Chapter 29
Musculoskeletal Care

Overview
- Musculoskeletal Review
  - The Muscular System
  - The Skeletal System
- Injuries to Bones and Joints
  - Mechanism of Injury
  - Bone or Joint Injuries
  - Emergency Care for Patients with Bone or Joint Injuries
- Splinting an Injury
  - Reasons for Splinting
  - Principles of Splinting
  - Equipment and Techniques
  - Risks of Splinting

The Musculoskeletal System
The Skeletal System

- The skeletal system is the scaffolding of the body
- Gives the body shape and rigidity
- Protects the vital internal organs
- Enables movement

Spinal Column

- Cervical (neck)—7 vertebrae
- Thoracic (upper back)—12 vertebrae
- Lumbar (lower back)—5 vertebrae
- Sacral (back wall of the pelvis)—5 vertebrae
- Coccyx (tailbone)—4 vertebrae

The Skull

- Skull
  - Houses and protects the brain
- Orbit
- Nasal bone
- Maxilla
- Mandible
- Zygomatic bone
Thorax

- Ribs
  - 12 pairs
  - Attached posterior to the thoracic vertebrae
  - Pairs 1-10 are attached anterior to the sternum
  - Pairs 11 and 12 are floating

- Sternum (breastbone)
  - Manubrium (superior portion of sternum)
  - Body (middle)
  - Xiphoid process (inferior portion of sternum)
Pelvis

Upper extremity

Lower extremity

Lower Extremities

- Femur (thigh)
- Patella (kneecap)
- Tibia (shin, lower leg)
- Fibula (lower leg)
- Medial and lateral malleolus
- Tarsals and metatarsals (foot)
- Calcaneus (heel)
- Phalanges (toes)
The Lower Extremities
- Patella
- Fibula
- Tibia
- Femur

The Foot
- Tarsals
- Metatarsals
- Phalanges

Upper Extremities
- Clavicle (collar bone)
- Scapula (shoulder blade)
- Acromion (tip of shoulder)
- Humerus (superior portion of upper extremity)
- Olecranon (elbow)
- Radius (lateral bone of forearm)
- Ulna (medial bone of forearm)
- Carpals (wrist)
- Metacarpals (hand)
- Phalanges (fingers)
The Upper Extremity

- Scapula
- Humerus
- Ulna
- Radius
- Metacarpals
- Carpals
- Phalanges

Joints

- Where bones connect to other bones
- Types
  - Ball and socket
  - Hinged

Hinge Joint
The Muscular System

- Function
  - Gives the body shape
  - Protects internal organs
  - Provides for movement
The Muscular System

Types
- Voluntary
- Involuntary
- Cardiac

The Muscular System

Voluntary (skeletal)
- Attached to the bones
- Form the major muscle mass of the body
- Under control of the nervous system and brain
- Can be contracted and relaxed by the will of the individual
- Responsible for movement

The Muscular System

Involuntary (smooth) muscles
- Found in the walls of the tubular structures of the gastrointestinal tract and urinary system, as well as the blood vessels and bronchi
- Control the flow through these structures
- Carry out the automatic muscular functions of the body
- Individuals have no direct control over these muscles
- Respond to stimuli such as stretching, heat, and cold
The Muscular System

- **Cardiac**
  - Found only in the heart
  - Involuntary muscle
  - Has its own supply of blood through the coronary artery system
  - Can tolerate interruption of blood supply for only very short periods
  - Automaticity—the ability of the muscle to contract on its own

Injuries to Bones and Joints

- **Mechanism of injury**
  - Direct injury
  - Indirect injury
  - Twisting injury
Injuries to Bones and Joints

- Indirect injury

Injuries to Bones and Joints

- Twisting injury

Injuries to Bones and Joints

- Types
  - Open
    - Break in the continuity of the skin
  - Closed
    - No break in the continuity of the skin
Injuries to Bones and Joints

- Signs and symptoms
  - Deformity or angulation
  - Pain and tenderness
  - Grating
  - Swelling
  - Bruising (discoloration)
  - Exposed bone ends
  - Joint locked into position

Injuries to Bones and Joints

- Emergency care for bone or joint injuries
  - Body substance isolation
  - Administer oxygen if not already done and indicated
  - After life threats have been controlled, splint injuries in preparation for transport
  - Application of cold pack to area of painful, swollen, deformed extremity to reduce swelling
  - Elevate the extremity

Splinting an Injury

- Reasons for splinting
  - Prevent motion of bone fragments, bone ends, or angulated joints
  - Minimize complications
    - Damage to muscles, nerves, or blood vessels caused by broken bones
    - Conversion of a closed painful, swollen, deformed extremity to an open painful, swollen, deformed extremity
    - Restriction of blood flow as a result of bone ends compressing blood vessels
    - Excessive bleeding due to tissue damage caused by bone ends
    - Increased pain associated with movement of bone ends
    - Paralysis of extremities due to a damaged spine
Splinting an Injury

- Assess pulse, motor, and sensation distal to the injury prior to and following splint application and record findings
- Immobilize the joint above and below the injury
- Remove or cut away clothing
- Cover open wounds with a sterile dressing
- If there is a severe deformity or the distal extremity is cyanotic or lacks pulses, align with gentle traction before splinting
- Do not intentionally replace the protruding bones

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Splinting an Injury

- Pad each splint to prevent pressure and discomfort to the patient
- Immobilize in the position of function
- Splint the injury before moving when feasible and no life threats
- When in doubt, splint the injury when feasible and no life threats

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Splinting an Injury

- Splint in the position of function
If the patient has signs of shock (hypoperfusion), align in normal anatomical position and transport.

Backboard takes care of all immobilization on emergency basis.

Equipment and Techniques

- Rigid splints
  - Types
    - Cardboard
    - Padded board
    - Ladder

Video Clip: Splinting a Long Bone With a Rigid Splint
Equipment and Techniques

- Traction splints
  - Uses
    - Deformity at midthigh
    - No joint or lower leg injury
    - No knee or pelvis injury

Video Clip: Use of the Hare Traction Splint

Equipment and Techniques

- Pneumatic splints
  - Air splints
  - Vacuum splints
  - Pneumatic antishock garment
Equipment and Techniques

- Pillow

Equipment and Techniques

- Sling and swathe
  - Immobilize arm and shoulder
  - Use with other splints

Risks of Splinting

- Compression of nerves, tissues, and blood vessels from the splint
- Delay in transport of a patient with life-threatening injury
- Splint applied too tight on the extremity, reducing distal circulation
- Aggravation of the bone or joint injury
- Cause or aggravate tissue, nerve, vessel, or muscle damage from excessive bone or joint movement
Summary

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