Chapter 20 Soft-Tissue Injury

Introduction to Soft-Tissue Injury
- Skin is the largest, most important organ
- ___________% of total body weight
- Functions:
  - ________________________________
  - Sensation
  - ________________________________ Regulation
- AKA: ____________________________ System

Epidemiology
- Most wounds require ________________________________ care
- Significant injuries include damaged arteries, ________________________________, and tendons
- Severe hemorrhage possible
- Risk factors include age, alcohol or drug abuse, and ________________________________

Types of Soft Tissue Wounds
- ____________________________ wounds
  - Over 10 million wounds present to ED.
  - Most require simple care and some suturing.
  - Up to 6.5% may become ________________________________.
- ____________________________ wounds
  - More common
  - Contusions, sprains, and and strains

Pathophysiology of Soft-Tissue Injury

Closed Wounds
- Contusions
  - ________________________________ (reddening of skin)
  - Ecchymosis
- ________________________________
- Crush Injuries

Open Wounds
- Abrasions
- Lacerations
- ________________________________
- Punctures
- Impaled objects
- ________________________________
- Amputations

Open Soft-Tissue Injuries

Hemorrhage
• Arterial: Bright red and ____________________________
• Veneous: Darker red and ____________________________
• Capillary: Darker red and ____________________________

8 [ ] Wound Healing (1 of 2)

Body’s natural ability to stop bleeding & the ability to clot blood

Begins ____________________________ after injury

Inflammation:

Local biochemical process that attracts WBCs

Migration of epithelial cells over wound surface

9 [ ] Wound Healing (2 of 2)

Neovascularization:

New growth of ____________________________ in response to healing

Collagen Synthesis:

: Cells that form collagen

: Tough, strong protein that comprises connective tissue (scar tissue)

10 [ ] The Wound Healing Process

11 [ ] Infection

• Most common and most serious complication of open wounds
• 1 in 15 wounds seen in ED result in infection
• Delay ____________________________
• Spread to adjacent ____________________________
• Systemic infection leads to ____________________________

12 [ ] Infection Presentation

• Pus: WBC’s, cellular debris, & dead bacteria
• Lymphangitis: Visible ____________________________ streaks
• Localized ____________________________
• Body Fever & ____________________________

13 [ ] Infection Risk Factors

• Host’s health & pre-existing illnesses
• Wound type and ____________________________
• Associated contamination
• ____________________________ provided

14 [ ] Infection Complications and Management

Complications:

– Deep space infection of anerobic bacteria
– ____________________________ Gas and Odor
● Tetanus (bacterial infection of the CNS)
Management:
● The best management is ____________________________
● ____________________________ & keep wound clean

15 Other Wound Complications (1 of 2)
● Impaired Hemostasis
  – Often due to medications (__________________________)
● Re-Bleeding
● Delayed Healing
  – Often due to ____________________________

16 Other Wound Complications (2 of 2)
● ____________________________ Syndrome: edema and swelling in deep
tissues that can compromise blood flow
● Pressure Injuries: due to prolonged ____________________________ of the
skin and underlying tissues

17 Pressure injuries may occur if a long bone spine board, splint, or
__________________________ is left on a patient for an extended period.

18 Crush Injury
● Body tissues are subjected to severe compressive forces
● ____________________________ of distal tissue
  – Buildup of byproducts of metabolism
  – “Wood-like” ____________________________ tissue
● Associated Injury

19 Crush Syndrome
● Body is entrapped for > ____________ hours
● Crushed muscle tissue becomes necrotic
  – Skeletal Muscle ____________________________
  – Release of toxins including ____________________________ and uric acids
● When tissue is released, toxins move RAPIDLY into systemic circulation
  -Impacts ____________________________ Function
  -Impacts ____________________________ Function

20 Injection Injury
● High- ____________________________ line bursts (normally hydraulic)
● Injects fluid or other substance into skin and into subcutaneous tissue
● Produces ____________________________ wound
● Can produce chemical damage
● Can produce ____________________________

21 Dressing & Bandage Materials (1 of 3)
● Sterile & Non-sterile Dressings
  – Sterile: ____________________________ wound contact
- Non-sterile: Bulk dressing above ____________________________________
  ● Occlusive/Non-occlusive Dressings
  ● Adherent/Non-adherent Dressings
    - Adherent: stick to ____________________________________ or fluid
  ● Absorbent/Non-absorbent
    - Absorbent: ____________________________________ up blood or fluids

22 ☐ Dressing & Bandage Materials (2 of 3)
  ● Wet/Dry Dressings
    - Wet: Burns, ____________________________________ wounds (Sterile NS)
    - Dry: Most common
  ● Roller bandage
    - Kerlex/Kling
    - Multi-ply, ____________________________________; 1-6”

23 ☐ Dressing & Bandage Materials (3 of 3)
  ● Gauze bandage
    - Single ply, non-stretch: 1-3”
  ● ____________________________________ bandages
  ● Elastic (____________________________________) Bandages
  ● ____________________________________ Bandages

24 ☐ Assessment of Soft Tissue Injuries
  ● Scene Size-up
  ● Primary Assessment
  ● Secondary Assessment
    - Evaluate ____________________________________ and consider
    - Rapid versus Focused Assessment
  ● Detailed Physical Exam
    - ____________________________________, Inspection, Palpation, Auscultation
  ● Reassessment

25 ☐ Wound assessment must be ____________________________________ to ensure that care
  of each injury can be assigned an appropriate priority.

26 ☐ Objectives of Wound Care
  ● Control ____________________________________
  ● Avoid Contamination
    - Keep the wound clean
    - Consider ____________________________________ if grossly contaminated
  ● Immobilize Site
    - Prevents movement and aggravation of wound
    - Do not use an ____________________________________ bandage: TQ effect
    - Monitor distal pulse, motor, and sensation

27 ☐ Hemorrhage Control
External bleeding is controlled by:
- Direct, even ____________________________________ and elevation
- Pressure dressings and/or splints
- ____________________________________
- It will often be useful to ____________________________________ these methods.

**28** Tourniquet
- If direct pressure fails, apply a tourniquet ____________________________________ the level of bleeding.
- Used only on ____________________________________
- It should be applied ____________________________________ and not released until a physician is present.

**29** Applying a Commercial Tourniquet
- BSI
- Hold ____________________________________ pressure over wound
- Place around the extremity just ____________________________________ the bleeding site
- Click the buckle into place and pull the strap tight
- Turn the dial clockwise until ____________________________________ are no longer palpable below the tourniquet or until bleeding is controlled

**30** Releasing a Commercial Tourniquet
- To release the tourniquet at the hospital, or if instructed by medical control, push the ____________________________________ button and pull the strap back.
- Caution: bleeding may rapidly return upon tourniquet release and may need to be rapidly

**31** Making and Applying a Tourniquet (1 of 2)
- Fold triangular bandages to ___________” wide and 6 to 8 layers thick
- Wrap the bandage around the extremity ____________________________________ just above the bleeding site
- Tie one knot in the bandage. Place a stick or rod on the knot and tie the ends of the bandage over the ____________________________________

**32** Making and Applying a Tourniquet (2 of 2)
- Twist the handle to tighten the tourniquet until ____________________________________ stops
- Secure the handle
- Write “_________” and exact time on a piece of tape and apply to patient’s forehead
- A great alternative is the use of a ___________ cuff

**33** Making a Tourniquet

**34** Tourniquet Precautions
- Do not apply a tourniquet directly over any ____________________________________.
- Make sure the tourniquet is tightened securely.
- Use ____________________________________ padding under tourniquet if possible
Never use wire, rope, a belt, or any other narrow material.
Do not __________________________ the tourniquet.

35  Pain and Edema Control
- Cold packs
- Moderate pressure over wound
- Consider __________________________ if approved by medical control
  - __________________________, Demerol,
  - __________________________, Toradol, and Nubian are most common

36  Anatomical Considerations (1 of 5)
Scalp:
- Rich supply of blood vessels
- In some cases, __________________________ can develop
- Can be severe and difficult to __________________________
- With Skull Fracture
  - Gentle __________________________ pressure around the wound
  - Pressure on local arteries
- Without Skull Fracture use __________________________ pressure

37  Anatomical Considerations (2 of 5)
Face:
- Heavy bleeding
- Assess and protect the __________________________
- Blood is a gastric __________________________
  - Be alert for nausea and vomiting
Ear or Mastoid:
- Cover and Collect bleeding
- Do NOT stop __________________________

38  Anatomical Considerations (3 of 5)
Neck:
- Consider circumferential bandage with little or no
  - Protect trachea and carotids
  - __________________________ and dressing
- Occlusive dressing if lacerated vessel
Shoulder:
- Care to avoid pressure to trachea and anterior

39  Anatomical Considerations (4 of 5)
Trunk:
- Minor wounds: Dressing and __________________________
- Major wounds: __________________________ wrap
- Groin & Hip
– Bandage by following contours of body
– ____________________________________ can increase tightness of bandage

40 Anatomical Considerations (5 of 5)
Elbow and Knee:
● Circumferential wrap and splint
  – ____________________________________ reduces movement
  – Position of ____________________________________
Hand and Finger:
● ____________________________________ dressing
● Position of function
Ankle and Foot:
● Circumferential bandage

41 Complications of Bandaging
● Always assess before and after:
  - ____________________________________
  - Motor function
  - ____________________________________
● Developing ischemia
  – Pain, pallor, tingling, loss of pulse, decreased capillary refill
● Is dressing size ____________________________________ to injury?

42 Bandaging Amputations (1 of 2)
Patient:
● Control bleeding by ____________________________________ dressing
● Consider ____________________________________ proximal to wound
● Do not delay transport to locate amputated part
  – Have a second ____________________________________ transport the part

43 Bandaging Amputations (2 of 2)
Amputated Part:
● Dry cooling and rapid transport
● Part in plastic bag (____________________________________ bag)
● Immerse in cold ____________________________________ or on ice
● Avoid ____________________________________ contact between tissue and cold water
  or ice

44 Bandaging Impaled Objects
● Stabilize with bulky dressing in place
● Prevent movement of object
● Consider cutting or shortening LARGE impaled objects
  – Prevent gross movement
  – Reduce ____________________________________ to patient if cutting torch used
● REMOVE ONLY IF:
  – In ____________________________________ and interferes with airway
Considerations of Crush Syndrome
- Ensure that scene is safe
- Greater the body area compressed, the longer the entrapment, the greater the risk of crush
- Once body part is freed, toxic elements of crush injury are released into systemic circulation.
- General management for soft tissue and musculoskeletal injury.

Management of Crush Syndrome
- IV: ____________-___________ ml/kg of NS or D5/1/2NS
- AVOID LR or K+ based solutions
- After bolus, continuous infusion of ____________ ml/kg/hr
- Consider ____________ Bicarbonate 1mEq/kg bolus and drip at 0.25 mEq/kg/hr to counteract acidosis
- Consider ____________ Chloride 500 mg IV to counteracts hyperkalemia
- Consider ____________ to decrease edema

Compartment Syndrome
- Likely ____________-___________ hours post-injury
  Symptoms:
  - Severe ____________ out of proportion with physical exam findings
  - ____________ motor and sensory function

6 Ps of Compartment Syndrome
- Pain
  - ____________: numbness and/or tingling
  - ____________: partial paralysis of the extremity
- Pressure
- Passive stretching pain
- ____________

Management of Compartment Syndrome
- Care of underlying injury
- Splint and immobilize all suspected fractures
- ____________ packs to severe contusions
  - Most effective prehospital management
  - Reduces ____________
  - Prevents ____________

Special Considerations of Face & Neck Injuries
- Potential for ____________ obstruction or compromise
- Aggressive suctioning and oxygenation
- Assess for ____________ injury
- Consider ____________ if excessive swelling or damage
Special Considerations of Thoracic Injuries

- Superficial appearing injury can be ____________________________________
- Always suspect the worst due to underlying ________________________________
- NEVER explore a wound internally
- Be alert for:
  - Subcutaneous emphysema
  - Pneumothorax or ________________________________
  - Tension pneumothorax
- Consider ________________________________ dressing sealed on 3 sides

Special Considerations of Abdominal Injuries

- Always suspect injury to abdominal organs if below the level of the ____________th rib.
- Damage to hollow or solid organs from blunt or penetrating trauma.
- Signs of symptoms of internal injury may be subtle and ____________________________ to progress.
- Supportive treatment unless ________________________________ care is warranted.

Wounds Requiring Transport, Transport any wound that involves:

1. Significant blood loss
   - Blood vessels
   - Tendons

2. Muscles
   - Significantly ________________________________
   - ________________________________ object
   - Likely cosmetic injury