

APPROACH TO TRAUMA CARE

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OBJECTIVES

- Demonstrate Concepts of Primary and Secondary Patient Assessment
- Establish Management Priorities in Trauma Situations
- Initiating Interventions to Care Management
- Arrange Appropriate Disposition

THE TEAM

- Communication between all team member is the Key
 - ✓ Prehospital
 - ✓ Core Team
 - ✓ Transferring agencies
- Preparedness
- Defined Team Members Roles
 - ✓ Who is your team
- Know Your Resources

INITIAL TRAUMA ASSESSMENT

- Systematic Approach
 - ✓ Primary Survey
 - ✓ Secondary Survey
 - ✓ Reevaluation
- Interventions
- Definitive Care or Transport

PRIMARY SURVEY

- Across-the room Observation
 - ✓ Treat the greater threat first (C)- ABC
- A – Alertness - Airway – C-Spine
 - ✓ Interventions
 - ❖ Jaw-Thrust
 - ❖ Suction
 - ❖ Foreign Body Removal
 - ❖ Oral / Nasal Airway
 - ❖ Definitive Airway - Intubation

PRIMARY SURVEY

2

➤ B - Breathing and Ventilation

✓ Interventions

- ❖ Chest Decompression – Needle vs Tube
- ❖ O2 Delivery - NRBM, NC, Bag-Valve, Vent

➤ C - Circulation and Control of Hemorrhage

✓ Interventions

- ❖ Control Bleeding – Direct pressure, tourniquets
- ❖ Body reposition – PG 15 degrees
- ❖ IV / IO Access
- ❖ Fluid Delivery – NS, PRBC

➤ D - Disability (Neurologic status)

✓ Interventions

- ❖ CT Scan

PRIMARY SURVEY

3

➤ E – Exposure and Environmental Control

✓ Interventions

- ❖ Control of Bleeding
- ❖ Warming – Blankets, Bair hugger, Fluid Warmers, Room Temp

➤ F – Full set of Vitals and Family

✓ Interventions

- ❖ Possible further fluid resuscitation
- ❖ Possible Inotropics Agents
- ❖ Active warming
- ❖ Family Involvement

PRIMARY SURVEY

4

➤ G – Get Resuscitation Adjuncts (LMNOP)

✓ Interventions

- ❖ L – Lab * T&C, ABG, CBC, Lytes, Lactic Acid, ETOH, SAS, BHCG
- ❖ M – Cardiac Monitor, Fetal Heart tones monitor,
- ❖ N - Nasal / Oral Gastric Tube
- ❖ O – SpO2, ETCO2
- ❖ P – Pain Control * Morphine, Fentanyl, Ketamine, Positioning
 - Sedation - Ketamine, Propofol, Versed, Ativan

SECONDARY SURVEY

- H – History
- H – Head to Toe Assessment
- I – Inspect Posterior Surface
- Ongoing Reevaluation and Post Resuscitation Care
- Definitive Care and/or Transport

SHOCK

STATE OF INADEQUATE TISSUE PERFUSION

➤ Types

- ✓ Distributive – Vascular Tone
 - ❖ Septic, Neurogenic Shock
- ✓ Cardiogenic – Direct Pump Failure
 - ❖ Cardiac
- ✓ Hypovolemic – Fluid Depletion
 - ❖ Hemorrhagic Trauma
- ✓ Obstructive – Indirect Pump Failure
 - ❖ Mechanical, PE, Cardiac Tamponate

HYPOVOLEMIC SHOCK

FLUID DEPLETION - PATHOPHYSIOLOGY

➤ Compensatory stage

- ✓ Decrease Arterial pressures which triggers the Baroreceptors
- ✓ Sympathetic Nervous System initiates a cascade in Attempting to restore the pressure.
 - ❖ Increase in heart, Myocardial Contractility, Peripheral Vascular resistance increases
 - ❖ Release of Catecholamine – increases Diastolic pressure, narrowing Pulse pressure

➤ Decompensatory stage

- ✓ The compensatory stage is unable to continue to maintain the pressure.
- ✓ You become hypotensive

HYPOVOLEMIC SHOCK

FLUID DEPLETION

➤ S & S

- ✓ Tachycardia
- ✓ Tachypnea
- ✓ Hypotension
- ✓ Narrowing Pulse Pressure (increase Peripheral Vascular Resistance)
- ✓ Cool Clammy Skin
- ✓ Delayed Capillary Refill – Decrease peripheral perfusion
- ✓ Altered Mental Status (Anxiety, Coma)
- ✓ Decrease Urine Output

➤ Treatment

- ✓ Fluid Replacement
- ✓ Control of Bleeding

OBSTRUCTIVE SHOCK

INDIRECT PUMP FAILURE – PE, CARDIAC TAMPONATE

➤ S & S

- ✓ Tachycardia
- ✓ Tachypnea
- ✓ Hypotension
- ✓ Narrowing Pulse Pressure (increase Peripheral Vascular Resistance)
- ✓ Cool Clammy mottled skin
- ✓ Altered Mental Status (Anxiety, Coma)
- ✓ **Beck's Triad** – Muffled Heart sounds, Increasing JVD, Hypotension
- ✓ Absent breath sounds on one side

➤ Treatment

- Fix Causation – Pericardiocentesis, Needle decompression..

DISTRIBUTIVE SHOCK

Decrease Vascular Tone - Septic, Neurogenic Shock

➤ S & S

- ✓ Bradycardia
- ✓ Tachypnea
- ✓ Hypotension
- ✓ Hypothermia
- ✓ Warm limbs but cool body, pale-pink, clammy
- ✓ Altered Mental Status (Anxiety, Coma)
- ✓ Decrease Urine Output

➤ Treatment

- Fluid Replacement
- Inotropic Agents - Dopamine

WHAT DOES THIS MEAN

- Baroreceptors
- Cardiac Output
- Pulse Pressures
- Mean Arterial Pressure (MAP)
- Beck's Triad
- Cushing Triad
- Lethal Triad

WHAT DOES THIS MEAN ₂

➤ Baroreceptors

- ✓ Receptors that set in the Carotid Arteries that monitor the Arterial Pressures
- ✓ Tries to maintain the **Compensation Stage** of shock to continue tissue perfusion
- ✓ They activate the sympathetic Nervous System
 - ❖ increases heart rate (parasympathetic)
 - ❖ Increase Myocardial Contractility
 - ❖ Increases Systemic Vasoconstriction
 - ❖ Increases Peripheral Vascular Resistance

WHAT DOES THIS MEAN ³

➤ Cardiac Output

- ✓ Blood pressure is determined by the Cardiac Output and Peripheral Vascular Resistance **$b/p = CO \times PVR$**
- ✓ CO – is the amount of blood ejected from the Lt Ventricle in one minute
- ✓ PVR – is the resistance in the peripheral Arteries determined by the Vessel size (vascular constriction)
- ✓ SV – amount of blood ejected from the Lt Ventricle with each contraction.
- ✓ **$CO = \text{Heart rate (HR)} + \text{Stroke Volume (SV)}$**

- ✓ How can the body increase to B/P?
 - ✓ Increase heart rate
 - ✓ Increase SV (preload)

WHAT DOES THIS MEAN

4

➤ Pulse Pressures (PP)

- ✓ Systolic Pressure minus Diastolic Pressure ($PP = SBP - DBP$)
- ✓ Health Adults is about 40 mmHg (120/80)
- ✓ Is considered abnormal if $< 25\%$ of systolic Value
- ✓ The most common cause of Decreasing (narrowing) PP is drop in Lt ventricular (stroke volume) (decrease Cardiac Output (CO))
- ✓ Narrowing PP in trauma suggest significant blood loss (Preload)
- ✓ Increased or widened PP is seen in Increasing ICP (increase in SBP with DBP not increasing or dropping)
- ✓ Example:
 - ❖ 102/88 – looks normal but $PP = 14$ and 25% of 102 = 25.5.

WHAT DOES THIS MEAN ⁵

➤ Mean Arterial Pressure (MAP)

✓ $MAP = DBP + 1/3(SBP-DBP)$

✓ *Normal 70 to 105 mmHg*

✓ Tells us more about perfusion than B/P (True Organ Perfusion)

✓ Target is MAP > 65 mmHg with a good Radial pulse and Good Pulse Oximetry waveform.

✓ Example:

✓ 88/55 : Pulse pressure = 34 and > then 25% (22) of SBP , MAP 65 mmHg

✓ 102/88 : pp = 14 and < then 25% (25.5) of SBP, MAP 92

WHAT DOES THIS MEAN

6

➤ Beck's Triad

- ✓ Hypotension
- ✓ Distended Neck Veins
- ✓ Muffled Heart Sounds

- ✓ Seen in **Cardiac Tamponade**
- ✓ Obstructive shock

WHAT DOES THIS MEAN ⁷

➤ Cushing Triad

- ✓ Bradycardia
- ✓ Widening Pulse Pressure (increasing SBP without increasing DBP)
- ✓ Irregular Respirations (impaired brainstem function)
- ✓ Impending fatal herniation of the brain

✓ What do we do?

- ✓ Acute hyperventilation
- ✓ Osmotic Diuretics – NS 3%, Mannitol
- ✓ Elevation of Head
- ✓ Sedation / Pain control

WHAT DOES THIS MEAN ⁸

➤ Lethal Triad

- ✓ Hypothermia
- ✓ Coagulopathy
- ✓ Acidosis

Keep your patients warm.....

CASE 1

- 23 yr old male found lying unresponsive approximately 35 ft from a vehicle.
- Vehicle appeared to have rolled several times. Several damage to the vehicle. Seat belt remain unbuckled without damage. Front airbag deployed. Unknown time of crash.
- Unresponsive with GCS 3.
- Agonal respirations. Patient being ventilated with Bag-Valve-mask system at 15 l/min
- Fully spine immobilized with long back board and C-Collar
- Vital: P: 144 /min, Spont Resp: 6/min, B/P 75/62, SpO2 unable to obtain
- ETE – 5 mins

CASE 1 – HOSPITAL (Across room) (A)

- Upon arrival you see no uncontrolled bleeding.
- Patient unresponsive and being ventilated with B-V-M
- C-Collar on and appropriate.
- Tongue partially obstructing patients airway.
- Blood and vomit in oral cavity
- Snoring respirations noted.

• **INTERVENTIONS**

- Jaw thrust
- Suction
- Oral Airway
- Intubation - ? RSI

CASE 1 – HOSPITAL CONT (B)

- Respirations shallow at 6/min (spontaneous)
- Minimum chest wall excursion with no movement on Lt side
- Skin is dusky
- There are contusions and lacerations noted on Lt side of chest
- Breath sounds unequal – Air exchange noted on Rt side but none on Lt side
- Bony crepitus noted in upper Lt chest wall
- Subcutaneous Emphysema noted on Lt chest wall and Neck area.
- JVD noted bilaterally.
- No trachea deviation noted

- INTERVENTIONS
 - Continue Ventilating with B-V-M
 - Needle Chest Decompression Lt Side – *readied for Chest Tube*

CASE 1 CONT (A – Intubation)

- Patient intubated with RSI
- ET Tube placement confirmed (5 points)
 - ❖ Epigastric gurgling
 - ❖ Breath sounds – Anterior / Axillary
 - ❖ Chest wall excursion
 - ❖ Skin color improvement
 - ❖ ETCO₂ indicator
- ET tube secured at 22 cm at front tooth
- Continues to be ventilated with B-V systems at 20 b/min
- Breath Sounds after intubation and Chest decompression – equal with good air exchange

CASE 1 CONT (C)

- No uncontrolled bleeding noted
- Pulses (central very weak) – (peripheral absent)
- Skin cold, clammy, very pale-grey.

- **INTERVENTIONS**
 - IV vs IO x2
 - Fluid Bolus – NS vs PRBCS
 - ? Mass transfusion Protocol
 - ? TXA

CASE 1 CONT (D)

- GCS = 3 (E1, V1, M1) (RSI)
- Pupils 4mm = very sluggish to react to light

- **INTERVENTIONS**
 - CT scan Stat

CASE 1 CONT (E)

- Abrasions throughout all extremities
- Abrasions and laceration on Lt chest wall
- Contusions and ecchymosis to Lower Lt Abd
- Contusions and ecchymosis and abrasions noted to Lt pelvic area
- Laceration to Lt upper leg
- Laceration across forehead with raccoon eyes and Battle signs bilaterally
- Deformity Lt upper leg with shorting and rotation of leg
- No uncontrolled external bleeding

- INTERVENTION
 - **WARM Environment** – warm room, Bair Hugger, Fluid warmer

CASE 1 CONT (F)

- Pulse 156
- Resp 20 b/min B-V-ET tube
- B/P 76/58
- SPO2 93% on 1.0 FiO2 (good wave form)
- ETCO2 43
- Temp 96.5 F Rectal
- Wt 240 lbs
- Family at bedside
- **INTERVENTIONS**
 - ❖ Continue Fluid infusions (? NS or PRBC)
 - ❖ Active Warming
 - ❖ Increase PEEP
 - ❖ MAP = 64 mmhg
 - ❖ PP = 18 mmhg , his 25% =19 mmhg (NPP)
 - ❖ SpO2 good wave form
 - ❖ Pulses weak
 - ❖ Tachycardiac

CASE 1 CONT (G)

- Lab (T & C, BS, ABG, Lactic Acid, Calcium)
- Monitor showing Sinus Tachycardia
- OG placement
- Pain Control ? Type
 - ❖ Morphine
 - ❖ Fentanyl
 - ❖ Dilaudid
 - ❖ Ketamine

CASE 1 CONT SECONDARY SURVEY (H)

- Unknow details of crash
- No allergy
- No medications
- Health history

CASE 1 CONT (H) (I)

- Head – Lac/abrasion, Raccoon eyes, Battle signs, Pupils 4 mm non-active
- Neck – Subq air, No further JVD
- Chest – Laceration and abrasion Lt, Needle Lt Chest Wall, Bony crepitus Lt upper chest. Equal Chest wall excursion
- Heart Sounds – Normal S1S2 without murmur
- Abd Lt Lower ecchymosis / abrasions, Bowel Sounds Absent x 4 quadrants, Firm
- Pelvis Abrasion to Lt side, Movement of the pelvis noted
- No blood at Penal Meatus
- Lt Upper Extremity deformity with shorting and rotation, abrasions and laceration throughout all extremities.
- Back clear, blood in Stool

CASE 1 CONT (H) (I)

- **INTERVENTIONS**

- ❖ Foley catheter insertion
- ❖ Chest Tube insertion
- ❖ Pelvis Binder – verbalize to all No further pelvis manipulation
- ❖ ? Femoral Traction
- ❖ Back Board Removed
- ❖ FAST

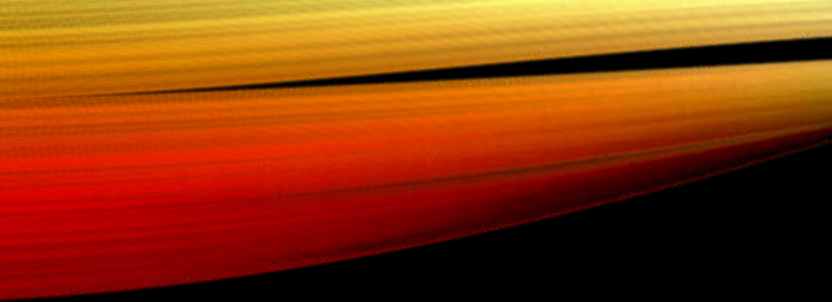
CASE 1 CONT (Definitive care)

- Transport Air vs Ground



QUESTIONS?

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Thank You