event of Incidence