Chapter 21
Abdominal & Extremity Trauma

Chapter Goal
- Integrate pathophysiological principles & assessment findings to formulate field impression and implement treatment plan for patients with abdominal or extremity trauma

Learning Objectives
- Recognize MOI causing abdominal trauma
- Describe MOI, signs & symptoms, and complications associated with abdominal solid organ, hollow organ, retroperitoneal organ, & pelvic organ injuries
- List 4 signs or symptoms of abdominal trauma
- Describe out-of-hospital assessment & management of patient suspected to have abdominal injury
Learning Objectives

- Describe treatment of abdominal trauma when patient is pregnant
- Identify position for pregnant trauma patient (in 3rd trimester) optimizing venous return to heart
- Describe treatment of evisceration
- Identify 1 difference between open & closed bone injuries

Learning Objectives

- List 3 signs or symptoms of bone or joint injury and internal, external bleeding
- Describe treatment of closed fractures, open fractures, internal & external arterial bleeding, circulatory compromise, pelvic fractures, and compartment syndrome
- Identify 3 complications of extremity trauma

Learning Objectives

- List 1 example each of rigid splint, formable splint, & traction splint
- Describe process of immobilizing suspected upper extremity fracture, lower extremity fracture, & pelvic fracture
- List 3 complications of splinting
Introduction

- Unrecognized abdominal injury is major cause of death
  - 2nd leading cause of preventable trauma deaths

Abdominal Trauma

- Injuries caused by:
  - Blunt mechanisms
  - Penetrating mechanisms
- Blunt trauma
- Penetrating trauma
- Seat belt injuries
  - Deceleration forces

Specific Abdominal Injuries
Specific Abdominal Injuries

- Solid organ injury
  - Most common—liver & spleen
  - Risk—exsanguination
  - Suspect with
    - Steer wheel injury
    - Lap belt injury
    - History of epigastric trauma
  - Suspect spleen injury in
    - MVCs
    - Falls
    - Sports injuries if impact to lower left chest, flank, upper left abdomen
    - Kehr’s sign

- Hollow organ injury
  - Symptoms from spillage of contents
    - Results in peritonitis
  - Penetrating trauma
  - Compression forces may cause bowel injuries

- Retroperitoneal organ injury
  - Blunt or penetrating trauma to
    - Abdomen (anterior or posterior)
    - Thoracic spine
  - Potential for hemorrhage from pelvic/lumbar fractures
  - Potential for injuries to
    - Kidneys
    - Ureters
    - Pancreas
    - Duodenum
Specific Abdominal Injuries

- Pelvic organ injury
  - Usually from MVC
  - Other causes
    - Penetrating trauma
    - Falls
    - Pedestrian accidents
    - Bicycle accidents
    - Sexual acts
  - Potential for associated injuries to bladder/urethra

Specific Abdominal Injuries

- Vascular structure injury
  - Potential for massive hemorrhage
  - May be associated with palpable abdominal mass
  - Most frequently injured vessels:
    - Aorta
    - Inferior vena cava
    - Renal, mesenteric, iliac arteries & veins
  - High mortality rate

Specific Abdominal Injuries

- Vascular structure injury
  - Assessment
    - Base index of suspicion on
      - MOI/vehicle damage
      - Outward signs of trauma
      - Shock with unexplained cause or unexplained by other injuries
      - Abdominal rigidity, guarding, distention
    - Avoid deep palpation of obviously injured abdomen
    - Do not waste time trying to auscultate bowel sounds
    - Do not rock pelvis when assessing
    - Suspect intraabdominal bleeding
Specific Abdominal Injuries

- Vascular structure injury
  - Management
    - Stabilize
    - Rapid transport to appropriate surgical facility
    - Airway
      - Maintain patent airway
      - Administer high-concentration O₂
      - Consider bag-mask/ET
    - Circulation
      - Control bleeding with direct pressure
      - Consider PASG per local protocol
      - Fluid replacement en route to hospital
    - Other
      - Immobilize if spinal injury suspected but do not delay transport
      - Perform further assessment en route

Specific Abdominal Injuries

- Impaled objects
  - Do not remove impaled objects
  - Management
    - Support & immobilize impaled object
    - Apply direct pressure if bleeding present
    - Do not palpate abdomen
    - PASG contraindicated

Specific Abdominal Injuries

- Evisceration
  - Management
    - Do not attempt to replace evisceration
    - Cover with moist, sterile gauze; remoisten as necessary

Specific Abdominal Injuries

- Trauma in pregnancy
  - Uterus & fetus enlarge above symphysis pubis
  - Fetus more susceptible to trauma
  - Be aware of changes in respiratory, cardiovascular, GI changes
Specific Abdominal Injuries

- Trauma in pregnancy
  - Management
  - Mother is priority
  - Transport without delay
  - High-concentration O₂
  - Apply leg portion of PASG per local protocol
  - Once immobilized, tilt long backboard to left 10-15°

Extremity Trauma: Pathophysiology

- Fracture types
  - Open
    - Disruption of skin
  - Closed
    - Skin remains intact

Extremity Trauma: Pathophysiology

- Dislocation
**Extremity Trauma: Pathophysiology**

- **Complications**
  - Excessive bleeding
  - ↓ Blood flow
  - Damage to muscles, nerves, blood vessels
  - Closed fracture becomes an open fracture
  - ↑ Pain
  - Paralysis
  - Compartment syndrome

- **Fractures causing major hemorrhage:**
  - Closed femur
  - Pelvic fracture

**Extremity Trauma: Pathophysiology**

- **Assessment**
  - Deformity
  - Pain, tenderness
  - Grating
  - Edema
  - Bruising, discoloration
  - Guarding
  - Exposed bone ends
  - Joint locked
  - Bleeding—external, internal

**Extremity Trauma: Pathophysiology**

- **Treatment**
  - Control bleeding
    - Direct pressure
    - Elevation
    - Pressure points
  - Treat for shock
  - Prevent further injury
  - Minimize damage
  - Reduce pain
  - Return injured limb to anatomic position unless severe pain or further damage results
  - Immobilize; reevaluate neurovascular status
  - Consider O₂ & IV therapy
  - Apply cold packs
Pelvic Fracture

Extremity Trauma: Pathophysiology

- Compartment syndrome
  - Signs & symptoms
    - Pain; ↑ when muscles stretched
    - ↓ Sensation distal to injury
    - Swelling
    - Paresthesia of web space between thumb & 1st finger or 1st & 2nd toes
    - Weakness/paralysis of involved muscles (late sign)
    - Absent distal pulse (late sign)
  - Rule out life- or limb-threatening injuries first

Extremity Trauma: Pathophysiology

- Compartment syndrome
  - Managed as fracture
  - Rapid transport
  - Document:
    - Position
    - Neurovascular status
    - Neurovascular changes

- Circulation compromise
  - Extremity in jeopardy
  - Repositioning
Extremity Trauma: Splinting

- Fractures
  - Immobilize joints above & below fracture site
  - Open fractures
    - Control bleeding
  - Traction splint
    - May cause bone ends to retract
  - Air splint
    - Once inflated, do not deflate
    - May cause tourniquet effect
  - Rigid splint
    - Use adequate padding

- Dislocations & joint injuries
  - Usually splint where found
  - If distal circulation compromised, move slightly to restore circulation
    - Warn patient about pain
  - Formable splint
  - Reassess neurovascular status

Extremity Trauma: Traction Splinting

- Hare Traction Splint
  - Provide manual stabilization
  - Manual traction may relieve pain
**Extremity Trauma: Traction Splinting**

**Hare Traction Splint**

- Slide splint under leg
- Apply ischial strap

**Extremity Trauma: Traction Splinting**

**Hare Traction Splint**

- Attach distal securing device; wind ankle hitch for manual traction
- Secure straps; release manual traction; reassess neurovascular status

**Extremity Trauma: Traction Splinting**

**Sager Traction Splint**

- Application procedure:
  - Place splint medially between legs
  - Seat perineal cushion against groin & ischial tuberosity
  - Apply thigh strap
  - Extend inner shaft of splint until pulley wheel or crossbars are even with patient’s heel
  - Apply ankle harness above medial & lateral malleoli
  - Pull control tabs on harness to shorten ankle sling, pulling it against sole of foot
  - Pull out inner shaft of splint
  - Extend shaft to achieve desired traction; watch amount registered on traction scale
  - Check thigh strap for snugness
  - Secure straps distally to proximally
  - Apply figure-8 strap around feet to prevent leg rotation
  - Reevaluate securing devices
  - Reassess neurovascular status
Long Bone Fractures: Lower Extremities
- Apply manual stabilization
- Measure for appropriate-size splint
- Place 1 splint medially, 1 laterally; pad between voids
- Immobilize joint above & below injury
- Stabilize extremity; measure for splint
- Pad voids
- Secure to board
Long Bone Fractures: Shoulder Injury

- Position sling over patient’s chest
- Bring bottom point over patient’s arm
- Tie ends together
- Secure arm with swathe

Summary

- Blunt trauma to abdominal organs usually results from compression or shearing forces
- Penetrating injury may result from stab wounds, gunshot wounds, or impaled objects
- Solid organs most commonly injured are liver & spleen
Summary

- Injury to kidneys, ureters, pancreas, & duodenum may cause massive hemorrhage
- Injury to pelvic organs usually results from motor vehicle crashes resulting in pelvic fractures
- Abdominal vascular structure injuries may be life threatening because of potential for massive hemorrhage

Summary

- Most significant indicator of severe abdominal trauma is presence of unexplained shock
- Emergency care of patients with abdominal trauma consists of stabilizing patient & rapid transport
- Extremity trauma alone is non-life-threatening

Summary

- Attention should focus on treating life-threatening or limb-threatening injuries
- Do not be distracted by appearance of open fracture
- All deformities & painful extremities should be treated as fractures