APPROACH TO SERIOUSLY ILL TRAUMATIC PATIENTS

Introduction

Globally, traumatic injuries account for approximately six million annual deaths. Trauma remains leading cause of mortality among under 46 years individuals. Therefore, it is important to increase the survival rate. Providing quality emergency care can prevent fatalities, reduce short-term and long-term disability. When treating seriously ill traumatic patients, clinicians rapidly assess injuries and initiate life-saving measures because timing is crucial. Frequent re-evaluation in every step is critical.

Preparation

- A resuscitation area is available for the patient
- Prepare trauma team
- Consider calling for help early (Anaesthetist, surgeon, orthopedic, etc.) in a center that does not have a dedicated trauma team
- Prepare functioning equipments that are organized, tested and placed to be easily accessible
- Use personal protective equipment (PPE) such as gloves, masks, and eye protection

Triage

Red criteria for seriously ill traumatic patients

X	Exsanguinating external hemorrhage	
A-airway	Stridor, gurgling sounds, central cyanosis	
B-breathing	Apnea / gasping, RR < 10 or > 29/ min, SpO2 < 90% RA	
C-circulation	SBP < 90mmHg or HR>SBP (Adults)	
D-Disability	GCS < 9, Unconscious or pain in AVPU	
Injury patterns	• Penetrating injuries to head, neck, torso and proximal extremities • Skull deformity, suspected skull fracture • Suspected spinal injury with new motor or sensory loss • Chest wall instability, deformity, or suspected flail chest • Suspected pelvic fracture • Suspected fracture of two or more proximal long bones • Crushed, degloved, mangled, or pulseless extremity • Amputation proximal to wrist or ankle • Active bleeding requiring a tourniquet or wound packing with continuous pressure	
Paediatric vital signs	Neonate	RR >60, HR >180, BP <60, CRT >2sec
	Infant	RR >50, HR >160, BP <70, CRT >2sec
	1 – 2 years	RR >40, HR >140, BP <75, CRT >2sec
	2-6 years	RR >30, HR >120, BP <80, CRT <2sec
	6 – 12 years	RR >20, HR >110, BP <90, CRT >2sec

INITIAL ASSESSMENT: PRIMARY SURVEY WITH SIMULTANEOUS RESUSCITATION (xABCDE)

Treat the greatest threat to life first!

X: CONTROL OF EXSANGUINATING EXTERNAL HEMORRHAGE

Assessment

- Massive bleeding from the extremity and other open wounds
- Compressible/ noncompressible type

Management

- Direct pressure or wound packing
- Apply tourniquet in cases of hemorrhage from extremity wound that does not respond to direct pressure or wound packing, massive extremity wound hemorrhage
- Junctional tourniquets to control bleeding from the groin/iliac area and the proximal axillary area

A: AIRWAY MAINTENANCE WITH CERVICAL MOTION RESTRICTION

Assessment

Assess airway patency, airway obstruction, identify foreign bodies; facial, mandibular and/or tracheal fractures; and other injuries that may cause obstruction, signs of airway edema or smoke inhalation in patients with thermal injury

LOOK: color, conscious state, facial and airway injury, airway edema, expanding hematoma, or open penetrating injuries

LISTEN: stridor, hoarseness

Management

- Suction or clear the airway of accumulated blood, debris and secretions
- Basic airway maneuver: Jaw thrust
- Airway adjuncts: OPA, nasopharyngeal airways (contraindicated in facial and basilar skull fracture), LMAs
- Mask ventilation: apply positive pressure ventilation with a mask connected to self-inflating bag
- Advanced airway: rapid-sequence tracheal intubation, surgical airway in cannot intubate, cannot ventilate situation

Spinal motion restriction

Apply spinal motion restriction measures in any patient at risk for spinal cord injury; placement of cervical collar or similar device, maintaining logroll precautions when the patient is moved or turned, maintaining cervical motion restriction as an important component of intubation process

B: BREATHING AND VENTILATION

Assessment

LOOK: RR, SpO2%, symmetrical chest wall movement, respiratory distress, penetrating injury, flail chest, sucking chest wound

LISTEN: presence and quality of breath sounds, heart sound, bowel sound

FEEL: tracheal position, laryngeal tenderness, cartilaginous asymmetry, crepitus, subcutaneous or mediastinal emphysema, percussion

Management

- Administer supplemental oxygen to maintain appropriate SpO2, assist ventilation if necessary
- Tension pneumothorax -> Needle catheter thoracostomy (2^{nd} ICS MCL or 5^{th} ICS b/t mid and anterior axillary lines) or Finger thoracostomy followed by a tube thoracostomy
- Open pneumothorax -> use any occlusive dressing or a vented chest seal, insert a tube thoracostomy through a separate incision as soon as feasible (Definitive therapy involves operative closure of chest wall laceration with placement of a tube thoracostomy)
- Massive or tension hemothorax -> finger f/b tube thoracostomy
- Reassess after each intervention using initial evaluation approach of "look, listen, feel"
- perform continuous pulse oximetry and capnography to monitor appropriate gas exchange

C: CIRCULATION, HEMORRHAGE CONTROL AND MANAGEMENT OF SHOCK

Assessment

- External hemorrhage
- HR, SBP, Pulse pressure, CRT, skin temperature, paleness of mucous membranes
- Shock index
- Perform an expeditious examination, focus on detecting signs and location of internal bleeding

Management

Control bleeding: pelvic binder, splint if necessary

In shock resuscitation**,**

- Use two large-bore peripheral catheters (16G and wider)/ IO access if need
- Blood for crossmatch and other blood tests
- Start with crystalloids 250-500ml, 10ml/kg in children (<20kg)

In hemorrhagic shock,

- Goal Blood product ratio 1:1:1 (PRBC: plasma: platelets), whole blood may be preferred.
- Target SBP 90mmHg (higher if head injury, spinal cord injury or history of hypertension is present)

Analgesia if necessary

***Failure to respond to volume administration indicates ongoing bleeding, inadequate resuscitation, or non-hemorrhagic shock ***

D: DISABILITY

• Assess Pupils, GCS / AVPU

• Trauma-focused medical h/o

E: EXPOSURE AND ENVIRONMENTAL CONTROL

- Fully expose and inspect the patient for externally visible injuries
- Identify Hypothermia (core temperature <35°C) /Hyperthermia core temperature >37.5°C) and address rapidly

Indications for airway management during primary survey

Airway

- partial or complete airway obstruction
- anticipated or impending airway obstruction (e.g. Direct trauma, hemorrhage, or burns)

Breathing

- severe chest injury with respiratory failure
- significant hypoxia (SpO2 <90%) despite high-flow oxygen, after exclusion of pneumothorax
- hypercapnia from hypoventilation, without an immediately reversible cause (e.g. due to neurological or respiratory failure)

Circulation

- altered mental status due to shock

Disability

- severe TBI with GCS score ≤ 8

Exposure

- high percentage body surface area burns

ADJUNCTS TO THE PRIMARY SURVEY WITH RESUSCITATION

Use adjuncts to monitor, diagnose, treat and prevent harm

- Continuous ECG, SpO2%, capnography, ABG
- Chest and pelvic x-rays, FAST, e-FAST, DPL
- Urinary and gastric catheter
- Interventions: IV/IO access, Spinal motion restriction, extremity splinting, pelvic stabilization
- Serial physical examination (**re-assess** to ensure changes in patient status)

INITIAL ASSESSMENT: SECONDARY SURVEY

- Thorough head to toe examination to identify all injuries
- When mechanism or other factors are consistent with potential spinal injury, SMR is maintained throughout the secondary survey
- History (AMPLE) : Allergies, Medications, Past medical/social history, Last oral intake, Events leading to injury

Adjuncts to secondary survey

- Imaging: X-ray, USG, CT
- Urinary catheter, naso or orogastric tube
- Other treatments: Analgesia, antibiotic prophylaxis, tetanus immunization, reduction, realignment, and immobilization with well-padded splints, wound management if necessary

MONITORING

Evaluate physiologic parameters at regular interval; GCS, PR, BP, pulse pressure, ventilatory rate, SpO2 %, capnography, body temperature, Urine output 0.5ml/kg/hr in adults, 1-2ml/kg/hr in children

REASSESSMENT

- Plan periodic reexamination of the patient during the period of observation
- Pay close attention to areas of abnormality previously identified and to new complaints, signs/symptoms
- Reassess vital signs at frequent intervals

DOCUMENTATION

- Record all findings, interventions and patient response
- Ensure accurate and thorough documentation for continuity of care

TRANSFER TO DEFINITIVE CARE/ INTERHOSPITAL TRANSFER

- Include both written documentation and verbal communication (S-xABCDE-BAR)
- Consider urgent transfer for specific findings on S° survey; ophthalmologic injury, complex maxilofacial trauma, neck hematoma or crepitus, flail chest or multiple ribs # with respiratory compromise, penetrating injury to head, neck or torso

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