

Responding to Acute Traumatic and Musculoskeletal Conditions: Immediate Action and Follow-Up Care

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Disclosure

I have no financial interests or relationships to disclose.

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Learning Objectives

Upon completion, the participant will be able to:

1. Be prepared to manage common emergent traumatic injuries
2. Recognize which injuries can be managed immediately onsite vs. those that require additional care
3. Manage common emergency procedures such as dental reimplantation, I&D of auricular hematoma and orthopedic reductions.



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Imagine: It's a Beautiful Day at the Local Ball Field When....



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Case #1

A 12 y/o was rounding first base, stopped to return and then fell to the ground with knee pain.

You are called on to the field.....

The knee had this appearance:



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Case #1:

In This Case, You Would:

- A. Attempt immediate reduction by hyperextending the knee and applying thumbs on lateral side of patella and applying medial-ward pressure.
- B. Attempt immediate reduction by flexing the knee applying thumbs on lateral side of patella and applying medial-ward pressure.
- C. Do not attempt immediate reduction and call EMS for transport to the ED.



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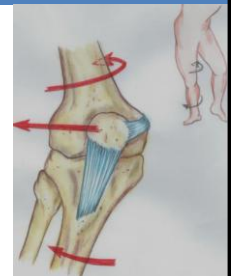
Reducing Patellar Dislocation



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Patellar Dislocation: What Happened?

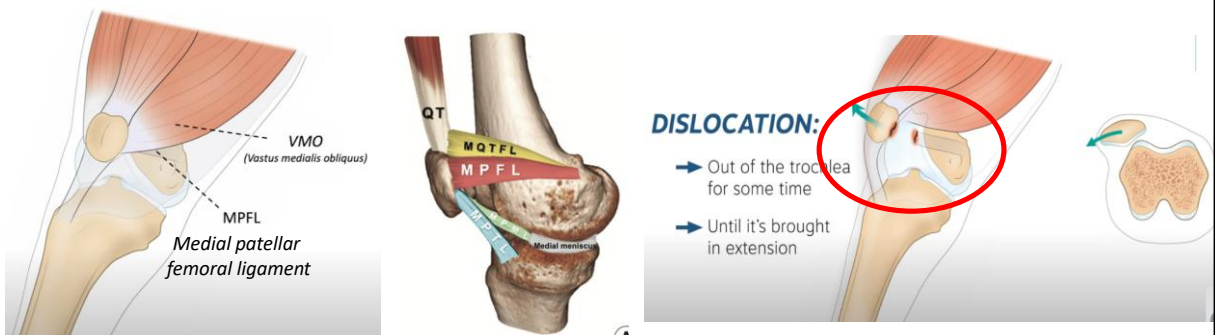
- Ext. tibial rotation with the foot fixed on the ground →



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Patellar Dislocation: What Happened?

- Ext. tibial rotation with the foot fixed on the ground
- 95% have tear of MPFL¹

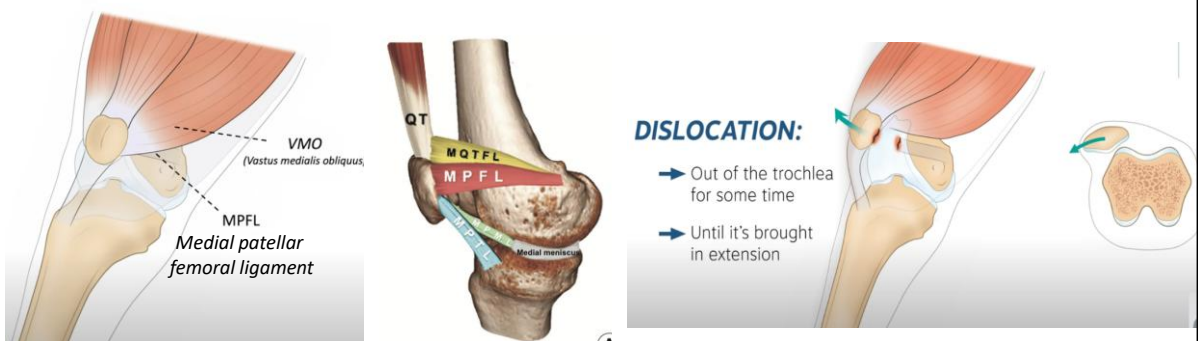


¹Kluczynski MA, et al. Orthop J Sports Med. 2020;8(12): 2325967120967338.

9

Patellar Dislocation: What Happened?

- Ext. tibial rotation with the foot fixed on the ground
- 95% have tear of MPFL¹
- Who: young, active adolescents, athletes at a higher risk.



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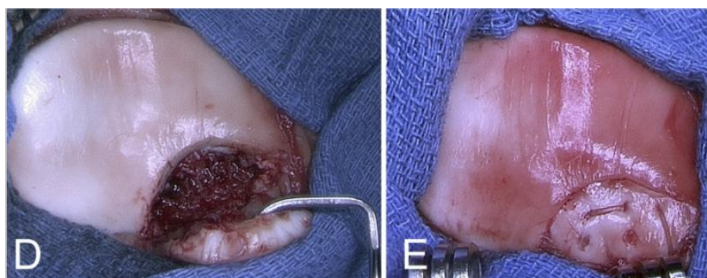
Are Post-reduction X-rays Warranted?

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Are Post-reduction X-rays Warranted?

Answer: **YES**

- Osteochondral fractures are common; 5-54%^{1,2}



¹ Nietosvaara, et al. J Pediatr Orthop 1994;14:513-5.]

² Nomura E, et al. Arthroscopy 2003;19:717-21.

³ Stanitski CL, et al. Am J Sports Med 1998;26:52-55.

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Are Post-reduction X-rays Warranted?

Answer: **YES**

- Osteochondral fractures are common; 5-54%^{1,2}
- However.. X-rays will miss 2/3 of osteochondral injuries³
- MRI has 86% sensitivity, 97% specificity identifying cartilage lesions

“MRI is recommended to establish the size, location, and quality of the lesion and assessing.... when planning surgical procedures.”⁴

¹ Nietosvaara, et al. J Pediatr Orthop 1994;14:513-5.]

² Nomura E, et al. Arthroscopy 2003;19:717-21.

³ Stanitski CL, et al. Am J Sports Med 1998;26:52-55.

⁴ Khan SA, et al. JAAOS Glob Res Rev 2021;5: e21.00155

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Patellar dislocation: Classic Management

Ice, Rest, Brace...

No fx or osteochondral fx < 15mm
AND non-weight bearing

Physical therapy

**If VMO is not strengthen,
Recurrent dislocation (20-40%)**

Osteochondral fx > 15mm

Surgery



VMO strengthening

⁴ Khan SA, et al. JAAOS Glob Res Rev 2021;5: e21.00155

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Case #2

A 10y/o right-handed player had a thrown ball strike the end of the finger.

The parents ask you to look at the finger.....



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Case #2:

In This Case, You Would:

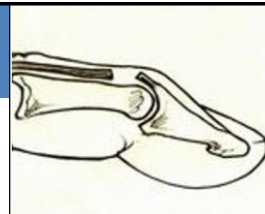


- A. Splint with an ice cream stick, send immediately to the ED.
- B. Splint and instruct to follow up in (circa 24 hours) for x-rays and definitive splinting.
- C. Splint and instruct for follow up in (circa 24 hours) for splinting but advised against x-rays.
- D. Refer immediately to a hand surgeon explaining to the parents that surgery is the only treatment.

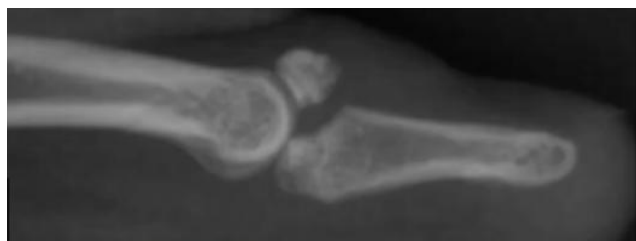
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Mallet Finger: Need to Know



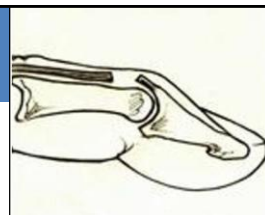
- Forced flexion of the extended fingertip
- Associated avulsion fractures reported: 23¹-33²%



¹Krastman P, et al. BJGP Open 2024; 8 (1): BJGPO.2023.0040. DOI: <https://doi.org/10.3399/BJGPO.2023.0040>

²LEGGIT JC, et al. , Am Fam Physician. 2006;73(5):810-816

Mallet Finger: Need to Know

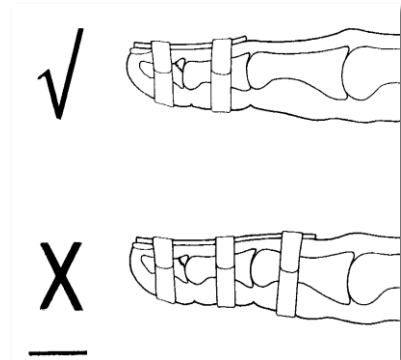
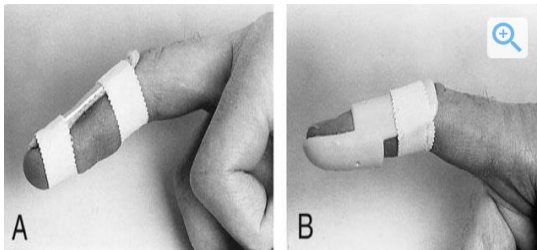


- Forced flexion of the extended fingertip
- Associated avulsion fractures reported: 23¹-33²%
- **Treatment remains controversial:** Generally...
 - **Splint:** full extension (0 - 10° extension) at the DIP
 - * **for 6 to 8 weeks.**
 - * followed by part-time splinting for 4 to 6 weeks
 - **Surgery:** for > 1/3 articular surface fx

¹Krastman P, et al. BJGP Open 2024; 8 (1): BJGPO.2023.0040. DOI: <https://doi.org/10.3399/BJGPO.2023.0040>

²LEGGIT JC, et al. , Am Fam Physician. 2006;73(5):810-816

Splinting: Mallet Finger



- Treatment is a “Stack” finger splint or dorsal splint of DIP ONLY in EXTENSION which is worn CONTINUOUSLY for 6 weeks

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Case #3

Two players collide in the outfield.

You are called to field to assess....

The first player has oral trauma – tooth #9 is laying in the grass



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Case #3:

In This Case, You Would:



- A. Vigorously clean the tooth with water, scrubbing the tooth until it is shiny and then reimplant it.
- B. Gently clean the tooth, only removing extra debris and then attempt reimplantation.
- C. Place the tooth in water or milk and send the patient to the ED.
- D. Place the tooth in water or milk and have the patient see a dentist or oral surgeon the next day.

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Dental Reimplantation: Sooner the Better!

- **Replant within 15–30 minutes for the highest chance of periodontal ligament (PDL) cell survival**
 - Gently wash in cold running water to remove loose debris and reimplant!
 - **Do Not Scrub clean!**
- If not... place tooth in (decreasing preference)
 - Milk → Balanced Salt Solution → saliva → saline
 - **Water is not recommended but is better than leaving the tooth to air dry.*
- **Dry time** should be less than 60 minutes to prevent loss of viability of periodontal ligament cells.

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Dental Reimplantation: Sooner the Better!

- **Do Not** reimplant milk teeth
- **Secure to adjacent tooth**
 - Dermabond to pliable metal from non-rebreather mask
 - 2 2-0 silk sutures
- **Prescribe oral antibiotics** and chlorhexidine (0.1%) mouth rinse BID x 7 days.



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Dental Reimplantation: Sooner the Better!

- Gently wash in cold running water to remove loose debris and reimplant!
- If not... place tooth in (decreasing preference)
 - Milk → Balanced Salt Solution → saliva → saline
 - *Water is not recommended but is better than leaving the tooth to air dry.*
- **Dry time** should be less than 60 minutes to prevent loss of viability of periodontal ligament cells.
- **Do Not** reimplant milk teeth
- **Secure to adjacent tooth**
 - Dermabond to pliable metal from non-rebreather mask
 - 2 2-0 silk sutures
- **Prescribe oral antibiotics** and use a chlorhexidine (0.1%) mouth rinse BID x 7 days.



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Case #4:

The second player's right ear at the end of the game was swollen.

In This Case You Would:

- A. Apply ice and follow up in the AM
- B. Apply ice and order antibiotics
- C. Apply ice and send to the ED/ENT for I&D

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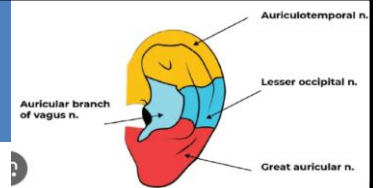
Auricular Hematoma: Need to Know

- Blood collection separates the perichondrial and cartilage
- If hematoma treatment is delayed or inadequate, **cauliflower ear** deformity may arise
- Needle aspiration if: < 6 hours **AND** < less 2 cm.
- Otherwise I&D
- Post-procedure: maintain pressure for 5-10 days.
- F/U with ENT in couple of days

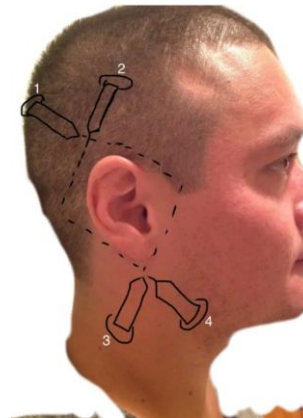


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Auricular Hematoma: Step 1 Anesthesia: Field Block



Field block



Lacerationrepair.com

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Auricular Hematoma



(1) Incise



(2) Express Hematoma



(3) Irrigate



(4) Reapproximate



(5) Protect inner ear

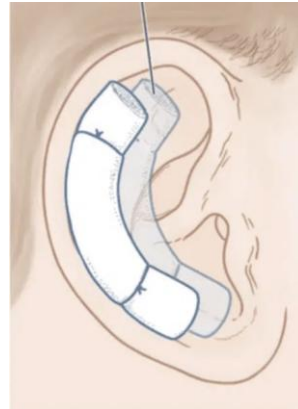


(6) Bolster & Compress

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Auricular Hematoma

Sewn-in bolster dressing



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Case #5:

The coach was not looking when a batted ball struck his nose.
You were called on-the-field to evaluate
In This Case, You Should:

- A. Send to the ED/UC for epistaxis control
- B. Send to the ED/UC for epistaxis control and evaluation for septal hematoma
- C. Send to the ED/UC for epistaxis control, and evaluation for septal hematoma and x-rays of the nose
- D. Send to the ED/UC for epistaxis control and evaluation for septal hematoma and obtain CT of facial bones



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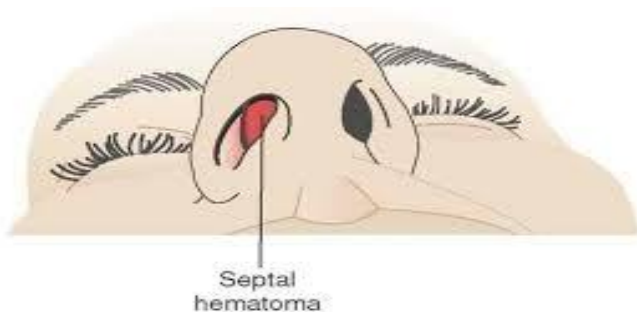
Nasal Fracture: The Basics

- X-rays : not necessary in cases of an obvious nasal fx
- Plain X-rays have poor sensitivity and specificity, missing approximately 50% of fractures, and → no useful diagnostic information
- No evidence for early fracture reduction¹
 - management can be safely scheduled after the swelling resolves, usually within three to five days
- **ASSESS FOR SEPTAL HEMATOMA!**

¹Gilpin T, et al. *J Accid Emerg Med.* 2000;17:286

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Septal Hematoma



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Septal Hematoma: More Examples



Medtube.net



PEMCincinnati.com



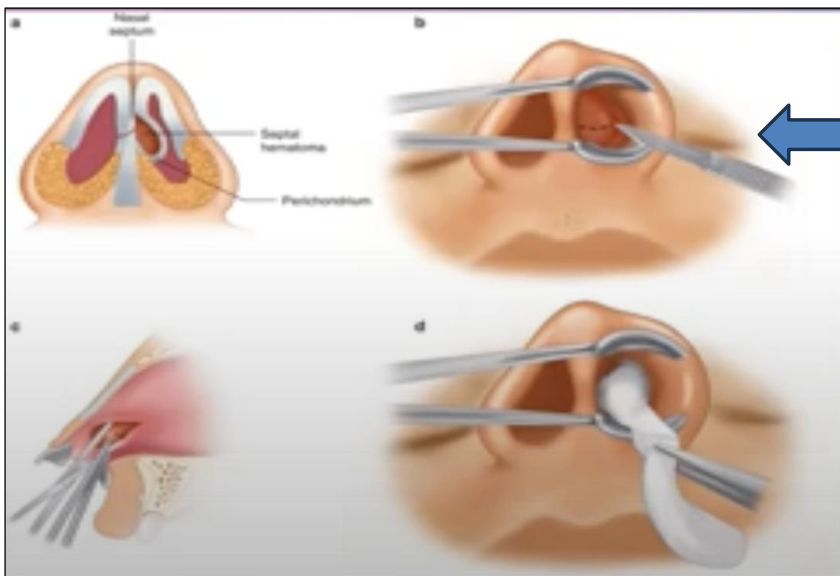
Entsho.com



BMJ Case Reports

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Septal Hematoma



**Anesthesia,
PLEASE!**

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Saddle Nose Deformity



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Case #6

A 12 y/o sliding into second base “jammed” his thumb into the ground.

After the game... the parents bring him to you....

No deformity, (+) tenderness ulnar side of the MCP joint.

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Case #6:

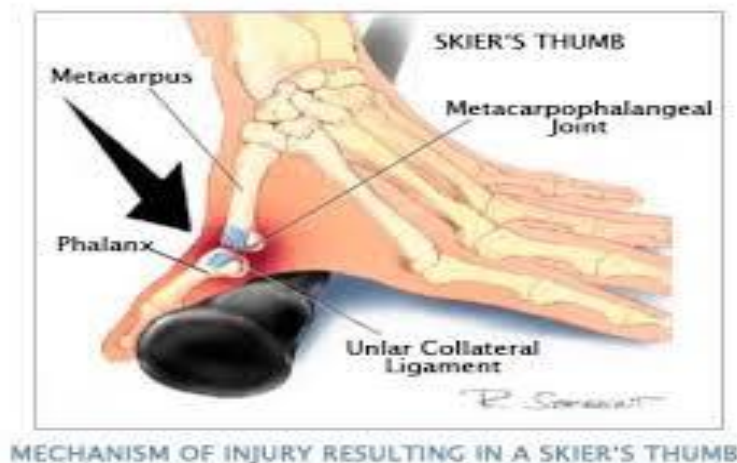
What Should You Recommend at This Time?

- A. You should/can test for ulnar laxity and get a follow up x-ray
- B. You should not test for ulnar laxity before x-rays
- C. You should recommend that an MRI be obtained, because x-rays will not identify ligament injury
- D. If the player can extend the thumb (hitch hike), the ulnar collateral ligament has been spared from injury

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“Gamekeeper’s thumb”



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Gamekeeper's (Skier's) thumb

- Tear of ulnar collateral ligament of thumb
- Common skiing and MVA injury
- Difficulty grasping objects
- Check for laxity: > 20% is abnormal
- X-ray to assess for associated fracture
 - 12% on x-ray, 28% on MRI¹
- Thumb spica splint



¹Manneck S, et al. Skeletal Radiology (2021) 50:505–513

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Case #7:

A 12 y/o made a vigorous swing while at bat. He noted immediate discomfort on the ulnar side of his wrist. There is pain, swelling and tenderness in this location.

The Most Likely Diagnosis Is:

- A. Pisiform fracture
- B. Body of the hamate fracture
- C. Hook of the hamate fracture
- D. Ulnar styloid fracture

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Fracture of the Hook of the Hamate

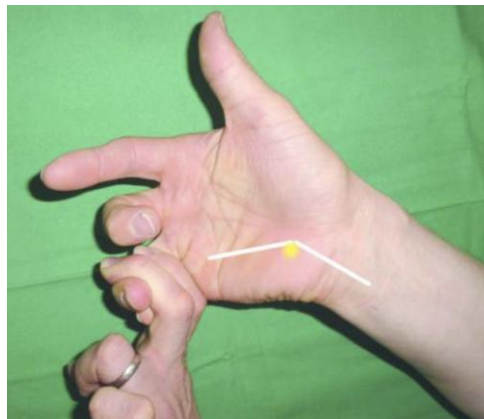


- Incidence: 2-4% of carpal fractures
- Due to a direct blow to the hamate bone
- Most common in baseball, golf, hockey
- Symptoms: ulnar sided wrist pain, pain with gripping
- Signs: tenderness over ulnar wrist, paresthesias of ulnar nerve
- **X-ray: often negative**
- **Sensitivity CT/MRI = 92%/100%**

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Hook of the Hamate Fracture

Hook of the hamate “pull test”



Musculoskeletalkey.com

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Hook of the Hamate Fracture

- The majority of patients arrive late (weeks after injury)
 - If arrive early, non-operative (conservative) care possible
 - If arrive late, often require surgery
- *Chronic fractures are more likely to be treated with excision (93.4%) vs. compared to nonchronic fractures (68.8%)*

Donahue JK, et al. J Hand Surg Glob Online 2023 Dec 27;6(2):183–187

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Case #8

- A 16 y/o sliding into first base experienced sudden severe right shoulder pain.
- You are called to the field and note:
- No ROM and has a noted deformity.
- States he has done this before....



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Case #8:

In This Case, You Should:

- A. Attempt to reduce the dislocation on the field
- B. Do not attempt reduction, explain this needs to go to the ED for x-rays before any attempt to reduce



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Do You Need Pre-reduction X-rays? Numerous Studies Say “NO”

Reid, *Pediatric Emerg Care*, 2013

Orloski, *Am J Emerg Med*, 2011

Emond, *CJEM*, 2009

Kahn, *J Emerg Med*, 2007

Hendey, *J Emerg Med*, 2006

Emond, *Acad Emerg Med*, 2004

Shuster, *CJEM*, 2002

Hendey, *Ann Emerg Med*, 2000

Shuster, *Am J Emerg Med*, 1999

Hendey, *Ann Emerg Med*, 1996

Edmond, *J Emerg Med*, 2018

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Immediate Shoulder Dislocation Reduction



Davos

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Case #9

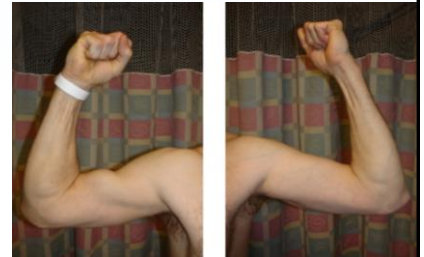
- 40 yo coach asks you to evaluate his right arm.
- Sudden "shotgun" pain in prox humerus after lifting heavy (approx. 50lb) equipment bag.



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Case #9

- 40 yo coach asks you to evaluate his right arm.
- Sudden "shotgun" pain in prox humerus after lifting heavy (approx. 50lb) equipment bag.



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Case #9:

You Inform the Coach of:

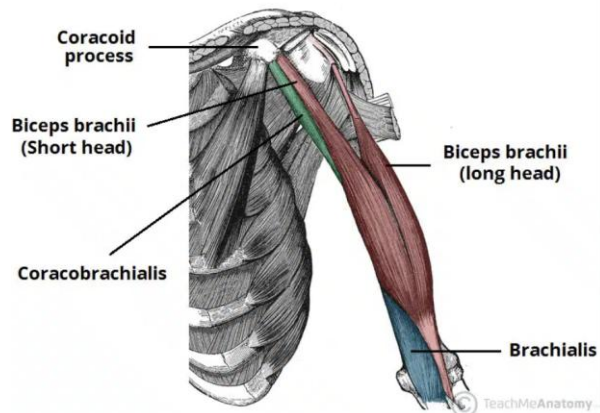
- A. A rupture of the long head of the bicep tendon and needs to go to ER now
- B. A rupture of the long head of the bicep tendon and conservative therapy is recommended
- C. A rupture of the distal bicep tendon and needs to go to the ER now
- D. A rupture of the distal bicep tendon and conservative therapy is recommended

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Rupture of long head of bicep

- Average age: 40-60 yrs
- Assoc with underlying shoulder problems such as rotator cuff disease or tendonitis



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Rupture of long head of bicep

- Average age: 40-60 yrs
- Assoc with underlying shoulder problems such as rotator cuff disease or tendonitis
- Conservative care (non-surgical) typical in older pts
 - Rest and Activity Modification: Avoid overhead activities and heavy lifting to reduce strain on the tendon.
 - Ice and NSAIDs
 - Physical Therapy: Focus on strengthening the rotator cuff and scapular stabilizers, and ROM... Start once acute pain subsides.
- Conservative treatment is often successful, with many patients regaining functional mobility within 4–6 weeks

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Case #10:

While sitting in the stands, your sister grabbed the arm of her 3 yo about to run out of the stands. The child cried and now will not move the arm.

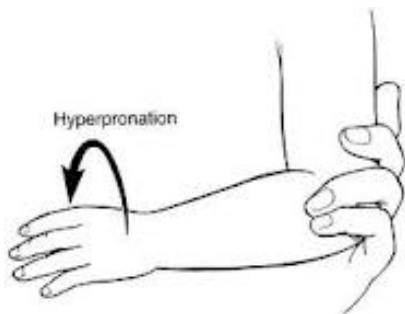
You:

- A. Tell her to go to the ER for x-rays
- B. Attempt hyperpronation and extension
- C. Attempt supination and flexion

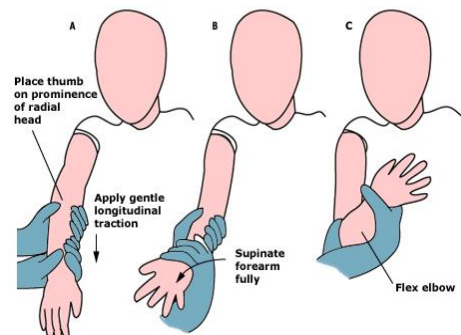
Case #10: Nursemaid's Elbow Pronation vs Supination/Flexion

Keep your thumb over the radial head
Feeling a "Click" = Success

A.



B.



Evidence-based analysis suggests the pronation technique might be a bit more effective

Case #10: Nursemaid's Elbow Pronation vs Supination/Flexion

Cochrane Review: 2017

- 8 small trials, low quality
- Results:

	<u>hyperpronation</u>	<u>supination/flexion</u>
- <i>first-pass failure</i>	9.2%	26.4%

Larger, more recent study, 2025

- RCT, 118 patient
- Results:

	<u>hyperpronation</u>	<u>supination/flexion</u>
- <i>first-pass failure</i>	9.8%	24.2%

Aksel G, et al. Am Jour of Emerg Med 2025; 88: 29–33

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Nursemaid's Elbow: Hyperpronation



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Case #11

The coach brings his 12 yo “star pitcher” to you at the end of the game. The child notes gradual onset of discomfort in his right elbow over the past 3 weeks. He notes the pain is aggravated by throwing and relieved by rest. The coach noted decreased velocity and accuracy of his pitches. On exam you note tenderness at the right medial epicondyle.



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Case #11:

The Most Likely Diagnosis Is:

- A. Medial epicondylitis
- B. Traction apophysitis = “Little League Elbow”
- C. Sever’s disease
- D. Stress fracture of the medial epicondyle



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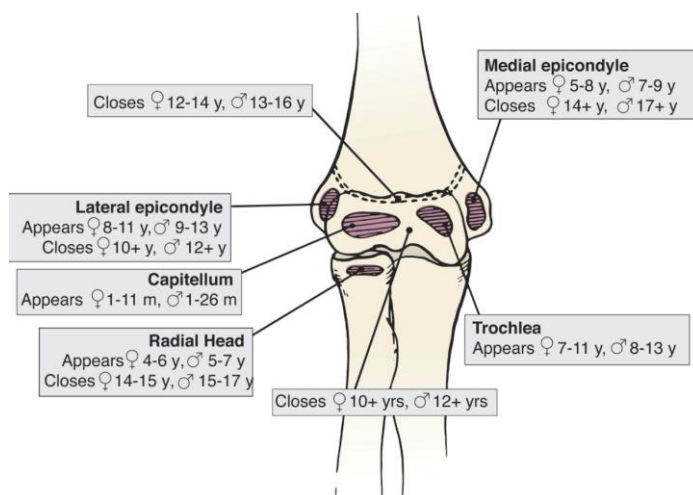
“Little League Elbow”

Table 1: Differential diagnosis of little leaguer's elbow⁽⁶⁾

Medial Elbow	Lateral Elbow	Posterior Elbow	Anterior Elbow
• Ulnar collateral ligament (UCL) strain / tear • Common flexor origin strain / tear • Ulnar nerve neuritis • Medial Epicondyle ○ Avulsion fracture ○ Bone fragmentation ○ Apophysitis ○ Growth disturbances ▪ Accelerated growth ▪ Delayed ossification	• Extensor origin strain / tear • Lateral extension overload • Radial head ○ Osteochondritis dissecans (OCD) ○ Deformation • Capitellum ○ Osteochondrosis (Panner's disease) ○ OCD ○ Traumatic osteochondral fracture	• Olecranon ○ Apophysitis / osteochondrosis ○ Avulsion fracture / unfused apophysis ○ Posteromedial impingement / osteophytes	• Flexion or capsular contracture

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Secondary Ossifications Centers



Radiopedia.org

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Traction Apophysitis of the Elbow

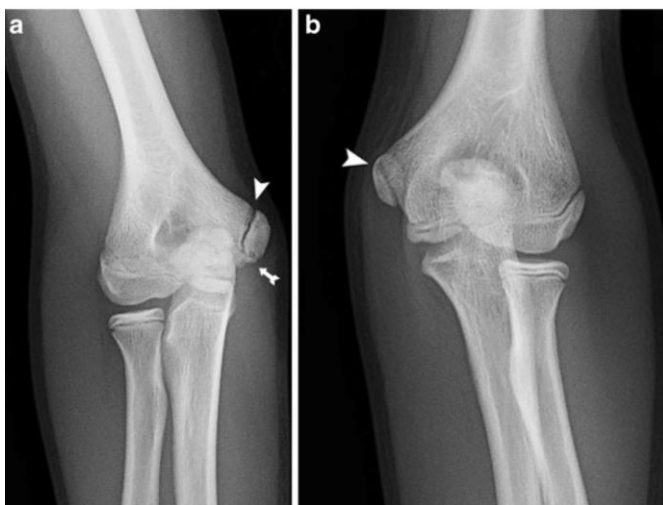


Ulnar
Collateral
Ligament
(UCL)



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When in Doubt... Get Comparison View



Dwek JR, et al. *Pediatr Radiol* (2013) 43 (Suppl 1):S120–S128

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vs. Medial Epicondylitis

- Overuse of flexor-pronator muscle group at the medial epicondyle, with the **pronator teres** and **flexor carpi radialis tendons** most commonly involved



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Traction Apophysitis of the Elbow

- Insidious onset that results from **overuse** of the [tendon and] surrounding ossification centers
- **Most commonly affected: Boys 10-14 years of age**
- Often occurs at or after growth spurt
- **Physical activity required**
- *Principles of rehabilitation include ice (pain), stretching (developmental inflexibility), and modification to activity (relative rest)*



- Progressive medial elbow pain, diminished throwing effectiveness, decreased throwing distance
- Refrain from throwing for 3-6 weeks until **pain-free & nontender** then progressive return-to-throwing program with focus on proper throwing mechanics

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Traction Apophysitis of the Elbow



Milking maneuver.

Achar S, et al. *Am Fam Physician*. 2019;99(10):610-618

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Traction Apophysitis of the Elbow



Milking maneuver.

Achar S, et al. *Am Fam Physician*. 2019;99(10):610-618



if the apophyseal
separation
> 3-5mm... refer

Dontforgetthebubbles.com

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Apophysitis and Osteochondrosis: Common Causes of Pain in Growing Bones

AFP May 15, 2019

Suraj Achar, MD, Rady Children's 360 Sports Medicine, University of California San Diego School of Medicine, San Diego, California
Jarrod Yamanaka, MD, Fairview Sports and Orthopedic Care, Blaine, Minnesota

Summary of Apophysitis and Osteochondrosis Disorders

Disorder	Clinical presentation	Radiographic findings	Initial treatment
Apophysitis			
Hip apophysitis	Pain over affected apophysis (seven sites in pelvis)	Normal or widened apophysis compared with contralateral side	Rest from painful sport or activities
Iselin disease	Insidious onset of pain over base of fifth metatarsal head	Normal or widened apophysis of the proximal metatarsal	Rest, stiff-soled shoe for protected weight-bearing
Larsen-Johansson disease	Pain at inferior patellar pole with activity and kneeling	Soft tissue swelling and calcification of inferior pole of patella	Activity modification; short course of acetaminophen or NSAIDs
Medial epicondyle apophysitis (i.e., thrower's elbow)	Localized pain over medial epicondyle with throwing	May show fragmentation or widening of medial epicondyle	Throwing cessation; acetaminophen or NSAIDs as needed
Osgood-Schlatter disease	Pain at anterior tibial tubercle with activity and kneeling	Soft tissue swelling and fragmentation of tibial tubercle	Activity modification; acetaminophen or NSAIDs
Sever disease	Posterior heel pain with activity and shoe wear	Plain radiography results are usually normal	Activity and shoe modifications; heel cups; calf stretches; acetaminophen or NSAIDs



Osgood-Schlatter disease (osteochondrosis of the tibial tubercle).

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Case #12:

While sitting in the stands, a friend eating a triple hamburger complains his jaw is locked.

You Recommend:

- A. Prescription of muscle relaxants
- B. Go to the ER for x-rays
- C. Attempt to reduce temporal-mandibular dislocation

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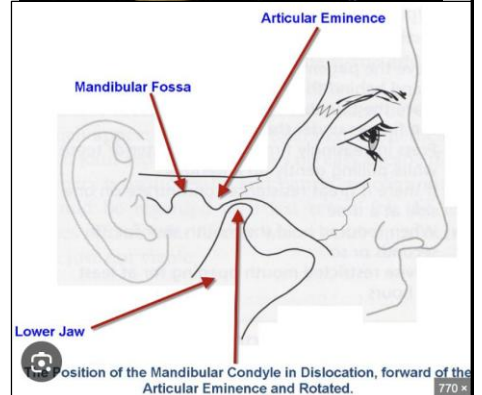
Temporo-mandibular Joint Dislocation Reduction

A. Nontraumatic

- Caused by extreme opening of the mouth
 - Yawning, dystonia, vomiting, dental procedures, laughing, etc.
- **No imaging required**

B. Traumatic

- **Imaging required** prior to manipulation



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Temporo-mandibular Joint Dislocation Reduction

- **Traditional intra-oral technique subject the performer to potential injury**



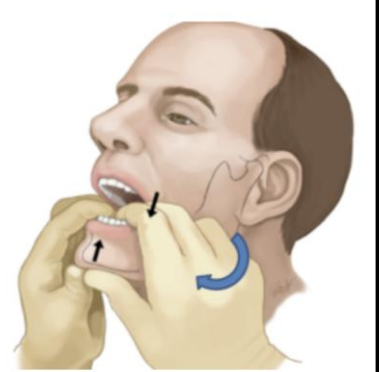
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Temporo-mandibular Joint Dislocation Reduction

- **The Wrist Pivot Technique**

Face the patient

- Place thumbs at the apex of the mandible
- Exert cephalad force with the thumbs
- Exert caudad force with the fingers
- Pivot the wrist



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Case #13

A mother of a 15 yo player who fell on their outstretched hand 8 weeks ago and had negative x-rays, is now being told that their child now has a scaphoid fracture and now needs a bone graft. She does not understand.

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Case #13:

You Explain:

- A. Among the 8 wrist bones, fracture of the scaphoid bone is uncommon and easily overlooked
- B. X-rays can easily miss a scaphoid fracture
- C. The patient likely had a missed dislocation on x-ray
- D. Because the blood supply to the scaphoid bone runs proximal to distal direction, it is prone to avascular necrosis



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Scaphoid Fractures

- Initial false negative X-ray: 10-54%
- **Strategies: Thumb spica splint and**
 - a) Repeat x-rays in 10-14 days
 - b) Bone scan in 10-14 days
 - c) MRI
 - d) CT

Board Answer!!!

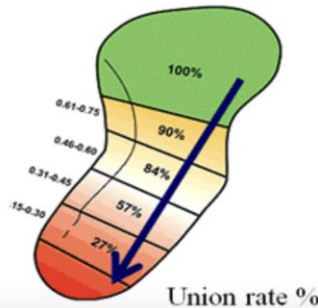


Modality	Sensitivity	Specificity	Key Strength	Limitation
CT	67–100% 1 2 5	85–100% 1 2 5	High specificity, widely available	Lower sensitivity in some studies 3 4
MRI	67–98% 2 3 7	89–99% 2 3 7	Best for ruling out fractures 6	Cost, accessibility, false positives 2 4

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Scaphoid Fracture

- Most commonly fractured carpal bone (60-70%)
- Hyperextension injury/FOOSH
- Ages 15-40, Males
- Complication: Avascular necrosis!!!
- the more proximal fx, increases risk of this
- **Thumb spica splint**



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Splinting....Thumb Spica Splint

Also used for.....

- Scaphoid Fracture
- Lunate fracture
- Gamekeeper's (or Skier's) Thumb
(Tear of ulnar collateral ligament)
- deQuervain's tenosynovitis
- Other thumb fractures



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Case #14:

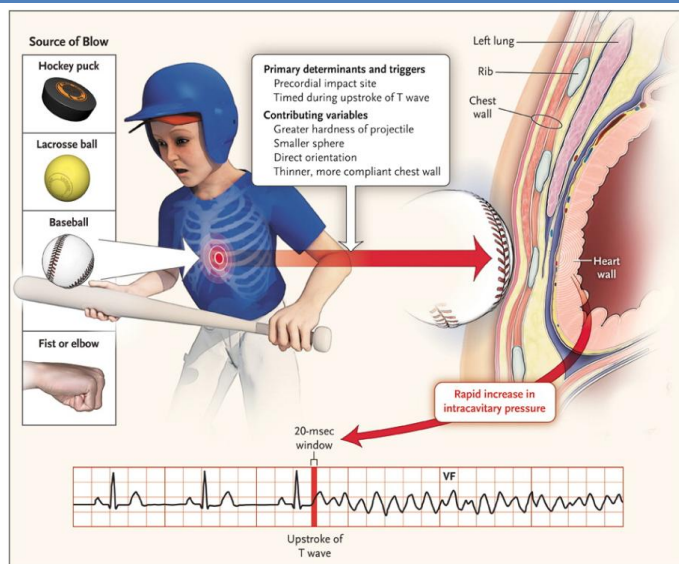
A 12 y/o pitcher is struck in the sternum by a line drive.
He falls to the ground and appears unresponsive.

Your First Move Is to:

- A. Attempt to clear the airway, as he most likely has gum stuck in the airway
- B. Open airway, give 2 rescue breaths and then begin chest compressions.
- C. Start chest compressions and call for a defibrillator.



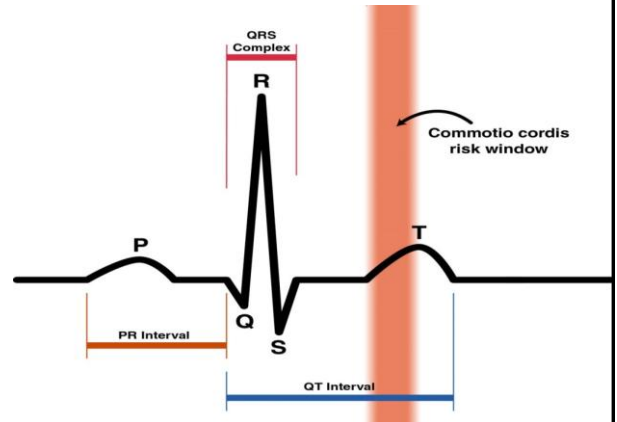
Case #14: Commotio Cordis



Barry J. Maron, M.D.,
and N.A. Mark Estes, III, M.D.
N Engl J Med 2010; 362:917-927

(Blunt) Chest Trauma: Comotio Cordis

- 216 cases in registry
- Blunt trauma (eg, ball)
- Strikes before peak of T wave → V Fib



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*Thank You for Your Time and
Attention*

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Supplemental Slides

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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique – (external rotation)
- Milch method
- Kocher maneuver
- Stimson technique
- Spaso Technique
- Cunningham technique
- Traction and countertraction

Post-reduction care: Sling and swath or shoulder immobilizer for 1- 3 weeks



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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique – (external rotation)
- Milch method
- Kocher maneuver
- Stimson technique
- Spaso Technique
- Cunningham technique
- Traction and countertraction

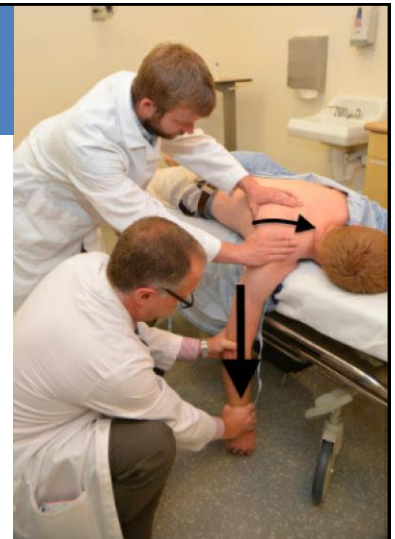


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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique – (external rotation)
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- Stimson technique
- Spaso Technique
- Cunningham technique
- Traction and countertraction



Post-reduction care: Sling and swath or shoulder immobilizer for 1- 3 weeks

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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique- (external rotation)
- Kocher maneuver
- Milch method
- Stimson technique
- **Spaso Technique**
- Cunningham technique
- Traction and countertraction

Post-reduction care: Sling and swath or shoulder immobilizer for 1- 3 weeks



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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique – (external rotation)
- Milch method
- Kocher maneuver
- Stimson technique
- **Cunningham technique**
- Traction and countertraction

Post-reduction care: Sling and swath or shoulder immobilizer for 1- 3 weeks



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Shoulder Dislocations: Reduction Techniques

- Scapular manipulation
- Hennipen technique – (external rotation)
- Milch method
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- Stimson technique
- Spaso Technique
- Cunningham technique
- **Traction and countertraction**



Post-reduction care: Sling and swath or shoulder immobilizer for 1- 3 weeks

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When Do Secondary Ossification Centers Appear?

- **Capitellum** ~0.5-2 years
- **Radial Head** ~4 years
- **Medial epicondyle** ~6-7 years
- **Trochlea** ~8 years
- **Olecranon** ~8-10 years
- **Lateral Epicondyle** ~12 years



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“Little League Shoulder”

Caution

Little league shoulder is a
Proximal humeral epiphysitis

Overhead athletes with open growth plates at risk:
Swimming
Baseball
Volleyball
Tennis
Gymnastics



Think of this as a stress fracture of the proximal humeral physis

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Apophysitis and Osteochondrosis: Common Causes of Pain in Growing Bones

Suraj Achar, MD, Rady Children's 360 Sports Medicine, University of California San Diego School of Medicine, San Diego, California
Jarrod Yamanaka, MD, Fairview Sports and Orthopedic Care, Blaine, Minnesota

Summary of Apophysitis and Osteochondrosis Disorders

Disorder	Clinical presentation	Radiographic findings	Initial treatment
Apophysitis			
Hip apophysitis	Pain over affected apophysis (seven sites in pelvis)	Normal or widened apophysis compared with contralateral side	Rest from painful sport or activities
Ishler disease	Insidious onset of pain over base of fifth metatarsal head	Normal or widened apophysis of the proximal metatarsal	Rest, stiff-soled shoe for protected weight-bearing
Larsen-Johansson disease	Pain at inferior patellar pole with activity and kneeling	Soft tissue swelling and calcification of inferior pole of patella	Activity modification; short course of acetaminophen or NSAIDs
Medial epicondyle apophysitis (i.e., thrower's elbow)	Localized pain over medial epicondyle with throwing	May show fragmentation or widening of medial epicondyle	Throwing cessation; acetaminophen or NSAIDs as needed
Osgood-Schlatter disease	Pain at anterior tibial tubercle with activity and kneeling	Soft tissue swelling and fragmentation of tibial tubercle	Activity modification; acetaminophen or NSAIDs
Sever disease	Posterior heel pain with activity and shoe wear	Plain radiography results are usually normal	Activity and shoe modifications; heel cups; calf stretches; acetaminophen or NSAIDs



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Larsen-Johansson disease. (A) Minimal fragmentation at inferior patellar pole. (B) Knee radiograph showing subacute patellar sleeve fracture.



Osgood-Schlatter disease (osteochondrosis of the tibial tubercle).

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Sever disease. (A) Squeeze test. (B) Radiograph of same patient with normal calcaneal apophysis.

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AFP May 15, 2019

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