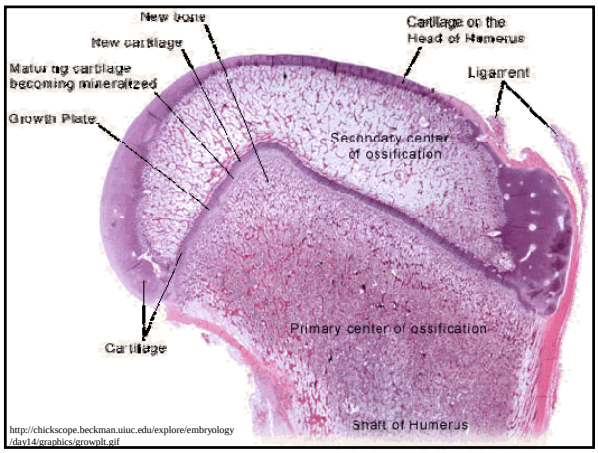
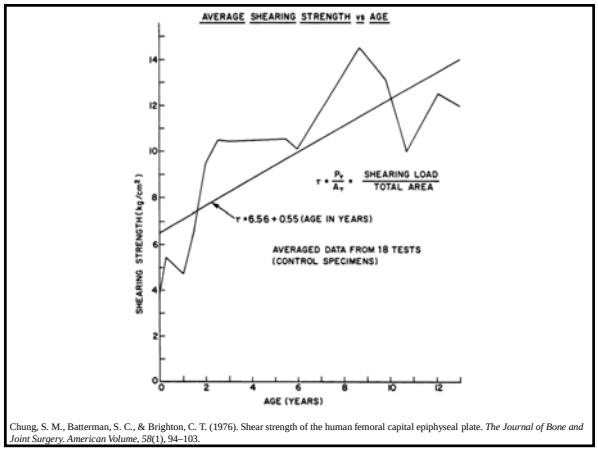
Little Leaguer's Shoulder

Peter N. Chalmers, MD
Division of Shoulder and Elbow Surgery
Department of Orthopaedic Surgery
University of Utah

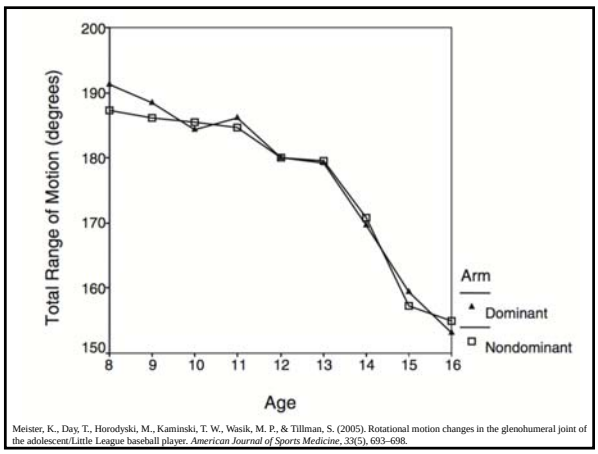
Kanematsu, Y., Matsuura, T., Kashiwaguchi, S., Iwase, T., Suzue, N., Iwame, T., & Sairyo, K. (2015). Radiographic follow-up study of Little Leaguer's shoulder. *Skeletal Radiology*, *44*(1), 73–76. http://doi.org/10.1007/s00256-014-2007-2



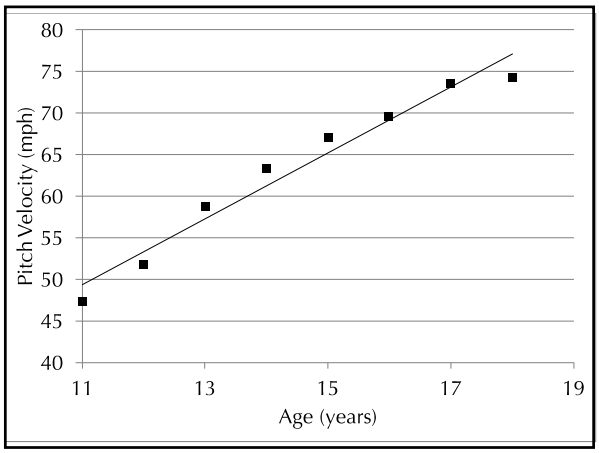
http://chickscope.beckman.uiuc.edu/explore/embryology/day14/graphics/growplt.gif

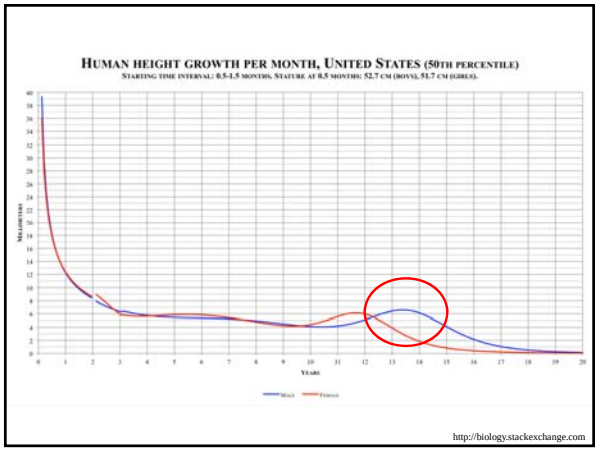


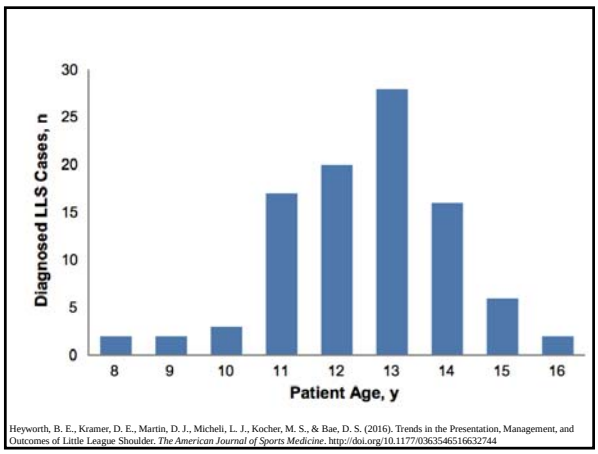
Chung, S. M., Batterman, S. C., & Brighton, C. T. (1976). Shear strength of the human femoral capital epiphyseal plate. *The Journal of Bone and Joint Surgery. American Volume*, *58*(1), 94–103.

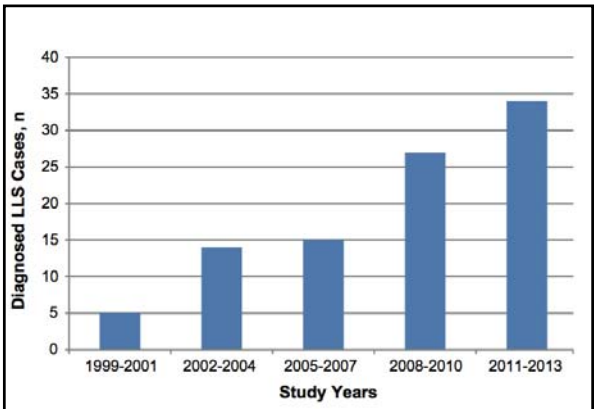


Meister, K., Day, T., Horodyski, M., Kaminski, T. W., Wasik, M. P., & Tillman, S. (2005). Rotational motion changes in the glenohumeral joint of the adolescent/Little League baseball player. *American Journal of Sports Medicine*, *33*(5), 693–698.


80
75
70
65
60
55
50
45
40
Pitch Velocity (mph)
11
13
15
17
19
Age (years)

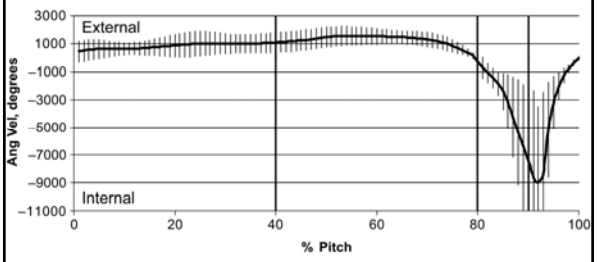

HUMAN HEIGHT GROWTH PER MONTH, UNITED STATES (50TH PERCENTILE)
Years
http://biology.stackexchange.com


30
25
20
15
10
5
0
Diagnosed LLS Cases, n
8
9
10
11
12
13
14
15
16
Patient Age, y
Heyworth, B. E., Kramer, D. E., Martin, D. J., Micheli, L. J., Kocher, M. S., & Bae, D. S. (2016). Trends in the Presentation, Management, and Outcomes of Little League Shoulder. The American Journal of Sports Medicine. http://doi.org/10.1177/0363546516632744

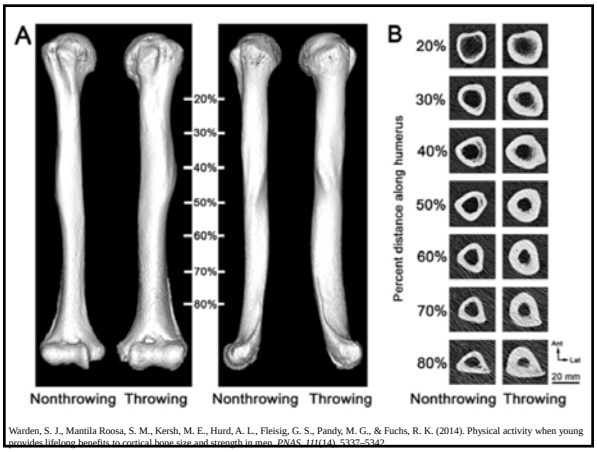


Heyworth, B. E., Kramer, D. E., Martin, D. J., Micheli, L. J., Kocher, M. S., & Bae, D. S. (2016). Trends in the Presentation, Management, and Outcomes of Little League Shoulder. *The American Journal of Sports Medicine*. http://doi.org/10.1177/0363546516632744

Angular Velocity as Cause?

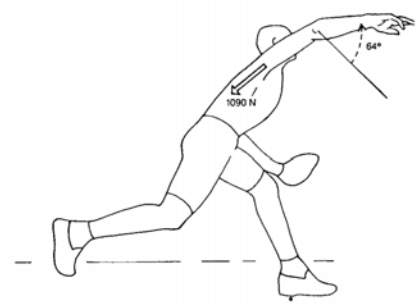


Keeley, D. W., Hackett, T., Keirns, M., Sabick, M. B., & Torry, M. R. (2008). A biomechanical analysis of youth pitching mechanics. *Journal of Pediatric Orthopedics*, *28*(4), 452–459. http://doi.org/10.1097/BPO.0b013e31816d7258

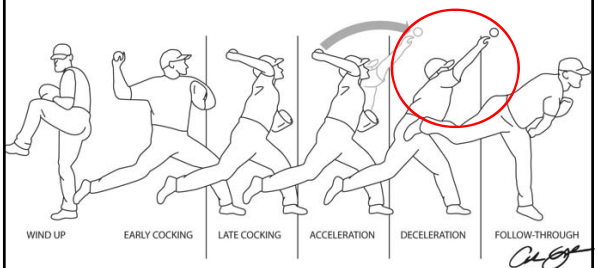


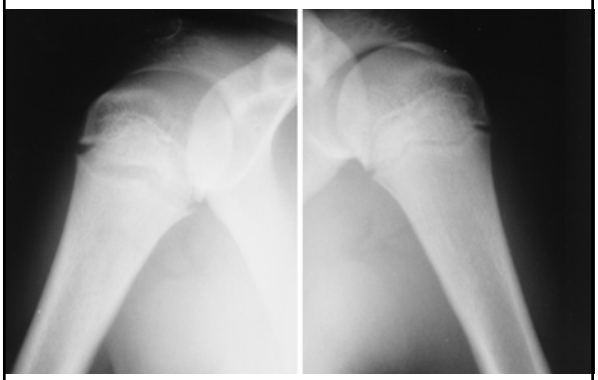
Warden, S. J., Mantila Roosa, S. M., Kersh, M. E., Hurd, A. L., Fleisig, G. S., Pandy, M. G., & Fuchs, R. K. (2014). Physical activity when young provides lifelong benefits to cortical bone size and strength in men. *PNAS*, *111*(14), 5337–5342.

Is this a torsional injury or a distraction injury?



Fleisig, G. S., Andrews, J. R., Dillman, C. J., & Escamilla, R. F. (1995). Kinetics of Baseball Pitching with Implications About Injury Mechanisms. *The American Journal of Sports Medicine*, *23*(2), 233–239. http://doi.org/10.1177/036354659502300218





Carson, W. G., & Gasser, S. I. (1998). Little Leaguer's shoulder. A report of 23 cases. *American Journal of Sports Medicine*, *26*(4), 575–580.

Barnett, L. S. (1985). Little League shoulder syndrome: proximal humeral epiphyseolysis in adolescent baseball pitchers. A case report. *The Journal of Bone and Joint Surgery*, *67*(3), 495–496.

Carson, W. G., & Gasser, S. I. (1998). Little Leaguer's shoulder. A report of 23 cases. *American Journal of Sports Medicine*, *26*(4), 575–580.

Carson, W. G., & Gasser, S. I. (1998). Little Leaguer's shoulder. A report of 23 cases. *American Journal of Sports Medicine*, *26*(4), 575–580.

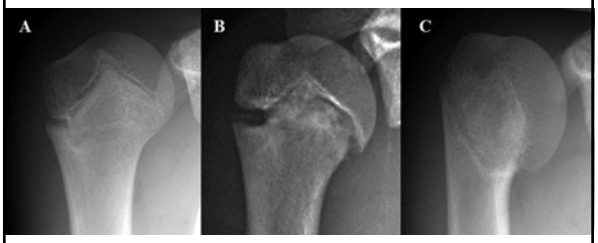
Torg, J. S., Pollack, H., & Sweterlitsch, P. (1972). The effect of competitive pitching on the shoulders and elbows of preadolescent baseball players. *Pediatrics*, *49*(2), 267–272.

Radiographic classification:

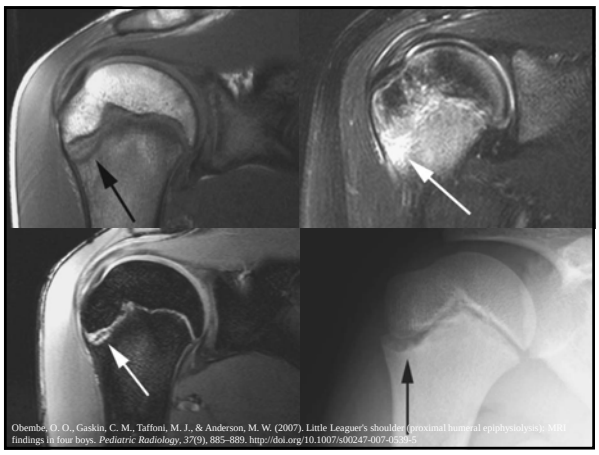
(A) Grade I : lateral widening of the epiphyseal plate

(B) Grade II, widening in all the areas of the epiphyseal plate and demineralization of the metaphysis.

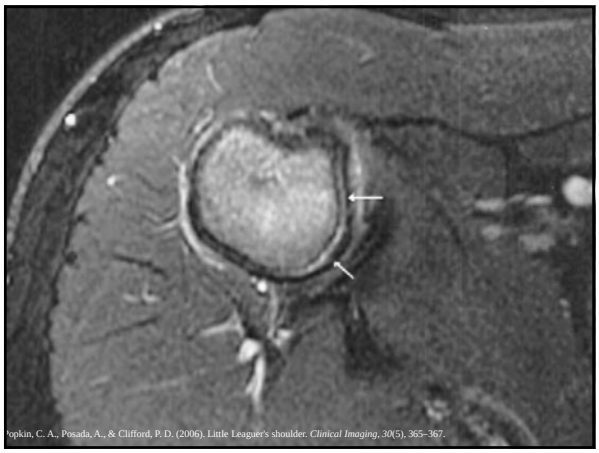
(C) Grade III, a slipped epiphysis.



Kanematsu, Y., Matsuura, T., Kashiwaguchi, S., Iwase, T., Suzue, N., Iwame, T., et al. (2015). Epidemiology of shoulder injuries in young baseball players and grading of radiologic findings of Little Leaguer's shoulder. *The Journal of Medical Investigation : JMI*, *62*(3-4), 123–125.



Obembe, O. O., Gaskin, C. M., Taffoni, M. J., & Anderson, M. W. (2007). Little Leaguer's shoulder (proximal humeral epiphysiolysis): MRI findings in four boys. *Pediatric Radiology*, *37*(9), 885–889. http://doi.org/10.1007/s00247-007-0539-5



Popkin, C. A., Posada, A., & Clifford, P. D. (2006). Little Leaguer's shoulder. *Clinical Imaging*, *30*(5), 365–367.

Popkin, C. A., Posada, A., & Clifford, P. D. (2006). Little Leaguer's shoulder. *Clinical Imaging*, *30*(5), 365–367.

Is physeal widening a normal adaptive response?

- 79 8-15 yo pitchers
- Physeal widening present in 62% of symptomatic and 55% of asymptomatic

Table III Descriptive statistics for physeal width

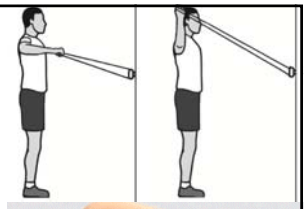
	Mean	SD	n	*t* Value	Significance (2-tailed)
Dominant IR physis width	3.13	0.67	79		
Nondominant IR physis width	2.91	0.63	79	3.57	*P* = .001
Dominant ER physis width	2.89	0.74	79		
Nondominant ER physis width	2.72	0.61	79	2.90	*P* = .005
Dominant physis mean width	3.01	0.64	79		
Nondominant physis mean width	2.81	0.56	79	3.81	*P* = .003

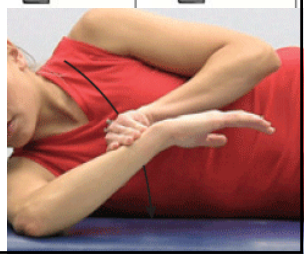
IR, Internal rotation, *ER*, external rotation.

Mair, S. D., Uhl, T. L., Robbe, R. G., & Brindle, K. A. (2004). Physeal changes and range-of-motion differences in the dominant shoulders of skeletally immature baseball players. *Journal of Shoulder and Elbow Surgery*, *13*(5), 487–491. http://doi.org/10.1016/S1058274604000849

Treatment

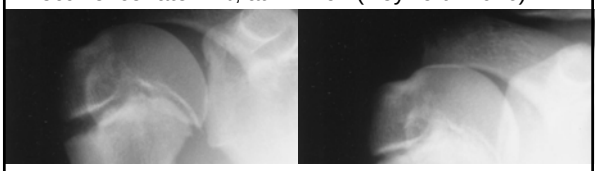
- Stop throwing
- Stretching
  - Increase rotational motion
  - Increase GERE
  - Reduce GIRD
- Strengthening
  - Scapular stabilizers
  - Rotator cuff
- Focus on mechanics
- Consider position change





Prognosis

- Return to play: 93-100% (Carson 1998, Heyworth 2016)
- Time to
  - Symptom resolution: 2.6 months (Heyworth 2016)
  - Return to play: 4.2 months (Heyworth 2016)
  - Radiographic resolution: 4.7 months (Yanematsu 2015)
- Recurrence rate: 7%, at ~7 mon (Heyworth 2016)



Carson, W. G., & Gasser, S. I. (1998). Little Leaguer's shoulder. A report of 23 cases. *American Journal of Sports Medicine*, 26(4), 575–580.