ATLS (10th ed.) Revisions Future of Trauma

Joe Acker, MS, MPH
ATLS REVISIONS

A BRIEF OVERVIEW
JOE ACKER EMT-P, MPH
ATLS COURSE COORDINATOR
ATLS NATIONAL EDUCATOR
ATLS CONTRIBUTING AUTHOR
ATLS UPDATE
TENTH EDITION

THIS PRESENTATION IS NOT INTENDED TO PROVIDE AN UPDATE FOR PROVIDERS/INSTRUCTORS/FACULTY
ADVANCED TRAUMA LIFE SUPPORT 10 TH REVISIONS

• WHY?
• WHAT ARE THE CONTENT REVISIONS?
• WHAT ARE THE COURSE OFFERING REVISIONS?
WHY UPDATES?

• Content changes based upon new science and practice --- not just USA but world wide

• Presentation/education changes based upon new science/studies to improve: learning environment, learning participation, content retention, psychomotor/skill use after the course in the first hour of trauma care

• Course teaching/facilitation changes to achieve the above goals
ATLS 10th edition instructor update
Content and skill station changes

Tenth Edition

THE COMMITTEE ON TRAUMA

ATLS
ADVANCED TRAUMA LIFE SUPPORT

AMERICAN COLLEGE OF SURGEONS
Inspiring Quality: Highest Standards, Better Outcomes
FACULTY

No restrictions on teaching skill stations!

Any faculty regardless of sub-specialty can teach any skill station including surgical skills embedded in the skill station!
Initial fluid bolus of 1 liter of WARMED FLUID may be required. Fluids are administered judiciously, as aggressive resuscitation before control of bleeding has been demonstrated to increase mortality.

Coagulopathy associated with severe trauma can be fueled by resuscitative measures. Use of massive transfusion protocols with blood components administered a predefined low ratios may mitigate this.
Be Prepared

**Equipment:**
Suction, \( O_2 \) oropharyngeal and nasopharyngeal airways, bag-mask, laryngoscope, gum elastic bougie (GEB), extraglottic devices, surgical or needle cricothyroidotomy kit, endotracheal tubes, pulse oximetry, \( CO_2 \) detection device, drugs

Restrict cervical spinal motion!

**Preoxygenate**
\( O_2 +/- \) bag-mask +/- oral airway +/- nasal airway

**Able to oxygenate**
- **YES**
  - Assess airway anatomy
  - Predict ease of intubation (LEMON)
  - **EASY**
    - Intubation +/- drug-assisted intubation
    - Cricoid pressure
  - **DIFFICULT**
    - Call for assistance, if available

**UNSUCCESSFUL**
- Consider adjunct (e.g. GEB/LMA/LTA)
- Definitive airway/Surgical airway

**Definitive airway/Surgical airway**

CONTENT UPDATE: CHAPTER 2 AIRWAY AND VENTILATORY MANAGEMENT

Change term RSI (rapid sequence intubation) to DAI (Drug Assisted Intubation)
• Fluid resuscitation 1 L warm crystalloid
• Minimum 18 gauge peripheral access X 2
• Choice of site for alternate access based clinician experience and skill
• Early resuscitation with blood and blood products must be considered in patients with evidence of class III and IV hemorrhage. Early administration of blood products at a low ratio of packed red blood cells to plasma and platelets can prevent the development of coagulopathy and thrombocytopenia.
• Massive transfusion define as > 10 units pRBC in 24 hours or more than 4 units in 1 hour.

• Some jurisdictions administer tranexamic acid in pre-hospital setting to severely injured patients in response to studies that demonstrated improved survival when this drug is administered within 3 hours of injury. The first dose is usually given over 10 minutes and is administered in the field; the follow up dose of 1 gram is given over 8 hours.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Class I</th>
<th>Class II (mild)</th>
<th>Class III (moderate)</th>
<th>Class IV (severe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approximate blood loss</td>
<td>&lt; 15 %</td>
<td>15–30%</td>
<td>31–40%</td>
<td>&gt; 40%</td>
</tr>
<tr>
<td>Heart rate</td>
<td>/↑</td>
<td>/↑/↑</td>
<td>↑</td>
<td>↑/↑/↑</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>/↓</td>
<td>/↓/↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Pulse pressure</td>
<td>/↓</td>
<td>/↓/↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Respiratory rate</td>
<td>/↑</td>
<td>/↑/↑</td>
<td>↑</td>
<td>↑</td>
</tr>
<tr>
<td>Urine Output</td>
<td>/↓</td>
<td>/↓/↓</td>
<td>↓</td>
<td>↓/↓</td>
</tr>
<tr>
<td>GCS</td>
<td>/↓</td>
<td>/↓/↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Base deficit</td>
<td>0 to −2 mEq/L</td>
<td>−2 to −6 mEq/L</td>
<td>−6 to −10 mEq/L</td>
<td>−10 mEq/L or more</td>
</tr>
<tr>
<td>Need for Blood Products</td>
<td>Monitor</td>
<td>Possible</td>
<td>Yes</td>
<td>MTP</td>
</tr>
</tbody>
</table>
Tension pneumothorax

• Presentation
  • Spontaneous ventilation – air hunger, desaturation
  • Mechanical ventilation - hemodynamic compromise

• Treatment
  • Decompression
    • Needle
      • Site – 4th or 5th ICS Adults MID AXILARY LINE
      • may fail by kinking or CW thickness
    • Finger
Hemothorax (smaller just as good)

- CT size 28-32 F

Blunt aortic injury medical management

- HR and BP control ↓ rupture
- Targets HR = 80 MAP = 60-70 mm HG if no contraindications
• Include blast mechanism in addition to penetrating and blunt injury.
• Palpation of the prostate gland is not a reliable sign of urethral injury
### Table 6-2: Glasgow Coma Scale (GCS)

<table>
<thead>
<tr>
<th>Original Scale</th>
<th>Revised Scale</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Opening (E)</td>
<td>Eye Opening (E)</td>
<td></td>
</tr>
<tr>
<td>Spontaneous</td>
<td>Spontaneous</td>
<td>4</td>
</tr>
<tr>
<td>To speech</td>
<td>To sound</td>
<td>3</td>
</tr>
<tr>
<td>To pain</td>
<td>To pressure</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Non-testable</td>
<td></td>
<td>NT</td>
</tr>
<tr>
<td>Verbal Response (V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oriented</td>
<td>Oriented</td>
<td>5</td>
</tr>
<tr>
<td>Confused</td>
<td>Confused</td>
<td>4</td>
</tr>
<tr>
<td>Appropriately</td>
<td>Words</td>
<td>3</td>
</tr>
<tr>
<td>Inappropriate words</td>
<td>Sounds</td>
<td>2</td>
</tr>
<tr>
<td>Incomprehensible sounds</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Non-testable</td>
<td></td>
<td>NT</td>
</tr>
<tr>
<td>Best Motor Response (M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obey commands</td>
<td>Obey commands</td>
<td>6</td>
</tr>
<tr>
<td>Localizes pain</td>
<td>Localizing</td>
<td>5</td>
</tr>
<tr>
<td>Flexion withdrawal to pain</td>
<td>Normal flexion</td>
<td>4</td>
</tr>
<tr>
<td>Abnormal flexion (decorticate)</td>
<td>Abnormal flexion</td>
<td>3</td>
</tr>
<tr>
<td>Extension (decrebrate)</td>
<td>Extension</td>
<td>2</td>
</tr>
<tr>
<td>None (flaccid)</td>
<td>None</td>
<td>1</td>
</tr>
<tr>
<td>Non-testable</td>
<td></td>
<td>NT</td>
</tr>
</tbody>
</table>
### BOX 6-1 NEUROSURGICAL CONSULTATION FOR PATIENTS WITH TBI

When consulting a neurosurgeon about a patient with TBI, communicate the following information:

- Patient age
- Mechanism and time of injury
- Patient’s respiratory and cardiovascular status (particularly blood pressure and oxygen saturation)
- Results of the neurological examination, including the GCS score (particularly the motor response), pupil size, and reaction to light
- Presence of any focal neurological deficits
- Presence of suspected abnormal neuromuscular status
- Presence and type of associated injuries
- Results of diagnostic studies, particularly CT scan (if available)
- Treatment of hypotension or hypoxia
- Use of anticoagulants

### TABLE 6-6 ANTICOAGULATION REVERSAL

<table>
<thead>
<tr>
<th>ANTICOAGULANT</th>
<th>TREATMENT</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antiplatelets (e.g., aspirin, plavix)</td>
<td>Platelets</td>
<td>May need to repeat; consider desmopressin acetate (Deamino-D-Arginine Vasopressin)</td>
</tr>
<tr>
<td>Coumadin (warfarin)</td>
<td>FFP, Vitamin K, prothrombin complex concentrate (Kcentra), Factor VIIa</td>
<td>Normalize INR; avoid fluid overload in elderly patients and patients who sustained cardiac injury</td>
</tr>
<tr>
<td>Heparin</td>
<td>Protamine sulfate</td>
<td>Monitor PTT</td>
</tr>
<tr>
<td>Low molecular weight heparin, e.g., Lovenox (enoxaparin)</td>
<td>Protamine sulfate</td>
<td>N/A</td>
</tr>
<tr>
<td>Direct thrombin inhibitors dabigatran etexilate (Pradaxa)</td>
<td>idarucizumab (Praxbind)</td>
<td>May benefit from prothrombin complex concentrate (e.g., Kcentra)</td>
</tr>
<tr>
<td>Xarelto (rivaroxaban)</td>
<td>N/A</td>
<td>May benefit from prothrombin complex concentrate (e.g., Kcentra)</td>
</tr>
</tbody>
</table>
Evidence based treatment guidelines introduced: including the BTF 4th edition TBI guidelines and the ACS TQIP best practices in the management of TBI

- Prolonged hyperventilation with PCO2 < 25 mm Hg is not recommended (Guidelines IIB).
- Maintain systolic blood pressure (SBP) at ≥ 100 mmHg for patients 50 to 69 years or at ≥ 110 mm Hg or higher for patients 15 to 49 years or older than 70 years; this may decrease mortality and improve outcomes (III)
- Although propofol is recommended for the control of ICP, it is not recommended for improvement in mortality or 6-month outcomes. Caution is required as high-dose propofol can produce significant morbidity.
- Mannitol 0.25-1 g/Kg to control ICP avoid arterial hypotension
CONTENT UPDATE: CHAPTER 7: SPINE AND SPINAL CORD INJURY

**Canadian C-spine Rule (CCK)**

For alert (GCS score =15) and stable trauma patients in whom cervical spine injury is a concern:

Any high-risk factor that mandates radiography?
1. Age > 65 years
2. Dangerous mechanism
3. Paresthesias in extremities

<table>
<thead>
<tr>
<th>NO</th>
<th>YES</th>
</tr>
</thead>
</table>

Any low-risk factor that allows safe range of motion assessment?
1. Simple rear-end MVC
2. Sitting position in the ED
3. Ambulatory at any time
4. Delayed onset of neck pain
5. No midline cervical tenderness

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

Able to rotate neck actively (45° left and right)

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

Spinal motion restriction

**Spinal Immobilization**

**National Emergency X-Radiography Utilization Study (NEXUS) Criteria**

Meets ALL low-risk criteria?
1. No posterior midline cervical-spine tenderness
2. No evidence of intoxication
3. A normal level of alertness
4. No focal neurologic deficit
5. No painful distracting injuries

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
</table>

**NEXUS Mnemonic**

N - Neuro deficit
E - EtOH (alcohol)/intoxication
X - eXtreme distracting injury(ies)
U - Unable to provide history (altered level of consciousness)
S - Spinal tenderness (midline)
Fluid resuscitation for patient with deep partial and full thickness burns involving $\geq 20\%$ BSA should begin with $2 ml$ of Lactated ringer’s $X$ patient’s weight in kg $X$ % BSA burn

- Fluid is titrated based on adequacy of the urine output.
- Avoid fluid boluses unless the patient is hypotensive.
- Resuscitate pediatric patients using $3 ml/kg/%TBSA$
Use of Don’t be a DOPE mnemonic to remember common causes of deterioration in intubated patients.

- D dislodgement
- O obstruction
- P pneumothorax
- E equipment failure

*Note no change in site for needle decompression in children 2nd intercostal space mid clavicular line.*
Damage control resuscitation in children represents a move toward limiting crystalloid resuscitation.

- 20 ml/kg bolus
- 10-20 ml/kg of PRBC
- 10-20 ml/kg of fresh frozen plasma and platelet as part of massive transfusion protocol
- No survival advantage has been demonstrated
Preexisting conditions impact morbidity and mortality.

- The five that appear to influence outcome in trauma patients are cirrhosis, congenital coagulopathy, chronic obstructive pulmonary disease, ischemic heart disease and diabetes mellitus
- Patients with one or more of these PECs twice as likely to die as those without.

**Mortality from pelvic fracture 4 X higher in older than younger patients**

- Need for blood transfusion even with stable fracture is higher
- Longer hospital stays and less return to independent lifestyles
Significant portion of trauma patients transferred to regional trauma centers undergo CT scanning at the primary hospital

- Increased length of stay before transfer
- Much of the time delay between injury and transfer is related to performing diagnostic studies despite lack of a surgeon to provide definitive care.

CT scans done before transfer to definitive care are often repeated upon arrival to the trauma center

- Making the necessity of a pre-transfer CT questionable.
- Multiple scans result in increased radiation exposure and additional hospital costs
## Table 13-2 Sample ABC-SBAR Template for Transfer of Trauma Patients

<table>
<thead>
<tr>
<th>ACRONYM</th>
<th>MEANING</th>
<th>INFORMATION TO PROVIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Airway</td>
<td>All airway, breathing, and circulation problems identified and interventions performed</td>
</tr>
<tr>
<td>B</td>
<td>Breathing</td>
<td>Patient Name</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Age</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referring Facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Referring physician name</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reporting nurse name</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indication for transfer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV access site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IV fluid and rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other interventions completed</td>
</tr>
<tr>
<td>S</td>
<td>Situation</td>
<td>Event history</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMPLE assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blood products</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medications given (date and time)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Imaging performed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Splinting</td>
</tr>
<tr>
<td>B</td>
<td>Background</td>
<td>Vital signs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pertinent physical exam findings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patient response to treatment</td>
</tr>
<tr>
<td>A</td>
<td>Assessment</td>
<td>Transport mode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Level of transport care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medication intervention during transport</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Needed assessments and interventions</td>
</tr>
<tr>
<td>R</td>
<td>Recommendation</td>
<td></td>
</tr>
</tbody>
</table>
BOX 13-1 QUESTIONS THAT CAN ASSIST IN DETERMINING APPROPRIATE TRANSPORT MODE

- Does the patient's clinical condition require minimization of time spent out of the hospital environment during the transport?
- Does the patient require specific or time-sensitive evaluation or treatment that is not available at the referring facility?
- Is the patient located in an area that is inaccessible to ground transport?
- What are the current and predicted weather situations along the transport route?
- Is the weight of the patient (plus the weight of required equipment and transport personnel) within allowable ranges for air transport?
- For interhospital transports, is there a helipad and/or airport near the referring hospital?
- Does the patient require critical care life support (e.g., monitoring personnel, specific medications, specific equipment) during transport, which is not available with ground transport options?
- Would use of local ground transport leave the local area without adequate emergency medical services coverage?
- If local ground transport is not an option, can the needs of the patient (and the system) be met by an available regional ground critical care transport service (i.e., specialized surface transport systems operated by hospitals and/or air medical programs)?
SCENARIO-BASED EDUCATION

• What is scenario-based education in ATLS?
• What is meant by an unfolding case scenario?
• How is it different from a case presentation?
Case Scenario

M 43-year-old obese restrained driver lost control of his small vehicle while traveling at a high speed on an icy road; crashed driver’s side into a large tree.

I None reported

S Patient combative during extrication

T Immobilized on long spine board; C collar; bag valve mask ventilation
Discussion Questions:

1. What aspects of the reported mechanism of injury present a risk of airway compromise?

2. Which clinical findings suggest(s) potential airway compromise?

Case Details

43-year-old obese- restrained driver lost control of his small vehicle while traveling at high speed on an icy road; crashed driver’s side into a large tree.

I

None reported

S

Patient combative during extrication

T

Immobilized on long spine board; C collar; bag valve mask ventilation
TRAUMA PATIENT POPULATIONS CHANGES

GERIATRIC
GROUND LEVEL FALLS
INTERFACILITY TRANSFERS
CLOSEST AVAILABLE LEVEL ONE IF WITHIN 60 MINUTES
RESPECT OF HOSPITAL CAPABILITY AND CAPACITY
REGIONALIZATION
ACCOUNTABILITY
QUESTIONS / COMMENTS