0:00 Introduction

0:37 Participation: Numbers in Organized Sports
  - 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.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
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
• Malunuiion
• 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 x-rays

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.”

29:11 I Am Invincible!

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

8:29 Conclusion:
13 YO “Big Pitcher” Syndrome
•Skeletally and mentally immature
•Fast growth phase
•Poor pitching mechanics
•Hip weakness
  = UE overuse injury

8:59 Little League pitchers do NOT become Big League pitchers

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10:04 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

10:22 Which is Safer?
Organized Sports or Free Play?

10:37 “Adults are obsolete children.”

10:45 I Am Invincible!

-End-