PEDIATRIC ORTHOPEDIC EMERGENCIES

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PITFALLS IN PEDS ORTHO: OBJECTIVES

- Recognize different types of fractures and injuries that occur in children
- Interpret radiographs of bone and joint injuries in pediatric patients; highlight subtle fractures!

KIDS’ BONES ARE DIFFERENT

- Physis - ends of long bones; under compressive forces - radiolucent
- Relatively weak! Sprains are rare!
- Apophysis - ossification center at bony prominence; under traction
- Periosteum - thicker and stronger, get quick callus, less displaced fxs
**KIDS’ BONES ARE DIFFERENT**
- Bones are less dense, more porous
- Haversian canal pores prevent extension of fracture lines
- Pediatric bones fail with compressive and tension forces
- Remodeling common at fx site; increases near physis

**HISTORY / EXAM HIGHLIGHTS**
- Mechanism of injury - longitudinal or rotational; direct blows unlikely to cause fractures
- Remember normal milestones!
- Examine other areas first
- Listen for cry increase as palpate
- Watch shoulders for elevation
- Do and record NVM status!

**X-RAY SUPPORT**
- Lateral view - key with buckles, and to see displacement
- Obtain specific views, not entire extremity; best detail seen at beam’s center
- Comparisons may be helpful, elbows, growth plates
- Consider bone scans for occult fx
- Describe displacement with distal compared to proximal part
QUESTION NUMBER 1: Which fx in not a “typical” peds fx but one usually seen in adults?

- A. Buckle fracture of the wrist
- B. Avulsion fracture of iliac spine
- C. Bend fracture of the radius
- D. Comminuted fracture of radius
- E. Greenstick fracture of clavicle

QUESTION NUMBER 2: All of these are true about buckle fractures except:

- A. They occur when longitudinal forces are applied to the bone
- B. They are most common in the diaphysis of the bone
- C. They are stable fractures
- D. Often best seen on lateral view
- E. They can be diagnosed when a sudden sharp angle change is seen

PEDS FRACTURE- BUCKLE

- Occur in porous metaphysis when forces compress along the longitudinal plane
- Lack of swelling or ecchymosis
- Cortex buckling or acute sharp angulation of cortex; normally long bone ends flare out smoothly!
- Stable fx; splint for pain relief; arrange convenient follow up
**BOW FRACTURE**
- Also known as plastic deformation
- Usually in ulna / fibula; radius also
- Elastic deformation with stress; if forces subside, no true fracture
- No hemorrhage, limited swelling
- Comparison views may be necessary to confirm the diagnosis

**GREENSTICK / COMPLETE**
- Angulation past bending limits yields greenstick; fx on tension side as compression side bends
- Completion or reduction of fracture may be necessary
- Rarely see comminution in complete fractures in children
- Beware unexplained diaphyseal spiral fractures-humerus! - NAT!!

**Rx for BOW / GREENSTICK**
- May require great force to align
- Completion of fx / correction of angulation depends on:
  - degree of angulation
  - distance from growth plate
  - age of the child
QUESTION NUMBER 3: What is the most common type growth plate injury?

- A. Salter-Harris Type I
- B. Salter-Harris Type II
- C. Salter-Harris Type III
- D. Salter-Harris Type IV
- E. Salter-Harris Type V

GROWTH PLATE FXS

- Consider with any joint pain or swelling; all types can be displaced or not!
- Type I - involves physis-widening
- Type II - most common, (85-90%) into the metaphysis, see a chip
- Type III - into epiphysis
- Type IV - thru metaphysis/epiphysis
- Type V - crush plate - in theory only!

QUESTION NUMBER 4: A two yr. old girl was grabbed by her older sib, is crying, not using left arm. No swelling. What to do next?

- A. Order x-ray of entire arm
- B. Order x-ray of elbow
- C. Fully supinate and flex the arm
- D. Fully supinate and extend arm
- E. Consult an orthopedist
NURSEMAID’S ELBOW

- Common between 4 mos-7 yrs; peak at 15-30 months
- Girls and left arms more common
- Annular ligament torn / dislocated
- Variety of histories; pulling theme
- No swell or ecchymosis, kids hold wrist; cry elevates with supination

NURSEMAID’S ELBOW

- No x-rays needed if H & P right
- Warn parent about audible click
- Use shaking hand technique-give slight traction on the arm then fully supinate and flex the forearm
- Keep opposite thumb on radial head to push radial head and feel the snap or click

NURSEMAID’S ELBOW

- Alternately, you can fully pronate the arm; thumb up to thumb down!
- Demonstrate return to function; use parachute reflex or similar move; be patient if you are sure!
- Discuss how to avoid it in the future; hold forearm when walking
SPLINTING / Rx

HI GHLIGT

- Splint joint above and below fx; AP splints / posterior molds OK
- Beware of compartment syndromes with supracondylar or tibial fxs; consider admit
- Avoid crutch use under age 9-10
- Pain increase after cast is ominous

QUESTION NUMBER 5:
Which of these fractures is suspicious of child abuse?

- A: Spiral diaphyseal humerus fracture of a 10 month old male
- B: Corner chip fracture of the distal femur in a 14 month old
- C: A posterior rib fracture in a 11 month old who fell inside the crib
- D: None of the above
- E: All (A, B and C)

CHILD ABUSE (NAT)
FRACTURES

- Unexplained spiral diaphyseal
- Bucket handle-corner fractures
- Posterior rib fxs-not from CPR
- Skull fractures-usually linear
- Consider skeletal survey < 5 yrs.
SUMMARY OF “MISSES”

- Buckle fx: beware of any sudden sharp cortex angulation; always check the lateral view!
- Growth plate: beware of pain and local swelling there; look for metaphyseal chips
- Avulsion: Often seen just one view
- Spiral: Recognize nutrient artery and always consider child abuse

TWO FINAL RULES!

- When pain and swelling present at joint or metaphysis, consider it a fracture and splint the area!
- Always keep child abuse in mind with unexplained fractures or fractures in kids < 3-4 years old

ANSWERS TO QUESTIONS

1- “D” Comminuted fx rarely occur in children due to periosteum
2- “B” Buckles occur in metaphysis
3- “B” Salter Type II-85-90%
4- “C” Supinate then flex; alternate is to fully pronate
5- “E” All three are very suspicious.