Pediatric Orthopedic Trauma

Overview

- Upper extremity fractures
- Lower extremity fractures
- Non accidental trauma

Upper extremity fractures

- What are they?
  - Fractures of the radius, ulna and/or humerus
- Who gets them?
  - Active children usually after a fall
  - Any age range
- Why do we care?
  - Painful injuries that sometimes require surgery
  - At risk for compartment syndrome and need close monitoring

Disclosures

- I have no disclosures
Distal radius and ulna fractures

- Usually treated in the ED and sent home
- Case example: 4 yo fell on outstretched hand

Distal radius and ulna cont.

- 4 days later doing ok
- 1 week later x-rays show some shifting
- 3 weeks later complete loss of reduction without healing

Distal radius and ulna cont.

- Now this becomes an operative problem
- Post op patient will be admitted for neuro monitoring and pain control

Both bone forearm fractures

- Less common fractures but more commonly admitted for monitoring
- Typically a mid shaft fracture that will be reduced in the ED with sedation and monitored for pain and swelling
Example of both bone

- 10 yo male
- Fell off playground bridge

Both bone cont.

- Treated in the ED with reduction and casting
- Often go on to need surgical intervention, especially in older kids
- Admitted for pain control and monitoring
  - What to look for?
  - Cast management?
  - Activity?

Supracondylar humerus fracture

- 4 yo male fell from monkey bars
- Thready pulse in ED
- Taken emergently to OR

SCH cont.

- Placed into long arm cast post-op and bivalved
- Post-op management:
  - Close monitoring by nursing and residents
  - Watch Cap Refill, sensation, pink fingers
- Pins stay for 3-4 weeks under cast and pulled in the office
**Lower extremity fractures**

- What are they?
  - Femur, tibia and/or fibula fractures
- Who gets them?
  - Walking age active children
  - Children playing sports
  - Children in car or bike accidents
- Why do we care?
  - Common injuries that need appropriate management

**Femur fractures**

- Typically high energy injury
- Treatment varies by location and age of patient
  - Up to 6 months: pavlik harness
  - 6 months to 5 yo: spica cast
  - Over 5 yo: surgical treatment
- Femoral neck fractures: surgical emergency
- Open femur fractures: surgery within 12 hours

**Case example 1**

- 6 month old male
- Mom was holding in one arm and baby arched his back and she lost control and twisted his leg to catch him
- Otherwise healthy

**Case 1 treatment**

- Full exam for other injuries
- Social work consult
  - Evaluate for non-accidental trauma
- Pavlik harness for 4 weeks
Case 2
- 2 yo male
- Dancing around and twisted his leg, refused to bear weight

Case 2 treatment
- Full exam for other injuries
- Social work consult
  - Again to eval for non-accidental trauma
- Spica cast applied in the ED or OR for 4 weeks

Spica cast care
- Kids in spicas get admitted for cast finishing as well as loaner car seat arrangement
- Casts are waterproofed on the floor by the nursing staff
- Keeping them dry is paramount
- Teaching parents to manage them is also of utmost importance

Spica care
- [Images of spica casts and care]
Case 3

- 14 yo male
- Collided with another player while playing baseball
- Severe right leg pain, inability to walk

Case 3 treatment

- Requires surgical intervention
- Pain control until OR available
- Non-weight bearing for 6-8 weeks

Case 4

- 12 yo female
- MVC
- Left leg and groin pain
- Skin intact
- No other appreciable injuries

Case 4 treatment

- Femoral neck fracture in skeletally immature is a surgical urgency/emergency
- Loss of blood supply to the femoral head is as high as 50%
- Outcomes improve with expedited intervention
Case 4 treatment cont.

- Open reduction perc screw fixation

Non accidental trauma

- Case Example:
  - 26 day old male
  - Brought to OSH for refusal to use right arm, transfer to UIHC for further workup
- HPI:
  - Per dad: baby was on the couch, dad turned to get a clean diaper and baby fell off the couch
  - Dad may have pulled him out of his Swaddle Me too forcefully

Images

- PMH:
  - Born near term, c-sect due to previous one week early for maternal HTN
  - Fussy but otherwise healthy
- Social:
  - 2nd born
  - Parents are not married but together x 4 yr
  - History of domestic dispute 4 years ago for which dad got a misdemeanor
- FH:
  - No known orthopedic or congenital concerns
“Pediatric NAI is stated to involve acts of commission or omission which directly or indirectly cause harm to the child, with wide-ranging negative effects on normal development progression to serious injury and death”

Likely grossly underreported/diagnosed
All socioeconomic, cultures, gender, race at risk
Low SES, unplanned pregnancy higher risk
Pre-term, twin gestation, special needs have higher risk
Missing NAT diagnosis increases risk of death for that child
Majority of victims are under 2 yo
Up to 56% under 1 yo
85% of accidental ped fractures are over 5 yo
History

- Red flags:
  - Vague history
  - History discordant with age and development
  - Unknown mechanism
  - Delay in seeking care
  - Multiple ER visits

History to take

- Birth/developmental history
  - Beware of developmental delay as a risk
  - Non-ambulatory kids much more common
- Past medical history
  - Any coagulopathies, connective tissue disorder
- Family history
  - Coagulopathies, OI, other genetic diseases

Clinical presentation

- Bruising is most common presentation
  - Increased accidental injury frequency with increased mobility
  - Non-accidental
    - Large area
    - Away from bony prominence
    - Shape of an object
    - Multiple clustered
- Fractures
  - Any fracture can be from abuse

- 1.2% of children have multiple accidental fractures
- 74% of non accidental victims have multiple fractures
### Fracture pattern

- Femur diaphyseal fractures in non-ambulatory are classic and highly suggestive
  - No association between pattern and NAT, can be any pattern
- Humeral fractures <15 mo other than SCH are associated with NAT
  - Spiral fractures are uncommon and highly suggestive

### Workup

- History
  - Child if age appropriate
  - Suspected perpetrator/s
  - Witnesses
- Labs
  - To rule out metabolic causes and drug exposure
    - Ca, phos, alk phos, Vit D, PTH
    - Hair testing for drug exposure
- Skeletal survey
- Head CT
  - Evaluate for ICH and non-displaced skull fractures
- Retinal exam
  - Common for retinal hemorrhage with shaking

### Questions?