

Presented by:
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---Start of Pediatric and Adolescent Upper Extremity Fractures---

0:00 Introduction

0:37 Participation: Numbers in Organized Sports

- Overall: (Hogan KA, "Overuse Injuries in Pediatric and Adolescent Athletes," Orthop Clin North Am, 2003 Jul;34(3):405-15.)

- 30 million adolescents & preadolescents

Little League 2007: (www.littleleague.org)

- 2,227,505 baseball participants

- 366,780 softball participants

- 2,640,285 total Little League participants

USA Baseball: (www.mlb.com/usa_baseball)

- 9 million participants aged 9 to 17

1:53 Introduction

- Children participating in sports each year:

30 million

- 3.5 million children < age 12 treated for sports injuries

- 50% of injuries are overuse

Epidemic injury patterns in youth sports – elbow injuries in pitchers

2:18 Injury Risks

- 11,840 athletes, 5-17 years old

- 4,379,000 injuries annually

- 1,363,000 serious

(missed school, surgery)

Sport injuries:

36% of all injuries for this age group

- Survey included playground equipment and skateboards

2:56 Survey 7-13 Years Old Children

- Two playing seasons

- Community organized

- Injury rates per 1000 athlete-exposures:

Soccer 2.1

Baseball 1.7

Football 1.5

Softball 1.0

3:31 Unique Properties of Growing Skeleton

- Periosteum thicker

- Cartilage thicker, more vascular

4:16 Fracture Healing

- Three stages

4:39 Remodeling

- Amount of growth
- Patient age
- Bone / physis involved
- Location in bone – ie: proximity to physis
- Deformity in plane of motion

5:38 Both Bone Forearm Fractures

- Limits of acceptable reduction?
- Functional complaints rare

6:45 Displaced fractures

- Splint them as they lie
- Can apply axial traction as assistant applies splint

7:08 Stress Fractures in Adolescent Competitive Athletes with Open Physis

- Stress Fractures, 21 Athletes
- 7 cases not satisfactory outcome
- 4 tibial diaphysis
- 6 athletes burst of speed
- Early and thorough investigation
- Diagnosis Made
- Routine x-rays + MRI scan
- 1 Surgery Olecranon

8:00 Imaging Studies

- Radiographs

Plain

Stress Views

- MRI Scan
- CT Scan with 3-D reconstruction
- Bone Scan

8:39 Unique Aspects

- Growth Plate
- First line of failures due to stress or falls
- Abnormal growth
- Rotational adaptation
- Physis / Epiphysis / Apophysis
- Articular cartilage
- Development
- Softness

9:37 Appearance and Closure of Secondary Ossification Centers – UPPER

EXTREMITY

10:46 Contributions of individual growth regions to overall limb length.

11:44 Which is Safer?
Organized Sports or Free Play?

11:59 "Adults are obsolete children."

12:07 I Am Invincible!

---End of Pediatric and Adolescent Upper Extremity Fractures---

---Start of Youth Sports Elbow Injuries---

0:00 Introduction

0:38 Elbow Injuries

- Supracondylar
- Lateral condyle
- Transphyseal
- Elbow dislocation
- Medial epicondyle
- Radial neck
- Olecranon

1:10 Supracondylar Fractures
Classification Gartland

1:35 Supracondylar Fractures
Treatment
Types II and III

- Closed Reduction and Pinning
- Cast / Pins 3 weeks

1:51 Displaced supracondylar humerus fracture
Refer to appropriate center for emergency management . . .

2:10 Supracondylar Fractures
Catastrophic Results
Neurovascular injury

- Compartment syndrome

2:41 What you never want to see, but if you see it you'll never forget it:
Volkmann's Ischemic Contracture

3:03 Supracondylar Fractures
Complications

Cubitus Varus

- Malunion
- Cosmetic not functional
- Corrective osteotomies = loss of fixation

3:35 Supracondylar Fractures (cont)

- Missed injury
- Cubitus varus

3:57 Elbow Dislocation

- Older Child and adolescent
- Think transphyseal, if young
- Medial epicondyle fracture?

4:25 14 YO Football Athlete

- Back of arm hit during practice
- Elbow posterior dislocation

6:07 17 YO Female

- RHD Catcher
- Junior high school
- Dived back into base sustaining elbow valgus loading force to outstretched hand
- Immediate swelling/pain, medial elbow

6:54 Xrays: Right elbow

Left elbow

7:33 MRI scan

7:58 Medial Approach

9:04 ELBOW Differential Diagnosis

MEDIAL Skeletally Immature

10:11 ELBOW Differential Diagnosis

LATERAL Skeletally Immature

11:11 ELBOW Differential Diagnosis

POSTERIOR Skeletally Immature

11:51 ELBOW Differential Diagnosis

ANTERIOR Skeletally Immature

13:47 Medial Humeral Epicondyle

- Origin of flexor pronator group (FCR, FCU, FDS, PL, PT Part)
- UCL attaches
- Anterior oblique band
- Medial epicondyle/coronoid ant inf

14:13 Medial Humeral Epicondyle

- Truly an apophysis
- Ossification center
- Appears 5 years
- Unites 15–16 years

14:25 Medial elbow pain diagnoses in throwers

- Medial epicondyle stress fracture
- UCL tear
- Ulnar neuritis/hypermobility
- Flexor-pronator strain much less common
- Subluxating medial triceps
- Valgus extension overload
- (elbow impingement)
- Sublime tubercle fracture proximal ulna

16:13 Lateral Forces = Compression

Medial Forces = Tension

16:48 Medial epicondyle fracture

- Controversial
- Displaced extra-articular fractures

17:36 12 year old medial elbow pain for 4 months
Pitcher and Quarterback

18:27 12 year, 11-mo. Old RHD Pitcher

- 3 week history, medial elbow pain
- Kept throwing
- Little League, now in All-Stars
- PE:
- Height 6'2", Weight 190 lbs.
- Medial elbow pain
- No instability

18:47 Elbow initial xrays

19:22 Follow up: 2,4,6 week, and 4 month

20:04 BB Bullet Appearance to
medial epicondyle fracture

- May heal if you don't allow pitching too early
- May take long time to heal, but UCL is intact

20:22 BB Gun

- Don't allow to fire too soon

20:29 14 YO Pitcher, medial elbow pain for a year, open medial humeral
epiphysis torn UCL

20:57 Risk Factors

- Overuse
- Fatigue
- High Pitch Velocity
- Showcase Participation
- Age Groups – Age Matched Case Control Study
- 95 pitchers surgery / 45 adolescent no surgery
- Multivariate Analysis, Injury Risk Pitching:
 - 8 months/year 5-fold
 - 80 pitches/game 4-fold
 - 85 mph 2.6X
 - Arm fatigue 36X

21:59 UCL Reconstruction

12:58 14 YO LHD Pitcher

24:10 Loose Bodies

24:49 Olecranon stress fracture

- 5 baseball players
- Persistent olecranon physis
- Underwent ORIF bone graft
- Mechanism
 - Extension forces – triceps
 - Gymnasts, divers
 - Combined – valgus extension overload
 - Overhead throwing athletes

25:28 14 YO WM

- RHD baseball player, wrestler, and football player
- Right elbow hyperextension sprain with impingement of the lateral synovial band

25:40 Initial presentation

26:05 Post op: 2, 4, weeks and 3 months

26:29 Prevention is Key

- Pitchers are at high risk
- No speed guns
- Less showcases
- Do training other than baseball
- Little League pitchers do not become big league pitchers

26:56 Conclusion:

13 YO “Big Pitcher” Syndrome

- Skeletally and mentally immature
- Fast growth phase

- Poor pitching mechanics
- Hip weakness
- = UE overuse injury

27:25 Little League pitchers do NOT become Big League pitchers

27:53 STOP Elbow Injuries in Youth Baseball:
Youth Sports Injury Prevention
Sports
Trauma and
Overuse
Prevention

28:30 CONCLUSION

- Protect our young athletes from harm
- UCL tears in young baseball pitchers occur too often
- Educate athletes, parents, and coaches in injury patterns and prevention

28:48 Which is Safer?
Organized Sports or Free Play?

29:03 "Adults are obsolete children."

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---End of Youth Sports Elbow Injuries---

---Start of Youth Sports Shoulder Injuries pt2---

0:00 Introduction

0:38 Shoulder Injuries
Adolescent (less than Age 16)

- No epidemiological Studies

Trends:

- Acute
- Football Defensive
- Extreme Sports
- Skateboarding
- Diving - Sky

0:56 Shoulder Injury Sports Epidemiology
1978 Older study

1:24 Males vs Females Sports Injury

1:51 16 YO WM
Epiphyseal displaced fracture of the medial clavicle at the level of

the sternoclavicular joint

2:27 1 year post injury

2:43 Must Rule Out Fractures

3:04 Nolan Ryan didn't start pitching until he was in high school

3:32 BioMechanics:
The Magazine of Body Movement and Medicine

3:44 Shoulder

- Little Leaguer's Shoulder
- Definition: proximal humerus stress fracture
- Symptoms: Diffuse shoulder pain, reproducible while throwing
- Signs: pain proximal humerus, posterolateral and with ER
- Radiographs: 4 views
- Comparison Stryker views

4:12 Distal radial growth arrest
Little Leaguer's Shoulder

5:08 Little Leaguer's Shoulder

- 23 patients
- Age: average 14 years
- 19 of 23 were pitchers
- Pain while throwing
- Symptoms: average duration 7.7 months
- Treatment: rest for average 3 months
- Follow up: average 9.6 months
- 21/23 (91%) returned to baseball

6:00 Physeal and ROM Changes

- 79 youth baseball players
- Age 8 – 15 years
- Increased physeal width on dominant side
- Increased ER dominant side

6:29 Diaphyseal Humerus Fracture in a Thrower
Think pathologic fracture – simple bone cyst

7:23 12 Y, 6 mo. old, broke left wrist. One week later, fell onto R upper extremity

7:53 ~ 3 years after fracture Complete filling in of cyst

8:02 Prevention is Key

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Sports

Trauma and

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-End-