

Acute Care PNP Review Course

Trauma/ Musculoskeletal

Andrea Kline-Tilford
PhD, CPNP-AC/PC, FCCM

C.S. Mott Children's Hospital
Ann Arbor, Michigan



Objectives

Objective:

1. Identify the key components of trauma assessment
2. Discuss diagnostic evaluation for Limb, organ and musculoskeletal injuries
3. Discuss initial therapy strategies for limb, organ and musculoskeletal injuries

Trauma

- Non-accidental Trauma
- Splenic, Pancreatic, Liver and Renal lacerations
- Thoracic/Chest
- Burns
- Musculoskeletal Injuries

Trauma

- Leading cause of death and disability in children > 1 year of age
 - ***Often preventable***

Trauma Evaluation

Primary Survey

- Airway
- Breathing
- Circulation
- Disability/Neurological Evaluation
- Exposure

Secondary Survey: vital signs, history, thorough head to toe examination and diagnostic testing.



Estimating Blood Volume

A Simple Method To Estimate Circulating Blood Volume

AGE	ESTIMATED BLOOD VOLUME (ml/kg)
Preterm Neonate	100
Full-Term Infant	90
Infant	80
Child	75
Teenagers & Adults	70

Copyright © 2014 Arsen Kohn, MD. Department of Anesthesiology, Tufts Medical Center, Boston, MA 02111

Circulating Blood Volume

- Small amounts of blood loss in children
 - Results in reduction in circulating blood volume and reduction in systemic perfusion
- Tachycardia is an early sign of shock
- Hypotension; late sign of shock
- Bradycardia; ominous

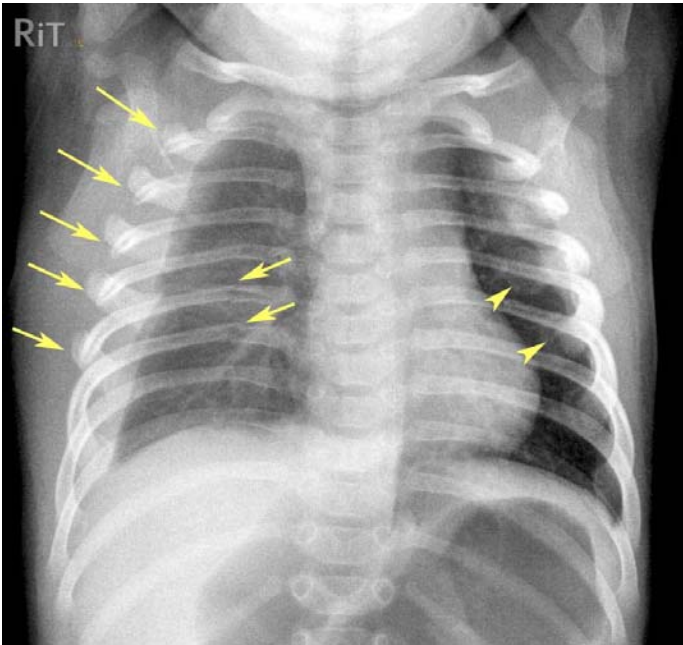
Non-Accidental Trauma (NAT)

Non-accidental Trauma: Consider in any unusual presentation of trauma or age based injury that **doesn't make sense**.

- Always evaluate whether injury matches story/history
 - Important in verbal and preverbal children

Non-Accidental Trauma

- Evaluation: history not consistent with findings
 - Cutaneous – bruising, lacerations, abrasions, burns
 - Location, shape
 - Skeletal – skull, rib and femur fractures
 - Age of child, likelihood of injury
 - Abdominal – rare, but possible
 - *Funduscopic evaluation for retinal hemorrhage of any child with suspected shaking or traumatic brain injury of questionable mechanism.



Non-Accidental Trauma

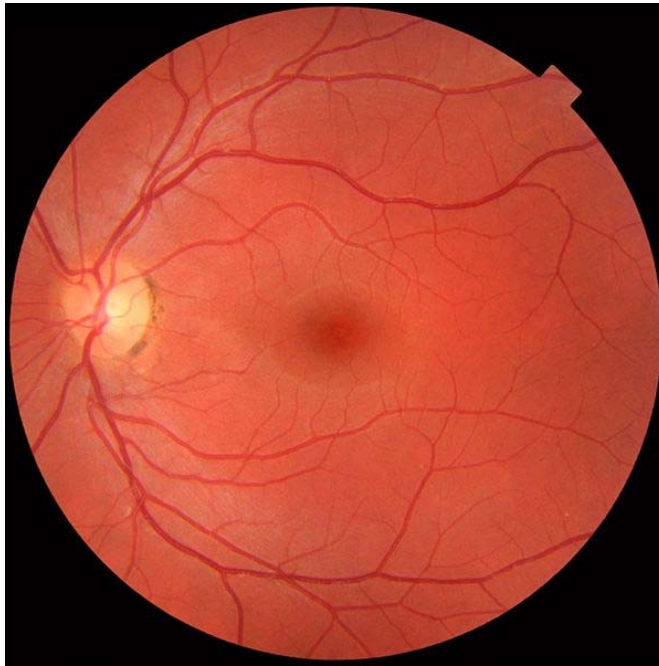
Diagnostics:

Radiographic Imaging: CXR/abdominal XR, skeletal survey

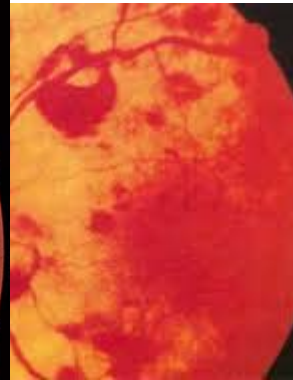
Eye Exam: Retinal hemorrhages

Brain imaging: CT scan

Retinal Hemorrhages

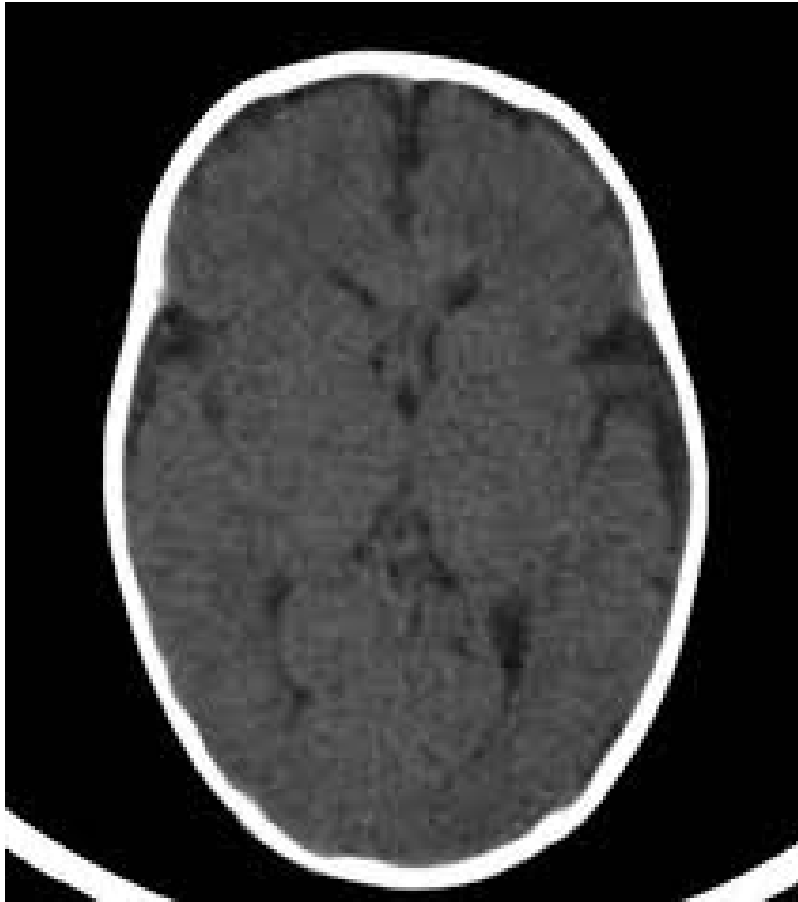


normal

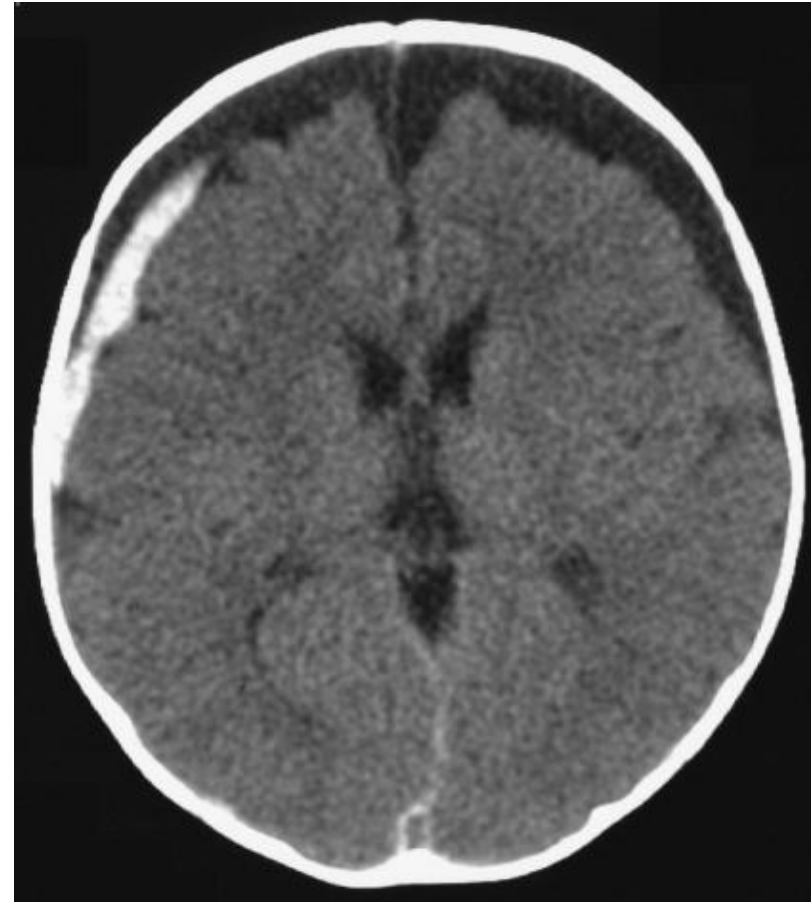


retinal hemorrhages

Head CT



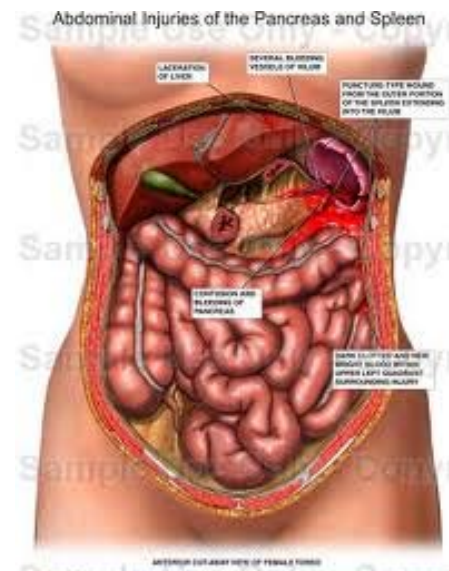
Normal CT: 2 month-old infant



Subacute subdural effusion; right tempoparietal acute subdural Hemorrhage: 4 month-old infant

Abdominal Trauma

- Abdominal Injuries: Any age group, typically via blunt force trauma, as motor vehicle accident (MVA)
- Splenic, Pancreatic, Liver and Renal Lacerations



Splenic Laceration

- Most common abdominal injury in childhood; blunt trauma to upper abdomen or lower thorax. Spleen is not adequately protected by rib cage.
- S/S: Pain in left shoulder , LUQ or left part of chest; bruising , abrasions, N/V. A mass may be palpable in LUQ
- Laboratory: Decreased hemoglobin/hematocrit
- Diagnosis by CT, but CXR may show fractures to left lower ribs or pleural effusion

95% are managed non-operatively

Splenic Laceration

Figure 1: AAST Spleen Injury Scale

Spleen Injury Scale (From Organ Injury Scaling Committee, AAST, 1994 Revision)		
Grade	Type	Injury Description
Grade I	Hematoma Laceration	Subcapsular, <10% surface area Capsular tear, <1 cm parenchymal depth
Grade II	Hematoma Laceration	Subcapsular, 10-50% surface area; intraparenchymal, <5 cm in diameter Capsular tear, 1-3 cm parenchymal depth that does not involve a trabecular vessel
Grade III	Hematoma Laceration	Subcapsular, >50% surface area or expanding; ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma >5 cm or expanding >3 cm parenchymal depth or involving trabecular vessels
Grade IV	Laceration	Laceration involving segmental or hilar vessels producing major devascularization (>25% of spleen)
Grade V	Laceration Vascular	Completely shattered spleen Hilar vascular injury that devascularizes spleen

* Advance one grade for multiple injuries, up to grade III.

<http://www.jlgh.org>

Splenic Laceration

- If splenectomy; prophylactic antibiotics indicated in children < 4 years old and in some cases, children > 4 years of age
- Post-op splenectomy: monitor for bleeding, thrombosis, infection, fistula formation
- Vaccination importance
 - <https://www.cdc.gov/vaccines/schedules/hcp/imz/child-indications-compliant.html>

Liver Laceration

- Major cause of death in children with blunt trauma, highest risk for injury.
- Associated with significant blood loss, exsanguination. Right lobe more prevalent than left lobe
- Presentation: Acute abdominal tenderness due to hemoperitoneum, pain in right shoulder or RUQ tenderness. Bruising, seatbelt markings and abrasions, hypotension and tachycardia, if bleeding and fractured ribs, associated pelvic or rib fractures.

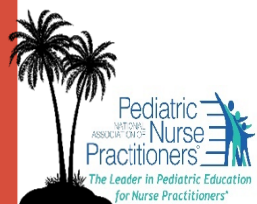
Liver Laceration

- Diagnostic evaluation: CBC, liver function tests, ultrasound, CT
- Non-operative management - Same as spleen: NPO status, hemoglobin/hematocrit every 4 – 6 hours
- Can ambulate after AST and ALT are within normal limits; blood products if indicated
- Operative management if hemodynamically unstable – often to control bleeding

Liver Laceration

- Injury Grading Scale
 - Grade I – Grade VI
 - Grade VI – avulsion of liver

www.trauma.org



Pancreatic Laceration

Pancreatic Injury/laceration:

- Associated with high morbidity and mortality. Findings – soft tissue contusion in upper quadrant, handlebar marking, tenderness to lower ribs and costal margin, epigastric tenderness, lower thoracic spine fracture, signs of peritonitis, vomiting.
- Diagnostic: CT with grading of injury, amylase and lipase labs

Kidney Laceration

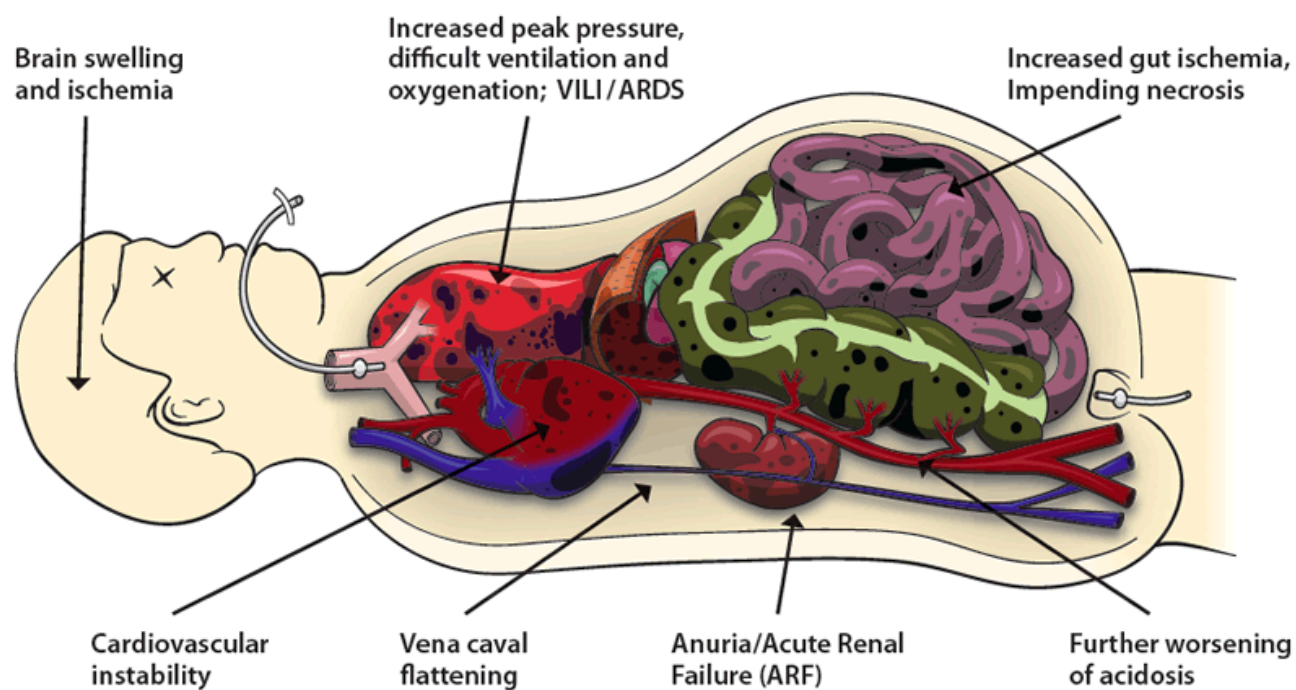
- Presentation: Contusion, hematoma, or bruising of flank or back, abdominal or flank tenderness, palpable mass, stab wounds posterior to anterior axillary line.
- Diagnostic: CT, urinalysis for hematuria, Intravenous pyelogram *American Assn for Surgery Trauma renal injury scale.

Trauma - Miscellaneous

- Abdominal Compartment syndrome: Life threatening complication of abdominal trauma, results in coagulopathies, acidosis, hypothermia, bowel edema – monitor bladder pressures.
- Pneumothorax, hemothorax and tension pneumothorax: Chest injury via fall, blunt trauma
 - Symptoms: Tachypnea, hypoxia, unequal breath sounds, muffled or displaced cardiac sounds

Abdominal Compartment Syndrome

Onset of Multiple Organ Dysfunction Syndrome (MODS) IAP > 20 mmHg



Chest/Thoracic Trauma

- Generally accounts for ~ 5-12% of pediatric trauma
- 2nd leading cause of pediatric trauma associated death
- Can have relatively little cutaneous evidence of injury due to cartilaginous thoracic cavity in children and still have significant injury
 - Chest wall of infants & children very compliant
- Rarely occur as singular insult (e.g. often associated with other injuries)

Chest/Thoracic Trauma

- Most common
 - Pneumothorax
 - Hemothorax
 - Pulmonary contusion
 - Rib fractures
 - Tracheobronchial tree disruptions
 - Cardiac trauma

Pneumothorax

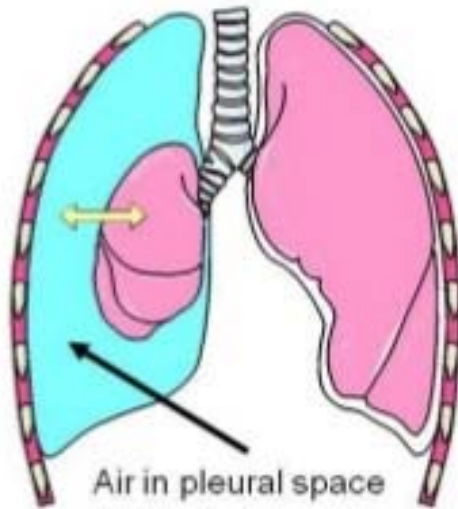
- Collection of air in the pleural space between the lung and chest wall
- Signs/symptoms: Tachypnea, dyspnea, unequal breath sounds, hypoxia, chest pain
 - Altered pitch may be difficult to appreciate in small child due to small chest size and referred breath sounds over the pneumothorax
- Can vary in size; not all require intervention
- Emergent = tension pneumothorax.
 - Generally builds up **acutely**, results in positive pressure in the chest cavity, resulting in shifting of mediastinum, and ultimately impacts cardiorespiratory functioning
 - Decompression can be life saving
- Treatment: Evaluation of air; depending on size and symptoms; 100% oxygen pneumothorax 'washout' = controversial



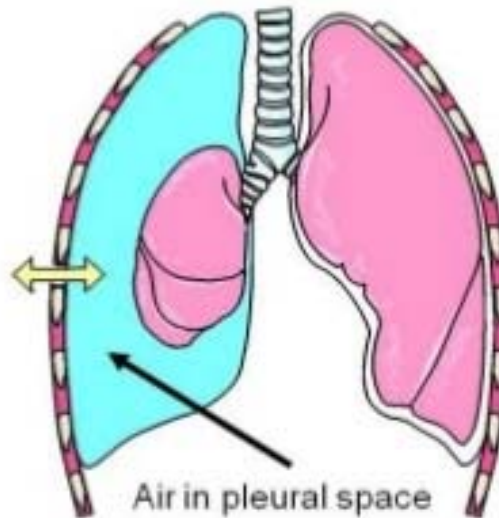
Pathology

Pneumothorax

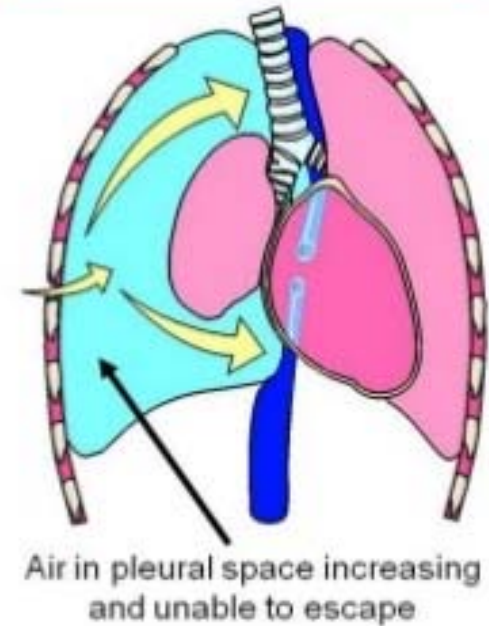
Closed pneumothorax



Open pneumothorax



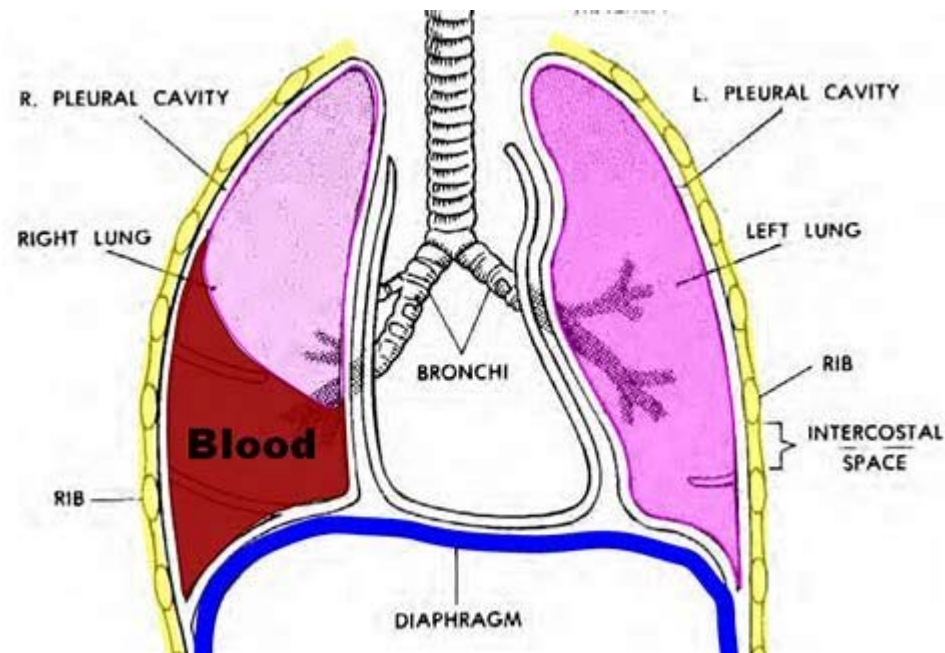
Tension pneumothorax



Hemothorax

- Accumulation of blood in the pleural space between lung and chest wall. Fluid build up can limit lung expansion
- Most common cause: Chest wall trauma resulting in pleural laceration, vascular damage (e.g. intercostal vessel, internal mammary artery)
- Signs and symptoms: Tachypnea, dyspnea, unequal breath sounds, anemia
- Vary in size and acuity
- Treatment: Evacuation of blood; depending on size/symptoms

Hemothorax



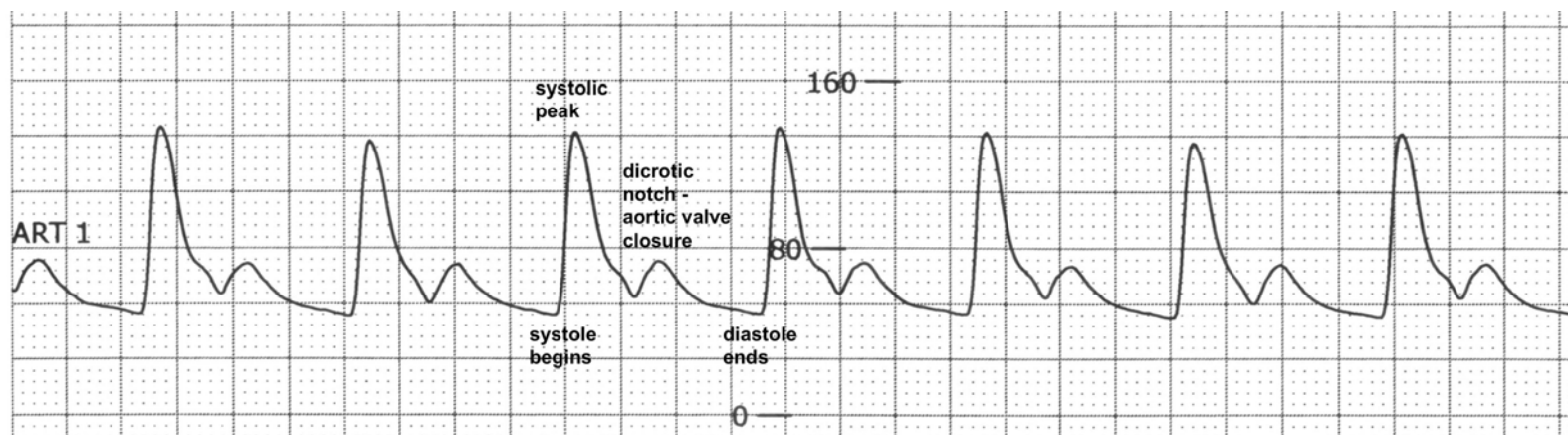
Hemodynamic Monitoring

- Arterial Line Placement

- Indications: Blood pressure monitoring, frequent laboratory sampling
- Placement:
 - Commonly: Radial artery, dorsalis pedis, posterior tibial, femoral
 - Considerations: Skin integrity/infection near placement site, trauma, collateral flow, platelet count, coagulation state
 - Procedure: Sterile conditions, Seldinger technique
 - Increased number of attempts, increased number of operators needed to place line – increases risk for complications
 - Complications: Infection, bleeding, hematoma, hemodynamic compromise, nerve injury

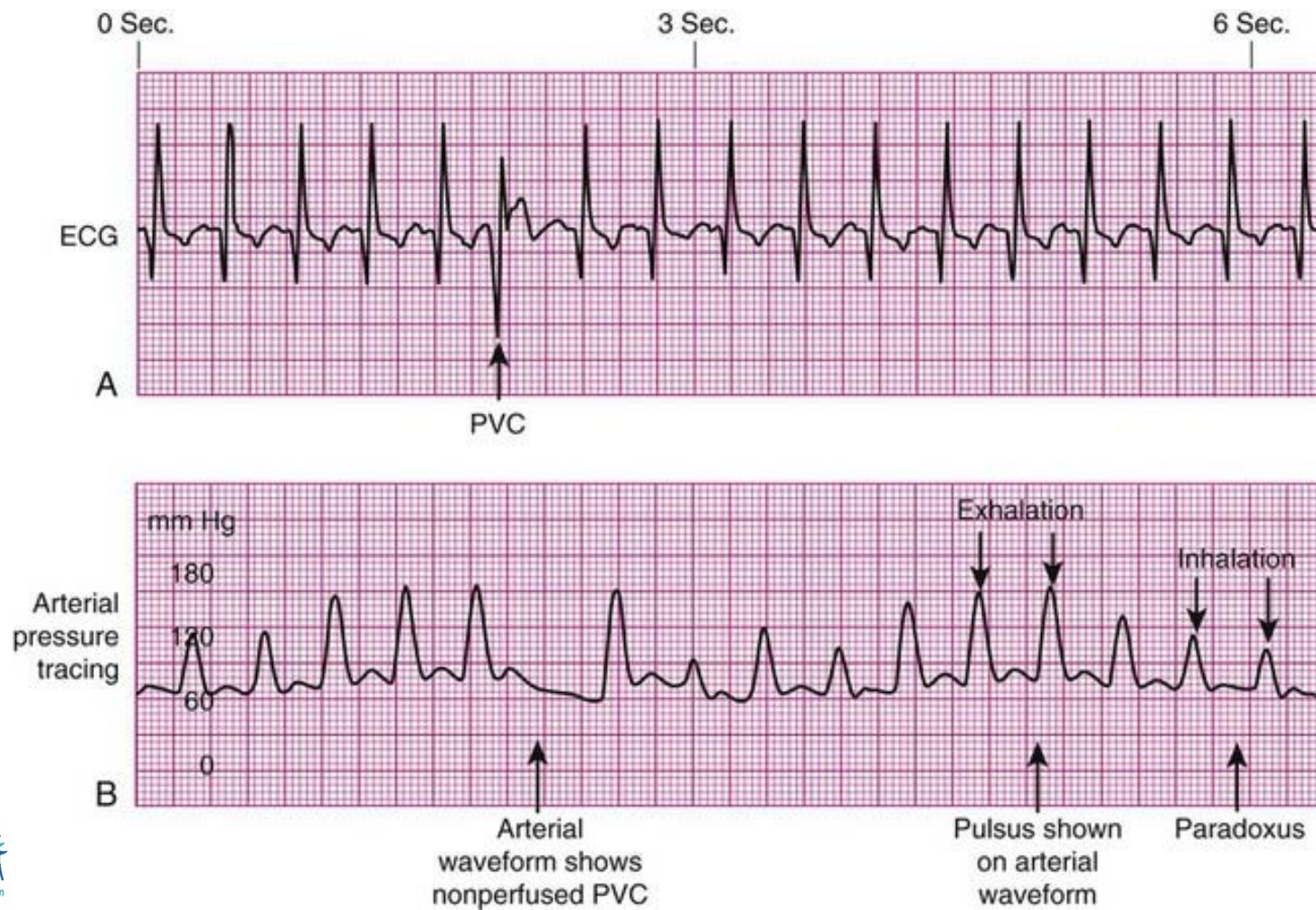
Hemodynamic Monitoring

- Arterial Line
 - Evaluation of tracing



Hemodynamic Monitoring

- Arterial Line
 - Evaluation of tracing



Hemodynamic Monitoring

- Arterial Waveform
 - Evaluation of tracing; affected by
 - Position of extremity
 - Zeroing at phlebostatic axis
 - Arterial vessel spasm
 - Tubing length
 - Others

Central Venous Access

- Central line placement
 - Considerations
 - Indications
 - Inability to obtain peripheral access
 - Anticipated intermediate-term/long term vascular access requirements
 - Administration of caustic medications
 - Hemodynamic monitoring
 - Placement
 - Evaluation of most appropriate site
 - Sterile conditions
 - Seldinger technique
 - Flush set-up
 - Aspiration as needle is advanced
 - Confirmation of venous vessel

Central Venous Access

- Central line complications
 - Pneumothorax
 - Bleeding
 - Hematoma
 - Air embolism
 - Arrhythmias
 - Venous thrombus, pulmonary embolism

Central Venous Access



Central Venous Access

- Pearls
 - If unable to access vessel; move to another site
 - Do not force guidewire; should advance easily
 - Always have a hand/fingers on the guidewire
 - Always confirm placement using blood gas and waveform tracing
 - Confirm placement with radiograph
 - Do no 'cure' patients
 - Always take longer than anticipated to place
 - Remove when no longer needed

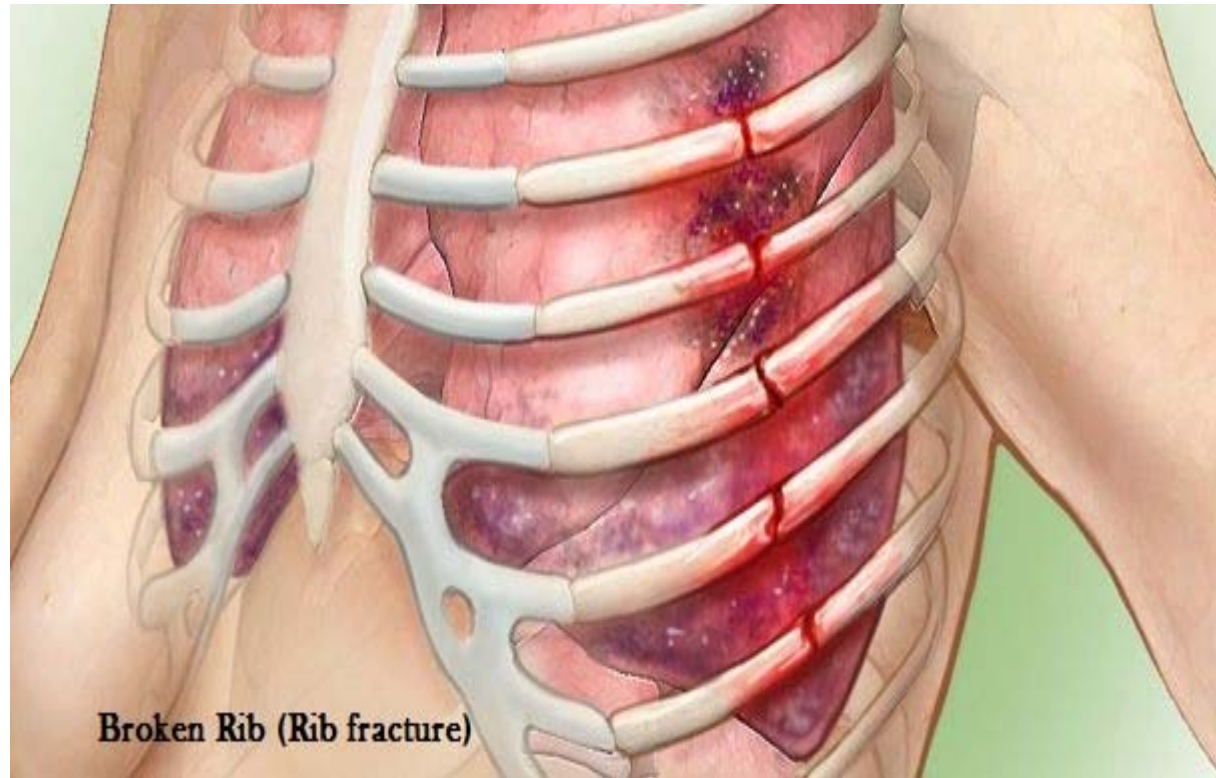
Pulmonary Contusion

- A 'bruise' of the lung/lung parenchyma, associated with alveolar lung injury without frank pulmonary laceration; results from chest trauma
- Signs/symptoms: tachypnea, respiratory distress, hypoxia
- Initial chest radiograph may be **normal**
- Within ~ 24 hours after injury, chest radiograph demonstrates ill defined geographic consolidation that is not specific to contusion (e.g. can appear as other pulmonary processes such as aspiration, atelectasis, infection..)
- Often, improvement over several days, as blood is absorbed; may improved within 24-48 hours; most resolved in 7-10 days
- Treatment: Supportive

Rib Fractures

- Children have more pliable chests than adults; rib fractures are less common in children
- ALWAYS raises suspicion of maltreatment
- Risk of mortality increases with each linear rib that is fractured
- Often associated with trauma/injury in other parts of the body: head, thoracic, solid organ
- Treatment: Evaluate for other injuries, evaluate for signs of abuse, consider diseases of bone (uncommon!), pain management

Rib Fracture

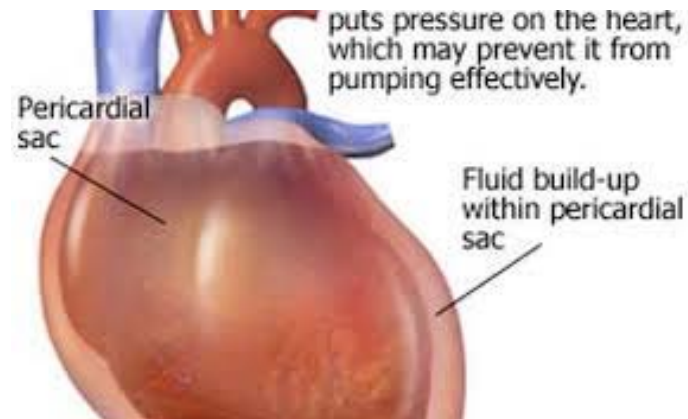


Broken Rib (Rib fracture)

www.diseasepictures.com

Cardiac Tamponade

- Accumulation of blood/fluid in the pericardial sac
- Compresses the heart
- Compromises venous return to the heart and cardiac output
- Signs/Symptoms
 - 'Obstructive shock'
 - Hypotension
 - Tachycardia
 - Distention of neck veins
 - Muffled heart sounds
 - Pulsus paradoxus



Cardiac Tamponade

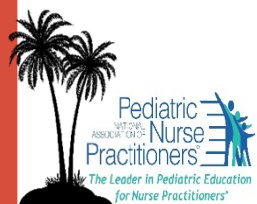
- Diagnosis
 - CXR - enlarged cardiac silhouette
 - *ECHO/Ultrasound – appears black against gray muscle
- Treatment
 - Pericardiocentesis
 - Transfusion, may be required

Cardiac Tamponade



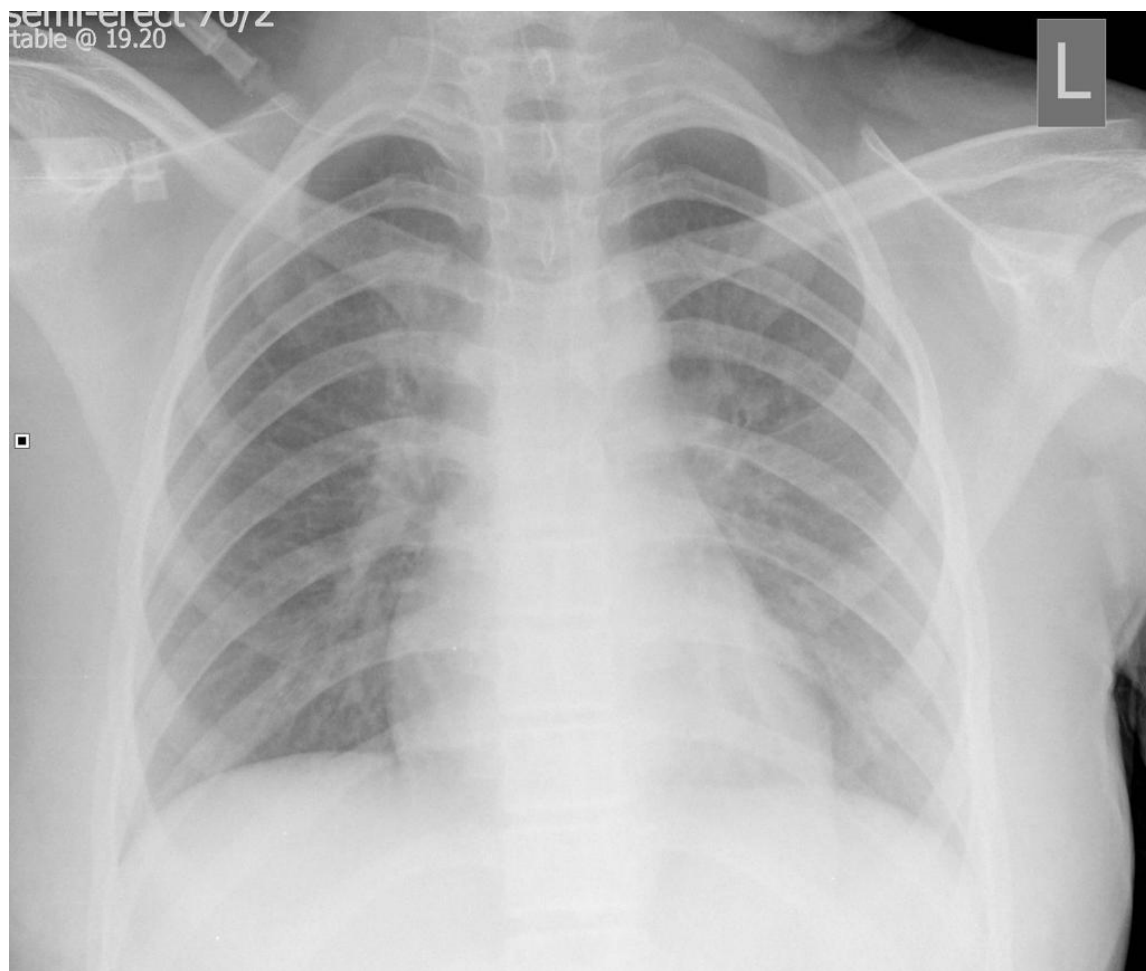
Figure-2: Echocardiograph, signs of tamponade (swinging heart and diastolic right ventricular collapse) and pericardial fluid 3.9 cm in size were found.

Radiograph Practice....

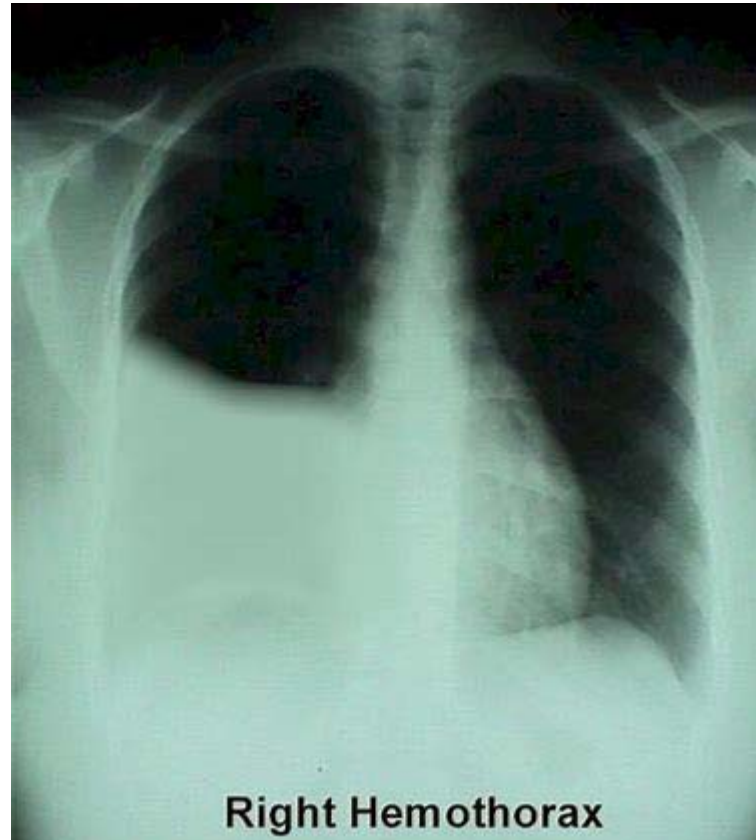








www.radiopaedia.org



Right Hemothorax

Burn Injury

- Burns occur as a result of chemicals or thermal injury. The outcome is often based on layer of skin involved with burns to the subcutaneous layer or third layer posing most problem with wound healing.
- Three layers of the skin involved are:
 - Epidermis, Dermis and Subcutaneous layers
- FIRST line management for burn injuries: includes: Airway, Breathing, Circulation, then Primary and Secondary Trauma Surveys.

Burn Injury

- Skin is the largest organ of the body
 - Has multiple functions → protective barrier, maintenance of fluid and electrolytes, and thermoregulation
 - Also, an excretory and sensory organ

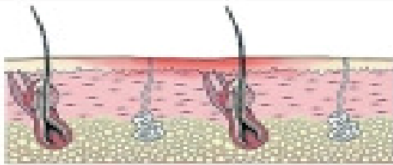

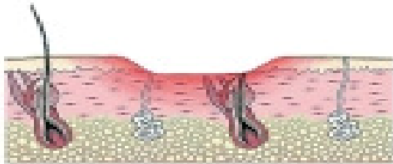
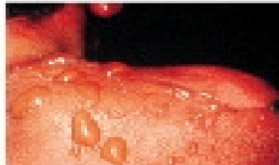




Burn Injury

- Airway Assessment: Potential for injury - facial burns, singed eyebrows, stridor, wheezing, hypoxia, carbon sputum, hoarseness, mucous membrane and tongue swelling
- Breathing and Circulation: Particle aspiration and CO inhalation causes hypoxia and difficulty breathing
- Laboratory and radiological evaluation: carboxyhemoglobin, CBC, complete metabolic panel with albumin, blood gas. Urine pH and myoglobin is indicated for children with electrical burns along with an EKG
- Primary and Secondary Survey: Burn surgeon

Degree of Damage

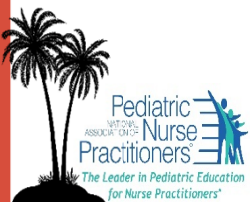
*Depends on temperature and exposure time

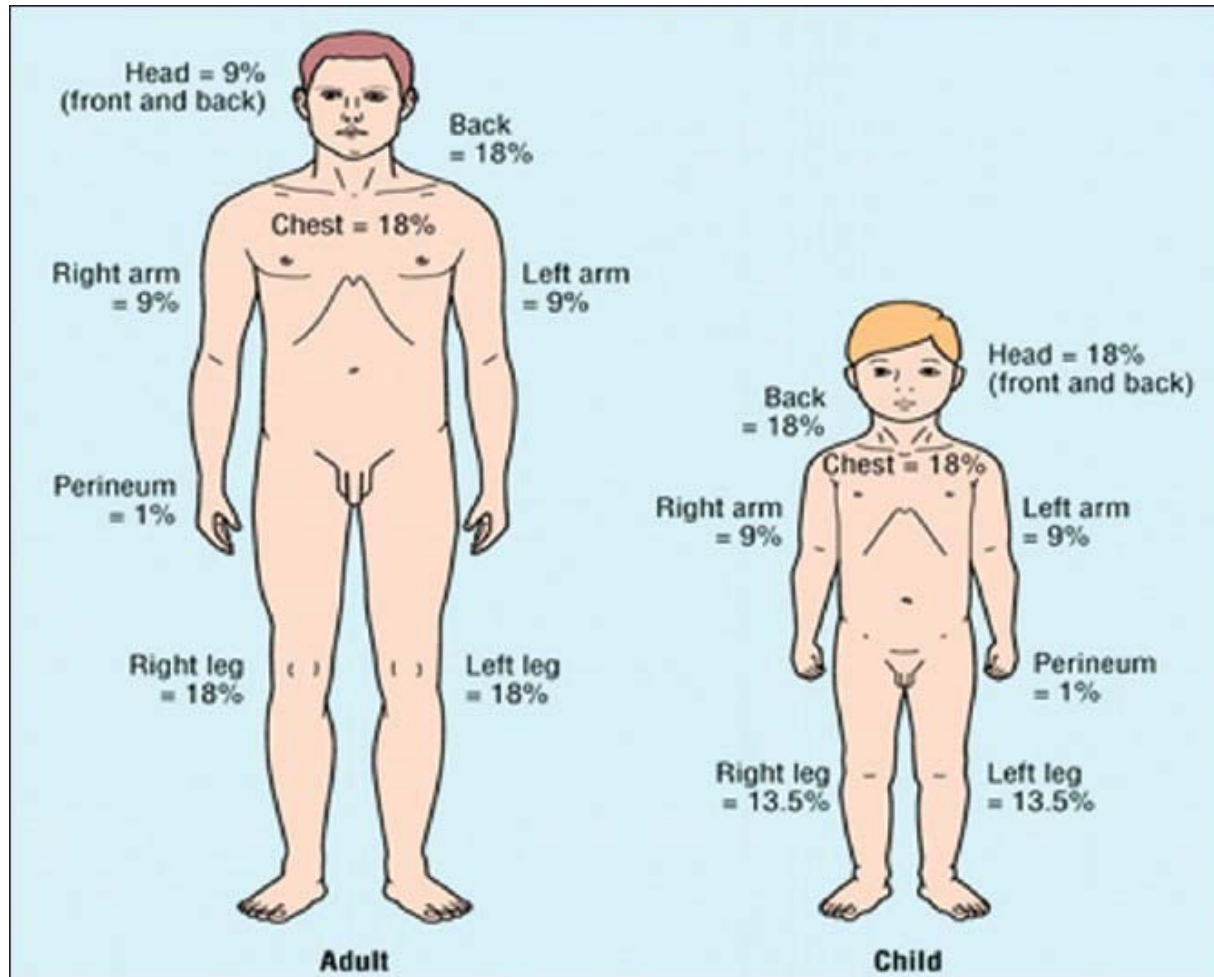
- **Superficial:** epidermis, minor in severity
- **Partial Thickness:** through the epidermis into the dermis, blister formation distinguishes a partial thickness burn from a superficial burn.
- **Full Thickness:** extends through the dermis, skin is white, yellow, brown or black in appearance, no blisters, skin is hard, minimal or no pain.
- **Deep Full Thickness:** all layers of the skin, may involve fascia, tendons, muscle and bone

Degree	Anatomic correlate	Schematic aspect	Clinical aspect
I	Reddening, swelling, pain (epidermis)		
IIa	Reddening, blistering, pain (superficial dermis)		
IIb	Pallor, blister, pain (partial dermis)		
III	Greyish white or black necrosis, analgesia (complete dermis)		
IV	Carbonization (may extend to the bones and joints)		

Burns: Fluid and Systemic Response

- TBSA (total body surface area) of the burn, calculated by the rule of nines. Burns can affect ***all*** body systems
- Capillary Leak. Fluid shifts occur 12 – 48 hours after injury resulting in metabolic compromise and electrolyte instability. Proteins can also escape into the interstitial space. Potassium may be released from injured cells.
- Compartment syndrome can occur as diffuse edema in an extremity, orbital or abdominal region.
- Fluid resuscitation assists in preventing rhabdomyolysis and subsequent renal failure.
- Hyperglycemia management is important with management of protein loss.
- Compromised immune function.





Fluid Management

- **Fluids – Parkland Formula.** Controversy crystalloid vs colloid. Lactated Ringers, most common

Parkland Formula

Parkland Formula

Apply only in 2nd and 3rd degree burns

Volume of Lactated Ringers solution

$4 \text{ mL} \times \text{Total body surface area of burn (\%)} \times \text{Body Weight (kg)}$

First half of the
solution over the
first 8 hrs

Second half of the
solution over the
next 16 hrs

Rule of Nines

Pediatric



Patient's PALM approximates 1%
total body surface area

Antimicrobials

- ***Infection is most common post-burn cause of morbidity and mortality**
- **Group A Strep- most common in fresh burn/graft.** Characterized by erythema, pain, induration, edema
- **Staph aureus/epi** – more insidious course – 3-5 days. Fever, ileus.
- **Gram negatives** – green/foul smelling discharge over 2-3 days, leukopenia, hypothermia, ileus
- **Fungal infections**
- ****Presence of central line and 3rd degree burns are highest risk for serious bacterial infection after burn injury**
- **Antimicrobial Therapy:** prevent bacterial overgrowth and systemic infection
- **Topical therapy:** Silvadene ointment or cream: water soluble, bacteriocidal activity against gram positive and negative bacteria and yeast. Should not be used for young infants or sulfa-sensitive children.
- ***Silver containing dressings:** silver containing hydrocolloid dressings and provide antimicrobial therapy.

Burn Injury Therapy

- Autograft
 - Excision of non-viable tissue
 - Donor site -> area of healthy skin
 - Reduces visible scarring from burn injury site
 - Donor site often painful; risk for infection
 - Not ideal and new therapies are needed
- Collagen animal-derived dermal substitutes, cultured epithelial sheets, bi-layered skin substitutes, others

Pain Management

- Pain Management is Imperative to healing!
 - Difficult to manage
 - Inadequate pain control is associated with long term psychological consequences
 - Acute on chronic pain
- Acetaminophen, NSAIDs, opioid analgesics, ketamine, alpha 2 antagonists all commonly used
 - Other options include antidepressants, anticonvulsants
- Regional blocks and virtual reality may be adjuncts to traditional pharmacologic approaches

Musculoskeletal Problems

- Children experience fractures with trauma!
- Compartment Syndrome: major concern following any trauma or musculoskeletal emergency
- Compartment pressure related medical emergency requires immediate treatment if pressures exceeds normal limits > 30-35mmHg; castings or bandages are removed with any question of status, keep extremity level.
- If signs/symptoms are excessive, emergent fasciotomy may be performed

Compartment Syndrome

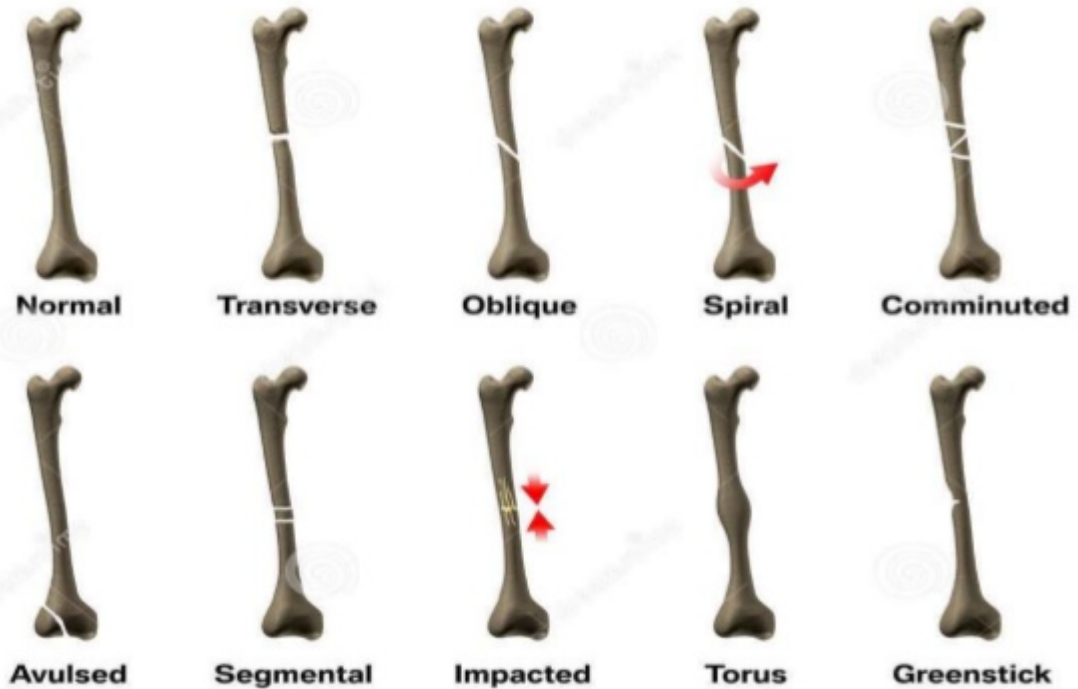
Definition: Emergency that compromises tissue within a closed, inflamed space limiting perfusion with inadequate blood flow to capillaries leading to tissue ischemia.

- Immediate treatment needed if pressures exceeds normal limits > 30-35mmHg; Remove castings or bandages are removed.
- Can result from many medical problems including fractures, burns, venomous bites, IV or IO infiltrates, thromboembolic events, athletes involved in heavy training.
- Symptoms: Three P's
 - Paralysis
 - Pallor
 - Pulselessness
- Preceding the 3 P's are 3 A's – Anxiety, Agitation and Analgesic Requirement

Fractures

- Fractures are common injuries with pediatric trauma.
- Physeal and growth plate fractures need immediate and specialized care. Use Salter-Harris fracture classification to determine growth plate involvement.







Classification of Epiphyseal Plate Fractures

- I – Complete separation without fracture Mgmt: closed reduction and cast
- II – Most common; separation of plate with fx Mgmt: closed reduction and cast
- III – Fracture through part of plate extending to joint. Mgmt; open reduction and internal fixation
- IV – Fracture completely through plate. Mgmt: open reduction and internal fixation
- V – Crush injury to area of plate that is nondisplaced with no fx line visible on xray. Mgmt: immobilization and non-weight bearing for a min of 3 weeks

Osteomyelitis

- Infection of the bone - most common infective organism is staph aureus
- Presentation is variable.
- Diagnostics: CBC, diff, ESR, CRP, blood culture, plain xray, MRI
- IV Antibiotics, but unknown documented time frame. Average length of treatment is 5 to 23 days. Surgical drainage is sometimes necessary.

Slipped Capital Femoral Epiphyses (SCFE)

- Separation of the growth plate in the proximal femoral head.
- Acute disease includes sudden exacerbation with hip, thigh or knee pain, limited internal rotation and obligated external rotation.
- Diagnostics: plain radiographs of pelvis, may need CT or MRI
- Surgical pinning or fixation.

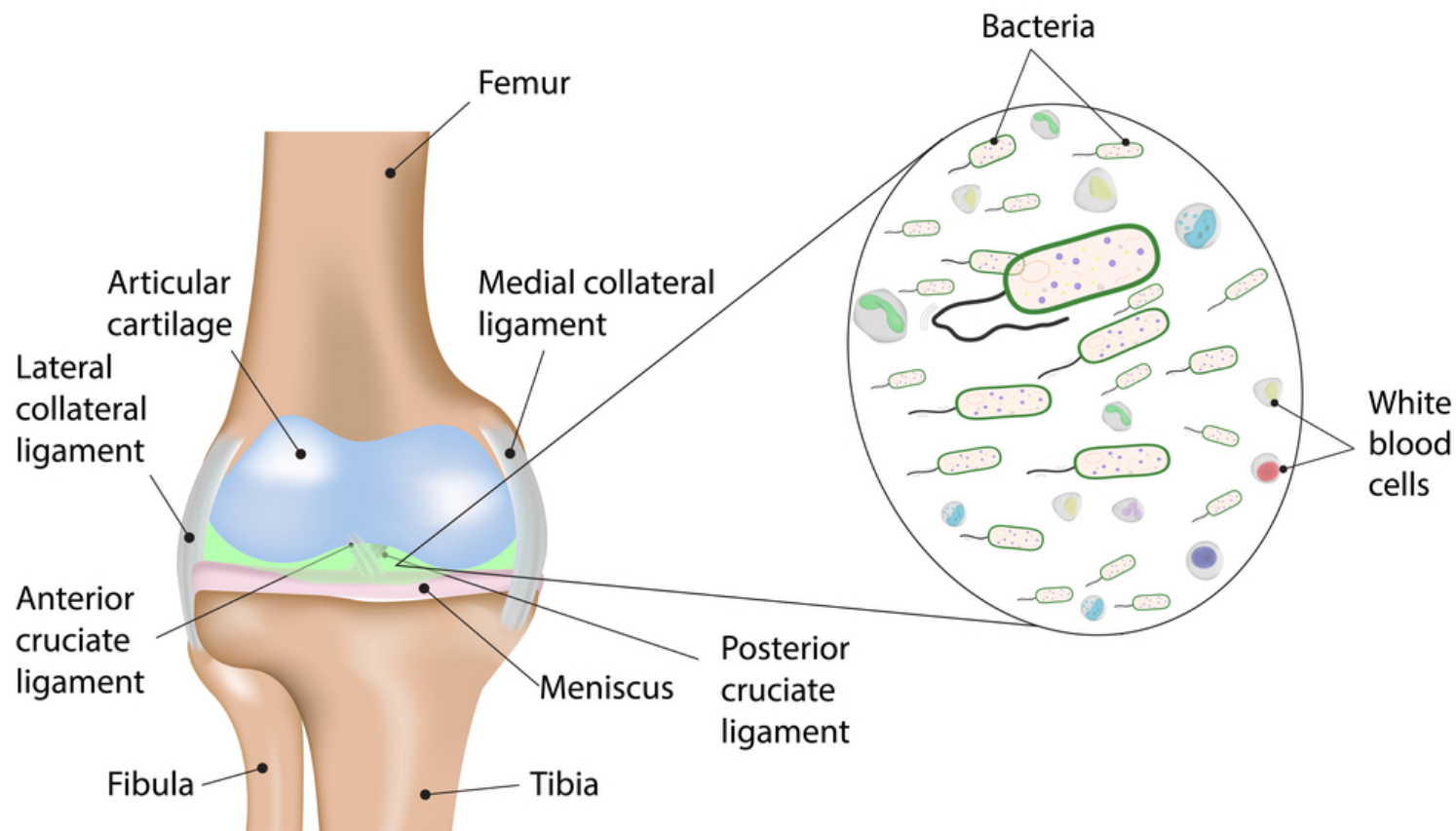
Toxic (Transient) Synovitis

- Transient monoarticular synovitis as inflammatory condition that affects large joint spaces, usually hip.
- Pain in the area of the affected joint, limping (antalgic) gait, and refusal to bear weight.
- Diagnostic: CBC, diff, ESR, CRP, MRI or bone scan.
- Symptom based treatment, NSAIDS for pain, rest and limited activity of the joint.

Septic Arthritis

- Infection of the synovial space of the joint.
- Pain to the affected area, fever, nonuse of extremity, limp or refusal to bear weight.
- Diagnostic: CBC, diff, ESR, blood culture, bone scan
- IV antibiotics – may require surgical intervention for drainage of joint.

Septic Arthritis

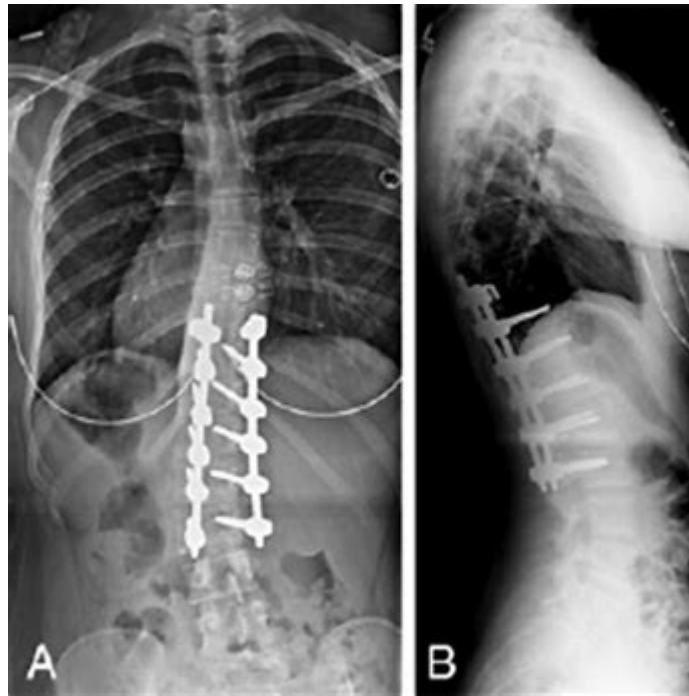


Spinal Fusion/Scoliosis Repair

Spinal deformity repair

- Intraoperative concerns include blood loss, hypotension, respiratory instability and kidney function, **SIADH** can occur intra or post operatively as a result of volume replacement and spinal manipulation
- Pain management, fluid and electrolyte monitoring and replacement, intake and output, neurologic assessment for first 24 hours

Spinal Fusion



Le Fort/Mandibular Procedures



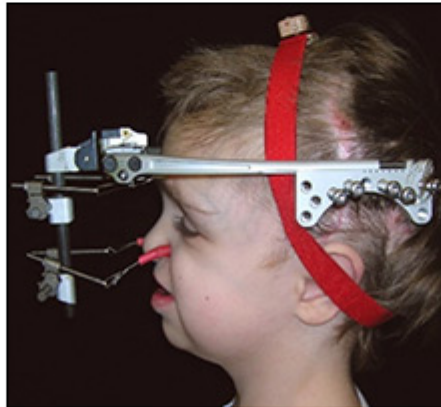
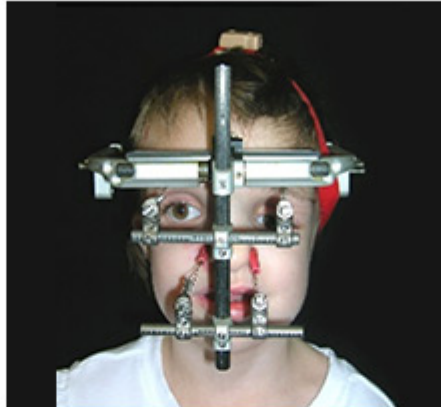
- Commonly used procedures to treat midface deformities
- Allows for 3 dimensional correction (advancement, retrusion, elongate, shorten)
- May be performed with other mandibular surgery simultaneously (for malocclusion, obstructive sleep apnea, ..)
- Often last stage in surgical treatment for cleft lip/palate (LeFort)
- Procedure completed with nasotracheal intubation
 - Usually secured with 2.0 silk to membranous septum

LeFort/Mandibular Procedures

- Post-op
 - Maxillomandibular fixation device may be in place
 - Nasogastric tube; risk of nausea
 - Hand-held suction device
- Complications
 - Nasolacrimal duct obstruction
 - Abscess
 - Sinusitis
 - Brain abscess
 - Severe hemorrhage
 - Pseudoaneurysm
 - Epistaxis

If distraction device in place;
meticulous respiratory
evaluation is needed

LeFort III



Esophageal Trauma

- Laundry detergent pods (contain ethanol, hydrogen peroxide, polymers)
 - Most common in children < 3 years of age
 - Adolescent “Tide pod challenge”
 - Signs and symptoms: Vomiting, drooling, depressed sensorium, lactic acidosis
 - Most do NOT demonstrate oral/lip cutaneous findings
 - Damage can be done to the esophagus; in some cases, erosion of esophagus (e.g. erythema, superficial erosion, perforation)
 - Evaluation: Upper endoscopy may be indicated





Ocular Trauma

- Can be open or closed globe injuries; closed globe more common
- More common in males than females
- Most common site of injury
 - Home: preschool children
 - Outdoor activities: > 13 years of age
- Most common cause of monocular blindness in children
- Children are more susceptible to ocular injury d/t immature motor skills, lack of common sense, natural curiosity
- Assessment – can be challenging in children, especially if uncooperative

Ocular Trauma

- Open globe injury presentations:
 - Hypotony
 - Traumatic cataract
 - Iris laceration
 - Vitreous prolapse
 - Uveitis
- Closed globe injury presentations
 - Hyphema
 - Secondary glaucoma
 - Retinal edema

Ocular Trauma

Treatment

- Varies; surgical intervention often needed in open globe injuries

Outcomes

- Less favorable in open globe injuries; increased risk for long term visual impairment/blindness
- **Aggressive evaluation for *amblyopia* in post-trauma phase to avoid additional visual impairment. Visual development in children continues until 9-10 years of age**



Question

The most important management of a stabilized child who experienced a liver laceration from a bicycle accident includes:

- a. Serial hemoglobin and hematocrit monitoring
- b. Serial abdominal CT
- c. Coagulation therapy
- d. Emergent surgical intervention

Answer

The most important management of a stabilized child who experienced a liver laceration from a bicycle accident includes:

A. Serial hemoglobin and hematocrit monitoring

Question

An obese 14 year old male presents with acute hip pain and inability to walk even with support of crutches. He has recently complained of knee pain and does not remember an injury. The MOST likely diagnosis is:

- a. Legg Calve Perthes Disease
- b. Femur fracture
- c. Slipped Capital Femoral Epiphysis
- d. Osteomyelitis

Answer

An obese 14 year old male presents with acute hip pain and inability to walk even with support of crutches. He has recently complained of knee pain and does not remember an injury. The MOST likely diagnosis is:

C. Slipped Capital Femoral Epiphysis

Question

A 6 year old who suffered a radial fracture yesterday, had the repair today and was discharged from the orthopedic center with a prescription for Roxicet. The parents call the surgical NP late that night stating that the child is in severe pain which is not relieved by pain medication. What discussion by the PNP should occur on the phone call to determine disposition of this child?

- a. If pain, pallor, decreased perfusion and sensation, return immediately to ED
- b. Elevate extremity, assess for continued pain and pallor, call back after 9am
- c. Administer another dose of pain medication and return call 2 hours later
- d. If cast appears too tight, tactile pain is present and swelling is noted, ice the limb

Answer

A 6 year old who suffered a radial fracture yesterday, had the repair today and was discharged from the orthopedic center with a prescription for Roxicet. The parents call the surgical NP late that night stating that the child is in severe pain which is not relieved by pain medication. What discussion by the PNP should occur on the phone call to determine disposition of this child?

A. If pain, pallor, decreased perfusion and sensation, return immediately to ED

Question

A 15 year-old has suffered a pulmonary contusion after being involved in a motor vehicle accident. Which CXR finding would you expect on presentation?

- A. Normal CXR
- B. Kerly B lines
- C. Diffuse opacities on the affected side
- D. Pleural effusion on affected side

Answer

A 15 year-old has suffered a pulmonary contusion after being involved in a motor vehicle accident. Which CXR finding would you expect on presentation?

A. Normal CXR

Question

An 8 year old is admitted with a suspected abdominal injury after a fall from an ATV (all terrain vehicle). The BEST mode of diagnosis for a suspected splenic laceration is:

- a. Bedside ultrasound
- b. Abdominal CT with IV contrast
- c. Abdominal CT with oral contrast
- d. Abdominal x-ray

Answer

An 8 year old is admitted with a suspected abdominal injury after a fall from an ATV (all terrain vehicle). The BEST mode of diagnosis for a suspected splenic laceration is:

B. Abdominal CT with IV contrast

Question

When devising a management plan for a child with suspected osteomyelitis, which agent should be included as part of the first line therapy?

- A. Azithromycin
- B. Gentamicin
- C. Cefepime
- D. Vancomycin

Answer

When devising a management plan for a child with suspected osteomyelitis, which agent should be included as part of the first line therapy?

D. Vancomycin