Pediatric Hand Injuries
1:45 – 2:30 p.m.

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I have no relevant financial relationships to disclose.
Objectives
Pediatric Hand Injuries

• Identify common ball related injuries and initial treatment modalities
• Identify hand burns, level of treatment necessary, understand zone of injury concepts
• Identify common household injuries and methods of prevention
• Injury is the leading cause of death in children – 7000 deaths
• Injury accounts for 50,000 disabilities per year
• Over 50% of deaths related to motor vehicle accidents
Introduction

• The hand is a tool for exploring and interacting with the environment
• The hand allows us to define the external environment – touch and feel
• The hand may be the most important method of impacting the environment
• The hand is a tool for defending us from the environment
Introduction

One-third of all traumatic injuries in the United States involve the upper extremity.
Most Common Surgical Procedures
Most Common Surgical Procedures

• Cesarean Section
• Hysterectomy
• Cholecystectomy
• Hernia Repair
• CABG

~ 1,000,000 per year
Consultations for Hand Problems
Consultations for Hand Problems

15,000,000 times per year
Problems Unique to Children

- Examination is difficult
- Structures are small
  (repair is technically demanding)
- Treat the whole family
Hand Examination in Children

- Cadence of the hand
- Passive Tenodesis Effect
- Pseudomotor Activity
Cadence of the Digits
Pseudomotor Activity
Positives Unique to Children

• Superior Healing
• Joint or Digital Stiffness unlikely
• Bone Remodeling – Deformities can improve with growth
Pediatric Hand Injuries

- Fractures
- Soft tissue injuries
  - Ligaments
  - Tendons
  - Nerves
- Burns
- Special Considerations
Pediatric Hand Injuries

- Fractures

Salter-Harris Classification of Growth Plate Fractures
Fractures

Growth Plates
Fractures

Growth Plates
**Pediatric Hand Injuries**

**Nailbed Injuries**

- Most common type of hand injury
- Crush Injury is the predominant type of injury
- Nail bed is trapped between force of external object and the distal phalanx
- Lacerations
- Amputations
Pediatric Hand Injuries
Subungual Hematoma
Amputations

a) Transverse
b) Dorsal oblique
c) Volar oblique
Fingertip Amputations

Healing by secondary intention
Skin Graft
Local Flaps
Regional flaps
Fingertip Amputations

Healing by Secondary Intention

• Clean
• No bone or tendon exposed
• Surface deficit < 1 cm2
Amputations

a) Transverse
b) Dorsal oblique
c) Volar oblique
**Fingertip Injuries**

**Advantages**

- Simple
- No immobilization of finger or hand
- No operating room
Fingertip Injuries

Advantages
- Simple
- No immobilization of finger or hand
- No operating room

Disadvantages
- Long time (6-10 weeks)
- Scar
Amputations

a) Transverse
b) Dorsal oblique
c) Volar oblique
Fingertip Amputations

Healing by secondary intention
Skin Graft
Local Flaps
Regional flaps
Distal Phalangeal Fractures

- Tuft
- Shaft
- Articular Fracture
- Dorsal or Mallet
- Volar
Distal Phalanx Fractures

Tuft Fracture  Diaphyseal  S-H I or II Fracture
Distal Phalangeal Fracture

Salter-Harris I
Distal Phalangeal Fractures

- Tuft
- Shaft
- Articular Fracture
- Dorsal or Mallet
- Volar
Jersey Finger

- Forced flexion of distal phalanx
- Tackling in football
- Avulsion of flexor tendon from base of distal phalanx
Jersey Finger
Middle Phalanx Fractures

- Transverse or Oblique Shaft
- If displaced, need stabilization
- Problems with angular deformity, rotational deformity, growth
Mallet Finger Deformity

Cast Immobilization or Pin Fixation?
Ball Related Injuries
PIP Fracture Dislocation

• Complex injury
• Innate Joint Architecture
• Complexity of Joint Architecture
• Complete Recovery is not the Rule
• Prolonged Stiffness is Characteristic
Proximal Phalanx Fractures

• Transverse or Oblique Shaft
• If displaced, need stabilization
• Problems with angular deformity, rotational deformity, growth
Proximal Phalanx Fractures

• Salter-Harris II or III fracture involving the base of the proximal phalanx
• Problems with angular deformity, rotational deformity, growth
Angulation Deformity
Metacarpal Fractures

- Rotational Deformity needs correction
- Angulated Deformity needs correction

If:

- > 30 degrees small
- > 20 degrees ring
- > 10 degrees index and long
“Boxer’s” Fracture

• Fifth Metacarpal Neck Fracture
Metacarpal Fractures

- Transverse or Oblique Shaft
- If displaced, need stabilization
- Problems with angular deformity, rotational deformity, growth
Rotational Deformity
Splinting Techniques
Splinting Techniques
Pediatric Hand Injuries

Pediatric burns
American Burn Association
  Any child with burns to face, hands, feet or genitalia
  Total body surface area >10%
  Any CPS case
  Any child older than 16 years with questionable mechanism of injury
Pediatric Hand Injuries

Hand Burns
American Burn Association
Evaluated by a Burn Center
Admitted to a Burn Center
Diagram of Burn Depth

- **Epidermis**
- **Dermis**
- **Subcutaneous Muscle**

- **Superficial (first degree) burn**
- **Partial thickness (second degree) burn**
- **Full thickness (third degree) burn**
Hand Burns

• Zone of Injury
• Dynamic area in which perfusion changes
• Necrosis may occur
• Burn can progress from first degree to third degree
Hand Burns
Hand Burns
Hand Burns
Hand Burns
Escharotomies
Amputated Parts

Pediatric Replantation Criteria

• Thumb
• Multiple Digits
• Hand and Arm Amputations
• +/- Amputation Distal to PIP joint
Amputated Parts

• Wrap in moist saline gauze sponge
• Place this wrapped part in a sealed bag
• Place this sealed bag into a 50:50 mixture of ice and water
• Expedite transfer of part and patient together
Special Considerations

Parental Distraction

- Treadmill
- Lawnmowers
Special Considerations

Dog Bites
Summary

Pediatric Hand Injuries

• Follow a pattern depending upon mechanism
• Treatment has significant and profound functional implications
Summary

• Sports related ball injuries follow a characteristic pattern of injury
• Vector of force is transmitted along the phalanges and causes injury at DIP or PIP joints
• Complex injuries with variable prognosis
Summary

Fracture Assessment and Management

Must take into consideration growth plates and potential for remodeling
Summary

Pediatric Burns
Referral to Burn Center
Initial care is critical
Can minimize extent of injury
Contact Information

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