Objectives

1) Mechanisms of amputation
2) Pre-hospital and pre-transfer care
3) Operative care, post-operative care, and rehabilitation

Upper Extremity Trauma

- Epidemiology –
  - Hand injuries are the most common reason to go to the ED (11.6% of 40 million visits in 2007)
  - Amputations
    - Distal to DIP – 1% of all hand injuries
    - Proximal to DIP - <0.1% of all hand injuries
    - <0.01% replant candidates
      - Probably around 1000 replants per year nationwide
  - History:
    - First arm replant (Dr. Ronald Malt MGH 1962)
    - First finger replant (Dr. Komatsu and Tamai Japan 1965)

Our Experience

- Last year we did 18 digits
  - One amputation at the level of the wrist
A big difference between…

- Being in the bucket
- And
- Being nearly in the bucket

Mechanisms of amputation

Saws

Snowblowers
Industrial accidents

Blast injuries

Avulsion

Pre-hospital and pre-transfer care
ABCs

- Arms
  - People can die
- Fingers
  - Very unlikely
- Trauma work-up
- How do I stop the bleeding?

What do we do with the part?

- Find it!!
- Don't try to clean it
- Don't freeze it
  - Wrap in a moist gauze, put in a baggy, put on top of ice in a bucket or specimen cup

Operative care, post-operative care, and rehabilitation

Am I going to replant it?
What is the mechanism of injury?

How many digits?
Single vs multiple digits

Other options for single digits - simple

Other options for simple digits - complex
Medical comorbidities

- General rule
  - 6-8 hours per digit
- > 7 day hospital stay
- ICU course
- Blood transfusions

Being safe
How will they do in therapy?

- Zones of trauma
  - Some zones do better than others for stiffness
- Social situation

Bad zone of trauma

Good zone of trauma

Controversy

If patients chosen properly, there is none.
Pediatric fractures

Objectives

1) Mechanisms of injury
2) Pre-hospital and pre-transfer care
3) Operative care, post-operative care, and rehabilitation
Why do I like pediatric fractures?

- Delicate, fine work
- If you give them a good operation, they do well
- Making a lifelong difference

Mechanisms of injury

Bouncing/jumping

Sliding/riding
Pre-hospital care

At the scene
- Don’t forget ABCs
- Supporting splint/padding
- Cover open wounds
- Sometimes difficult to assess
  - Gross deformities are never normal

In the ER
- What is an emergency?
  - Open fractures
  - Mid-shaft humerus
    - Rarely
  - Supracondylar fractures
    - Ischemic arm
  - Forearm fractures
    - Compartment syndromes
  - Wrist fractures
    - Rarely

Operative and post-operative care
Scaphoid fractures
- Non-displaced
  - Dealer’s choice
- Displaced
  - Fixate
  - Arthroscopic fixation

Distal radius fractures
- We tolerate a degree of deformity because of remodeling potential
- Closed reduction
  - In ER
- Reduction and fixation
  - Pinning vs plates

Forearm fractures
- Non-displaced
  - Casting
- Displaced
  - Reduction
  - +/- Intramedullary rodding
Supracondylar fractures
- OR for everything but non-displaced (type I)
- Need to be prepared to do brachial artery reconstruction
  - Should not be doing these if you aren’t able to

Supracondylar fracture (type 3)

Distal humerus fractures in teenagers
- Operative except for non-displaced
Humerus shaft fractures

- Surgeon experience often dictates treatment

Infant humerus fractures

- Almost all non-operative

Rehab
Make it fun!

- Kids don’t want to be working on their ROM and strengthening, especially when it hurts

- Fortunately, we have excellent therapists

- No issues of secondary gain

Thank You!