Less Common Causes of Elbow Pain

Tyler Crawford, MD

May 11, 2006

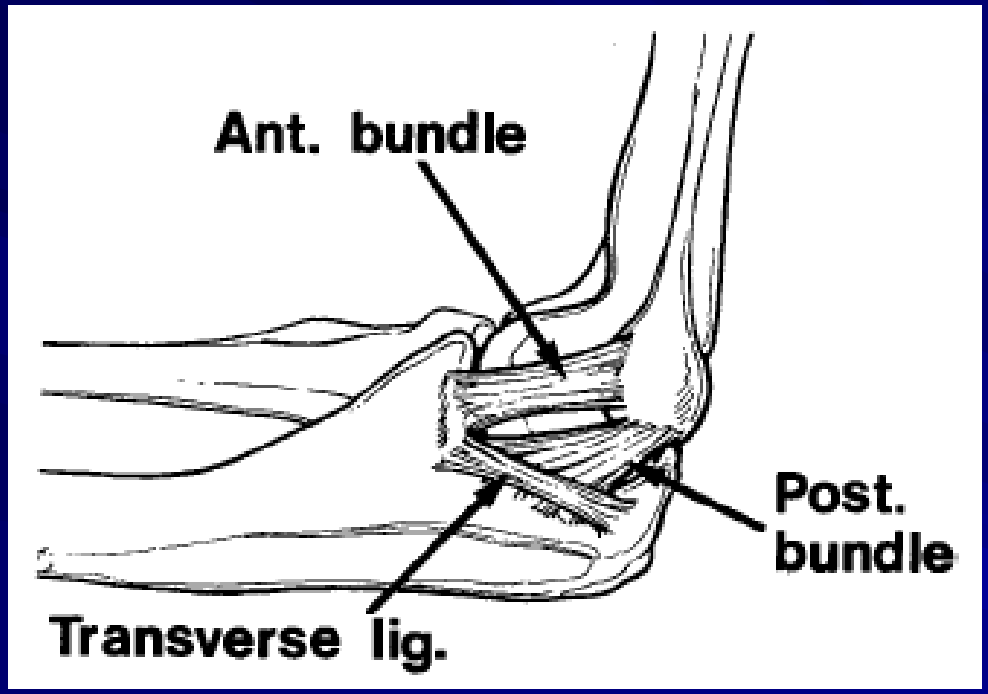
Pain in the throwing athlete

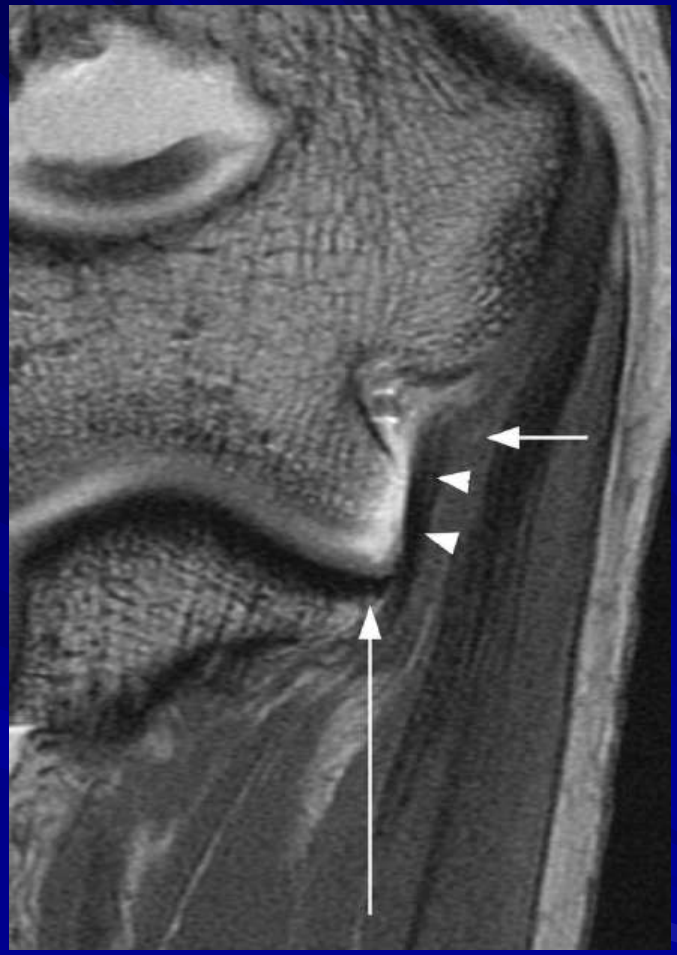
- Usually medial
- Usually (85%) during acceleration phase
- Etiology: Ulnar collateral ligament tears, ulnar neuritis, flexor-pronator strain/tear/tendonosis, medial epicondyle avulsion, valgus extension overload syndrome, olecranon stress fractures, OCD, loose bodies

Cain EL. Amer J Sports Med 2003; 3(4):621-635

Ulnar Collateral Ligament

- Most important to exclude an injury to the ulnar collateral ligament
- Anterior band from the medial epicondyle to the sublime tubercle
- Injury usually not a difficult clinical question





Cain EL. Amer J Sports Med 2003; 3(4):621-635

Munshi M. Radiology 2004; 231:797-803

Ulnar Collateral Ligament

Partial tear

T2 FS

Complete tear

T2 FS

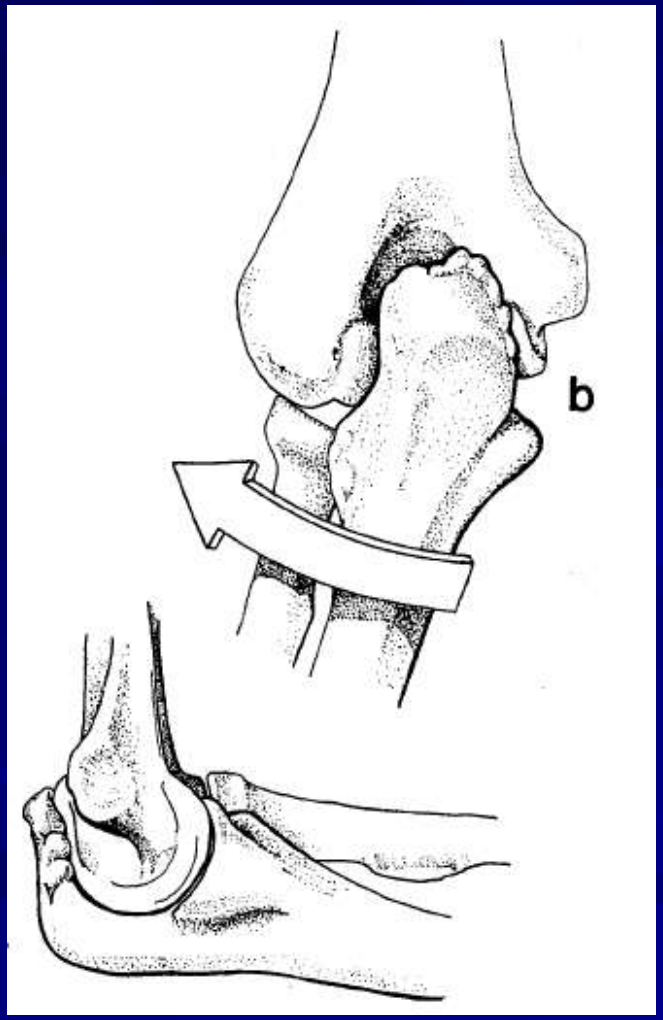
Kijowski R Skeletal Radiol(2005) 34:1-8

Valgus extension overload syndrome

- Repetitive high loads during throwing may lead to anterior band UCL attenuation & failure
- Carry angle (nl 11 men and 13 women) may increase to >15 degrees
- Valgus stress leads to “kissing lesion” osteophytes on posteromedial olecranon/trochlea

Cain EL. Amer J Sports Med 2003; 3(4):621-635

Valgus extension overload syndrome



- Subtle laxity may contribute to medial soft tissue and posterior compartment osseous disorders
- Posterior compartment osteophytes and bodies are the most common cause for surgery among baseball players

Cain EL. Amer J Sports Med 2003; 3(4):621-635

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Cain EL. Amer J Sports Med 2003; 3(4):621-635

Snapping Elbow

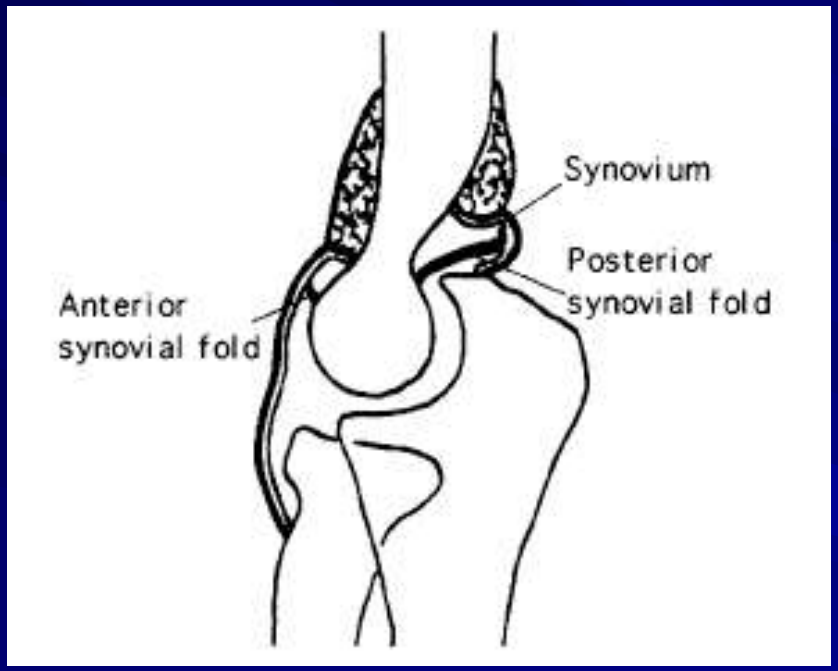
- Subluxation of the medial head of the triceps
- Subluxation of the ulnar nerve
- Intra-articular factors, such as torn annular ligament
- Synovial folds
- Intraarticular bodies

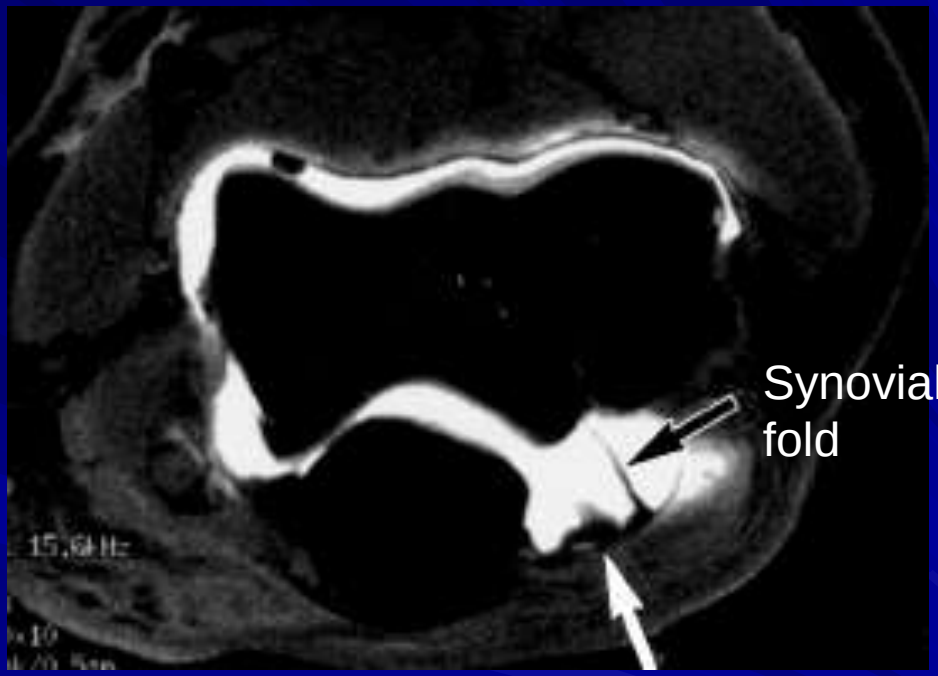
Fukase N, Skelet Radiol 2005 Jun 7

Synovial Folds

- Commonly seen within the elbow as a remnant of joint development
- May simulate intra-articular bodies
- Normal anterior and posterior fat pads may mimic synovial folds

Awaya H. AJR:177, Dec 2001





Normal
nodularity

Awaya H. AJR:177, Dec 2001

Synovial Fold Syndrome

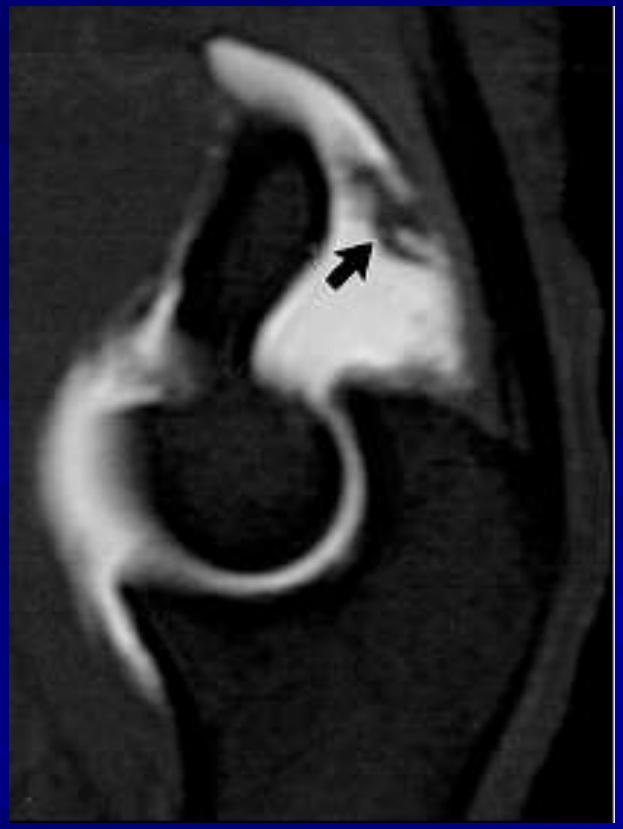
- Patients present with locking or limitation of full extension because of impingement
- Superoposterior plicae in the superior olecranon recess
- Both symptomatic and asymptomatic patients may have thickened folds

Awaya H. AJR:177, Dec 2001

Pain

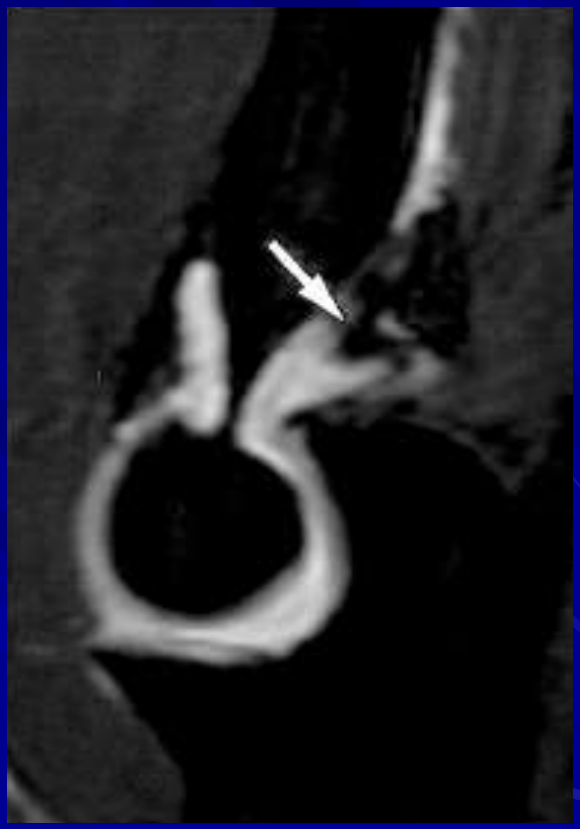
GRE

Chronic pain



T1 FS
Arthrogram

Chronic pain



T1 FS
Arthrogram

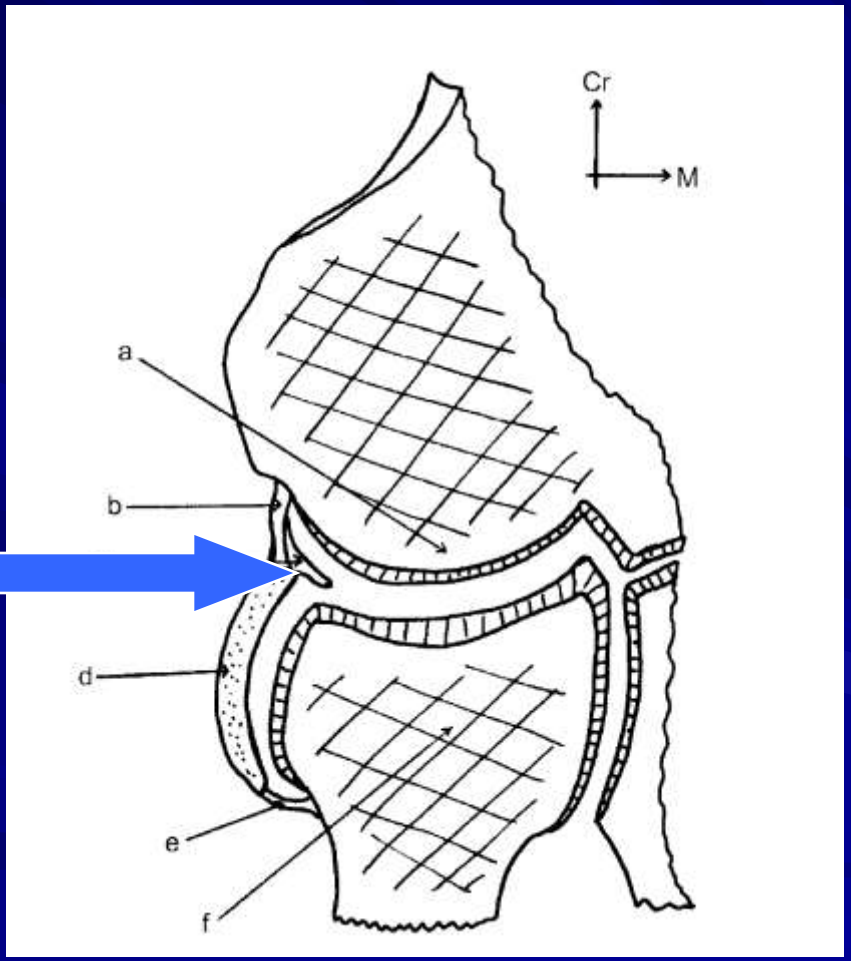
Awaya H. AJR:177, Dec 2001

Radiohumeral Synovial Fringe

- Arises from the embryonic joint septum and almost always present anteriorly and posteriorly.
- Embryos rarely have a lateral fringe
- Adults can develop a lateral fringe over time.
- Enlargement, hardening, & lateral extension is likely a manifestation of underlying derangement or degeneration.

Isogai S. J Shoulder Elbow Surg. 2001; 10:169-181

Synovial Fringe



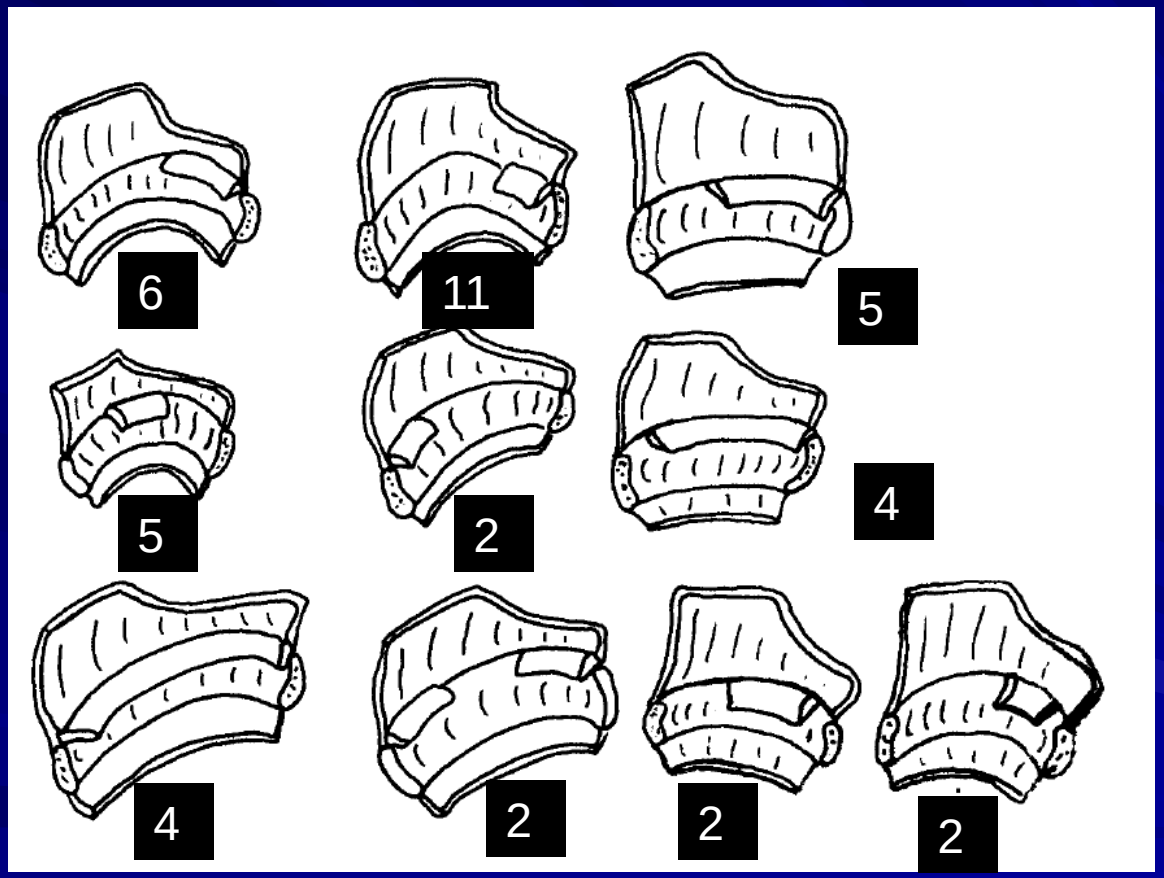
Duparc F. Surg Radiol Anat (2002) 24:302-307

Distribution

Lateral

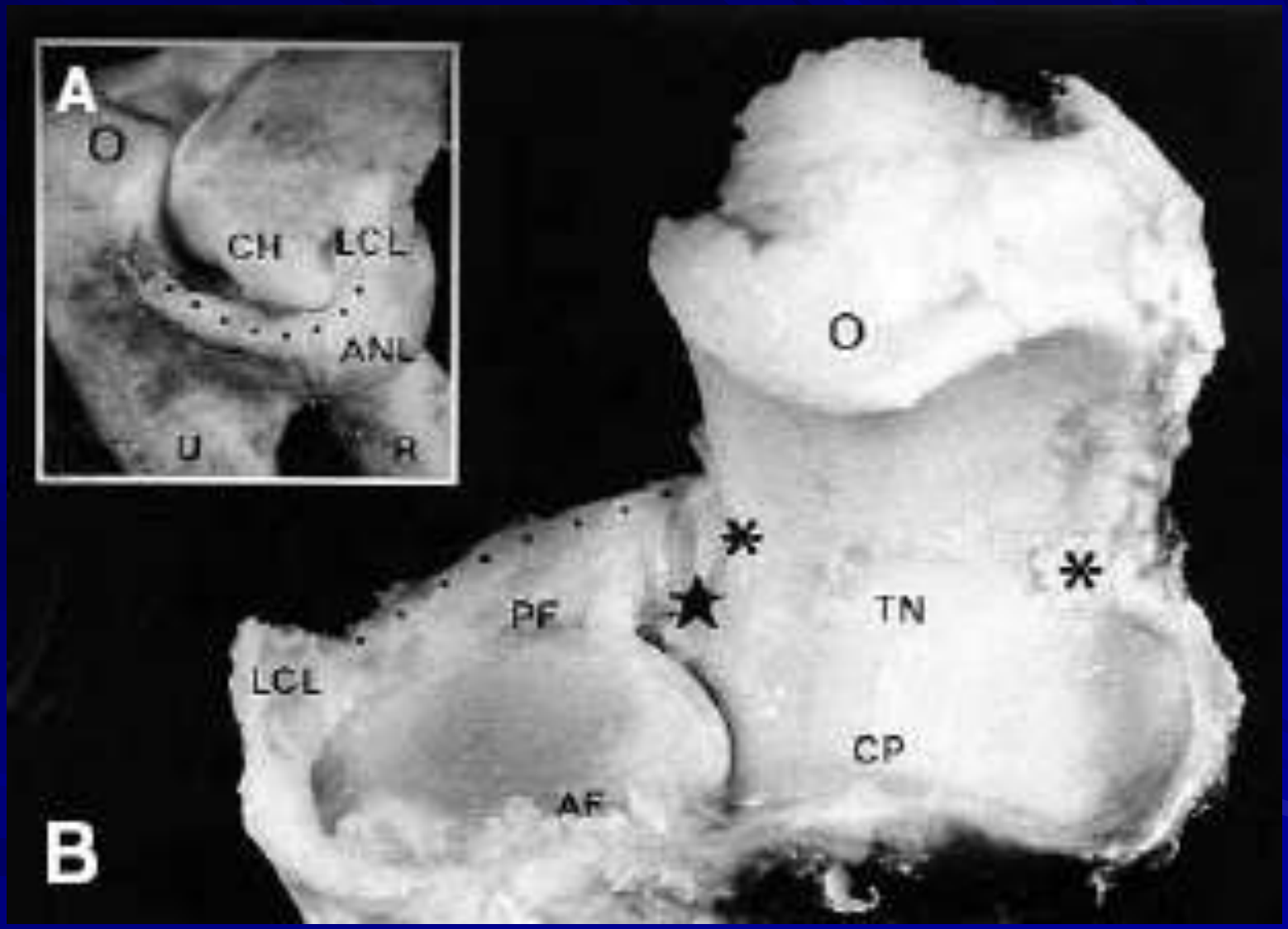
Ventral

Dorsal



50 Specimens

Duparc F. Surg Radiol Anat (2002) 24:302-307



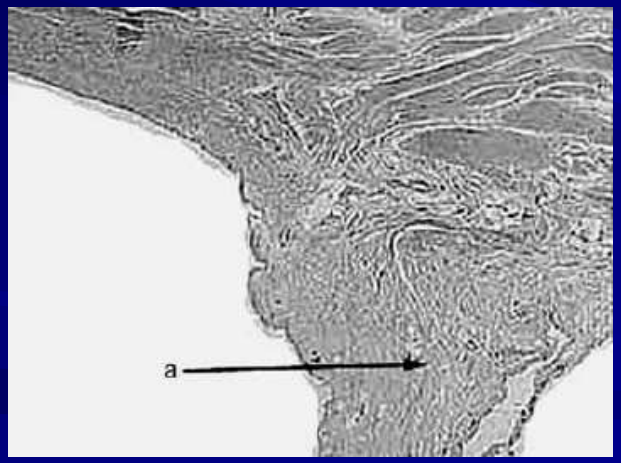
Isogai S. J Shoulder Elbow Surg. 2001; 10:169-181

Synovial Fringe/Posterolateral Impingement

- Athletes engaged in repetitive motions such as throwing or golfing are prone
- Complain of pain, clicking or snapping, swelling, or inability to fully extend.
- Flexor-pronation test—not helpful
- Anconeous soft spot tenderness—most helpful

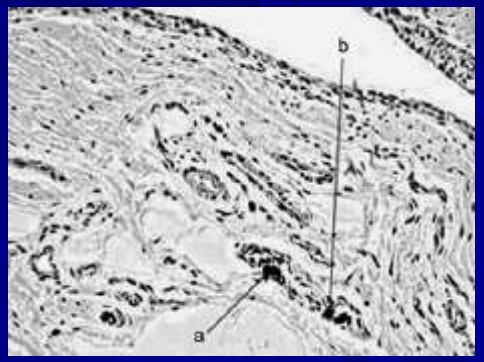
Kim D. Amer J Sports Med. 2006, Vol 34, Num 3, p. 438-444

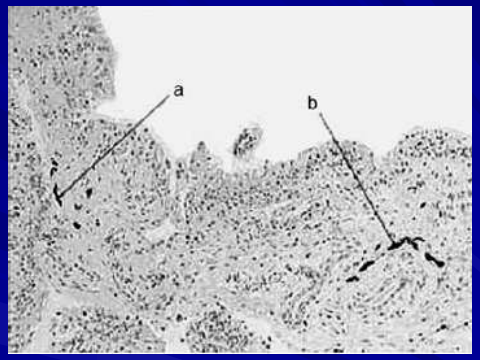
Fatty



Fibrous

Nerves





Duparc F. Surg Radiol Anat (2002) 24:302-307

PD

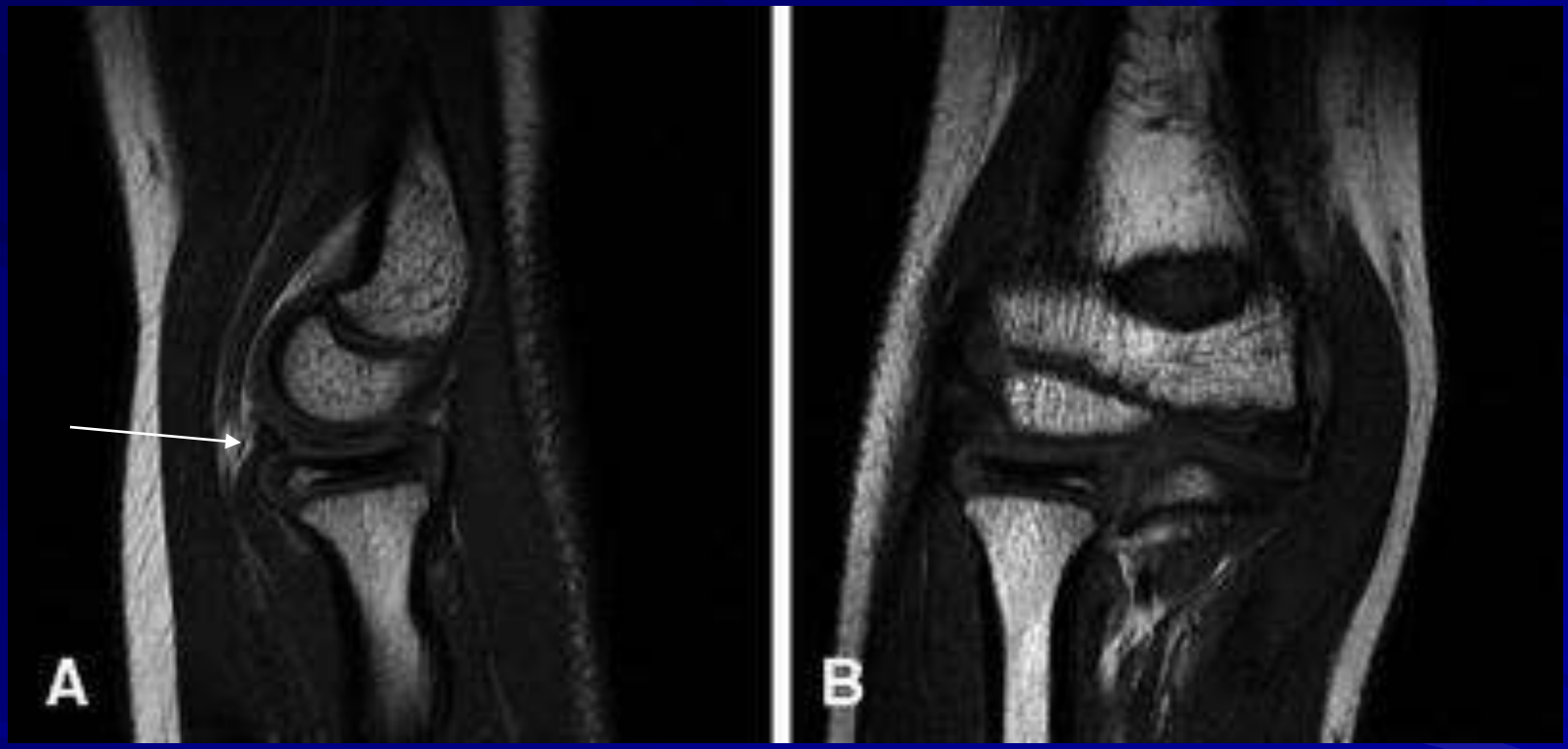
Huang G. Eur Radiol (2005) 15: 2411-2414

Flexed

Extended

12 yo boy with a snapping elbow

PD



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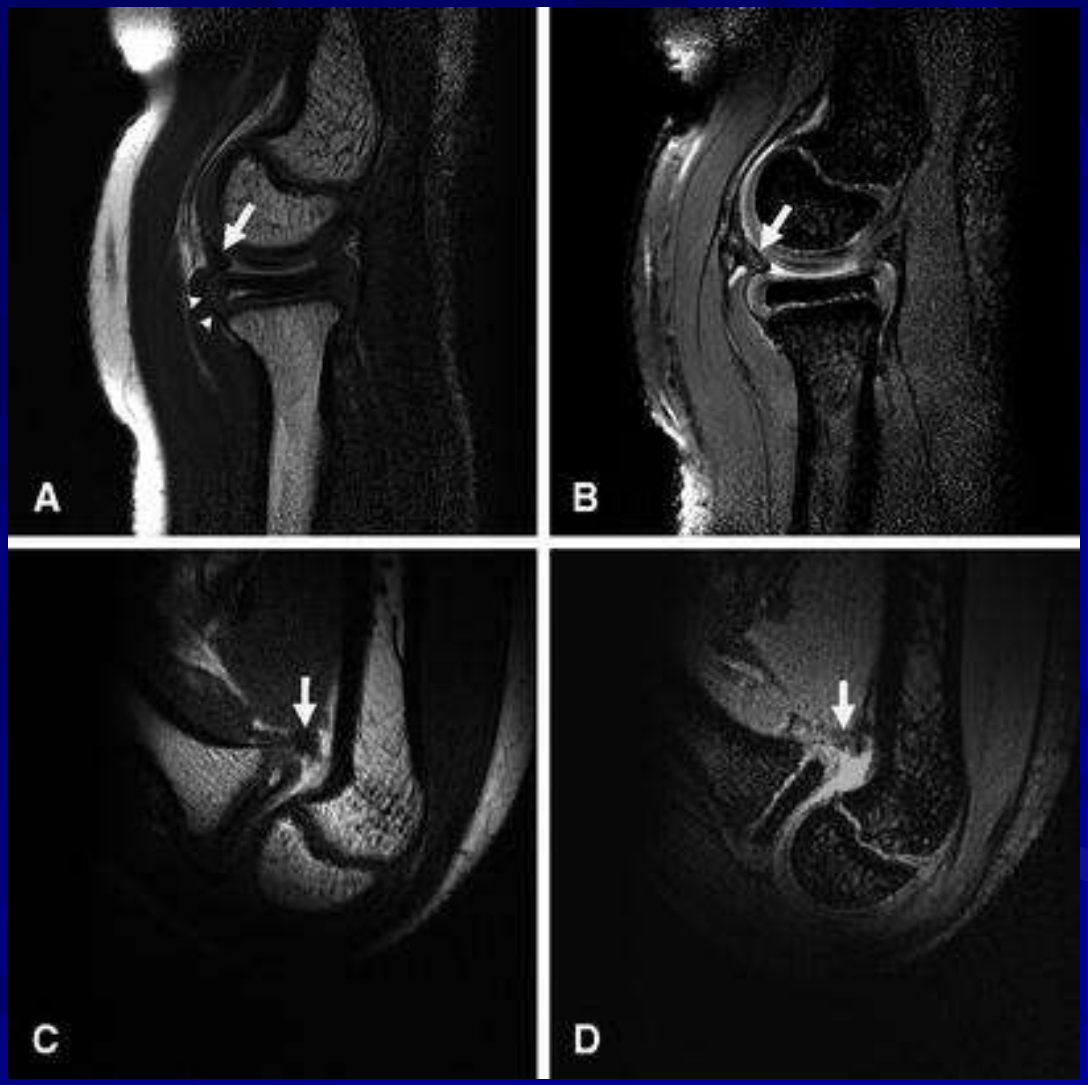
PD

T2*

Extension



Flexion

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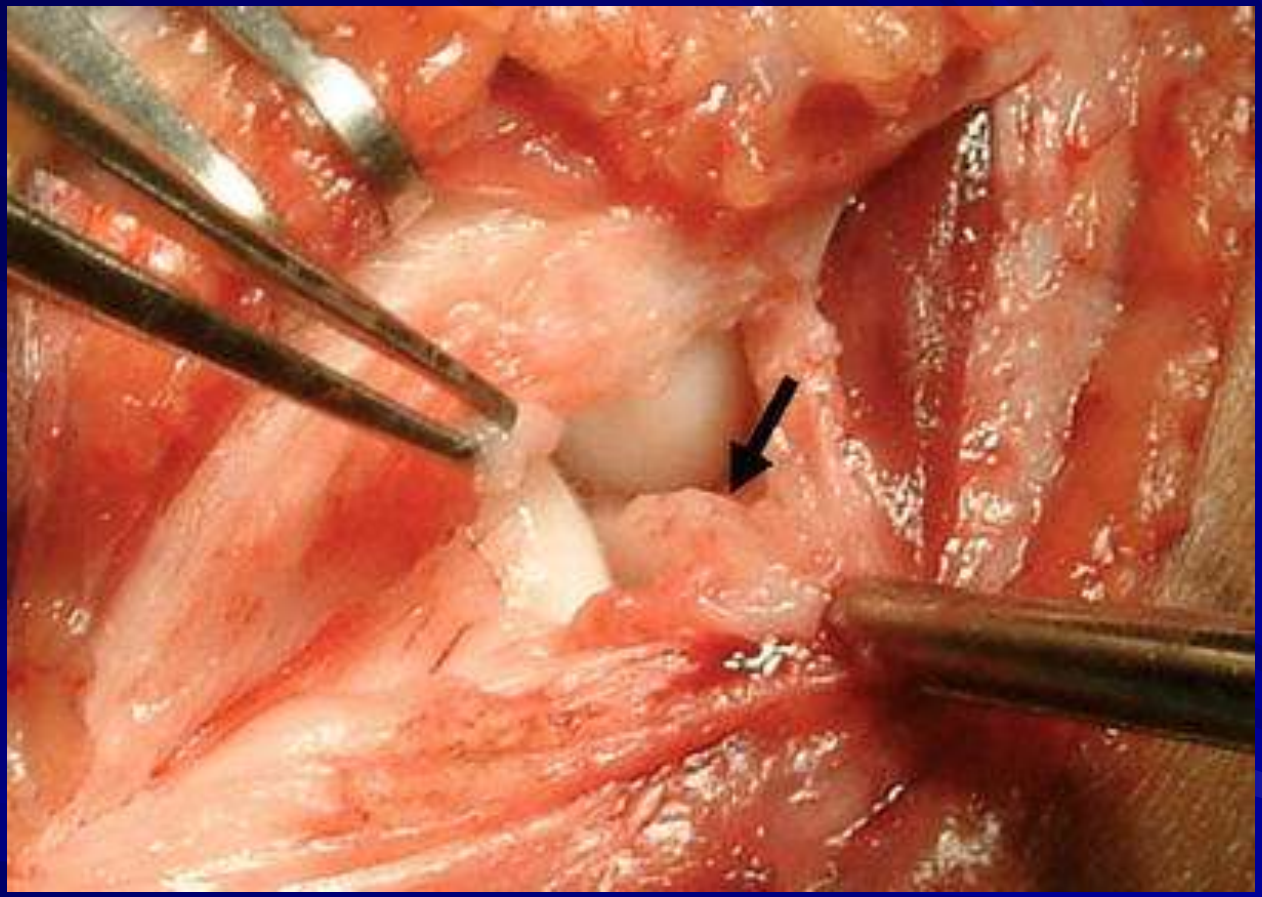
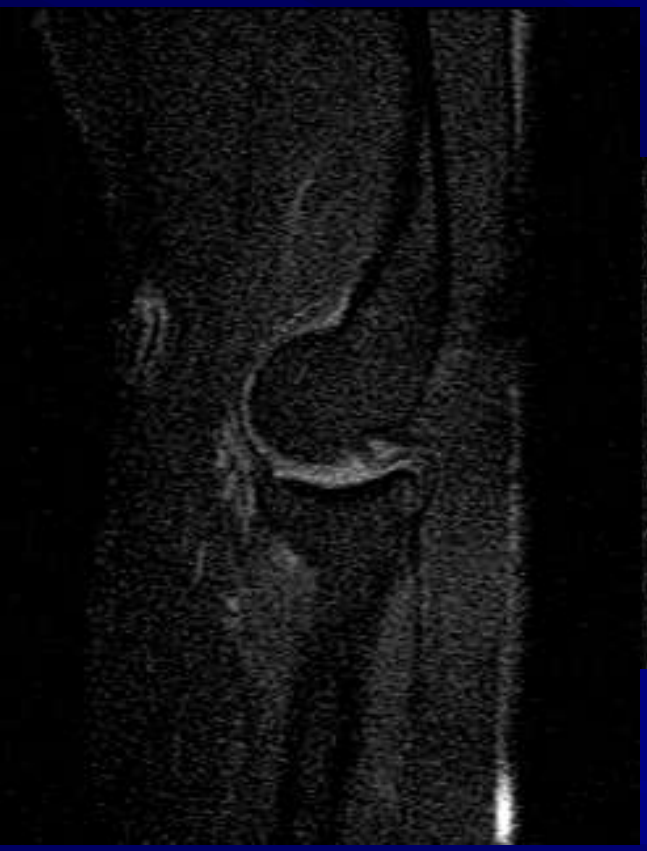
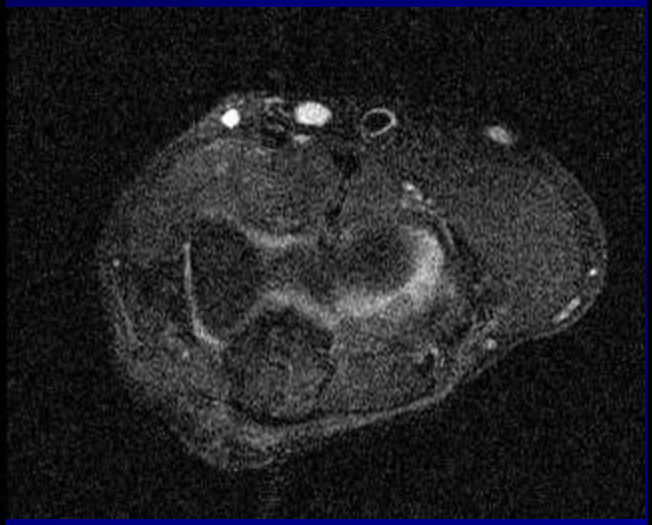
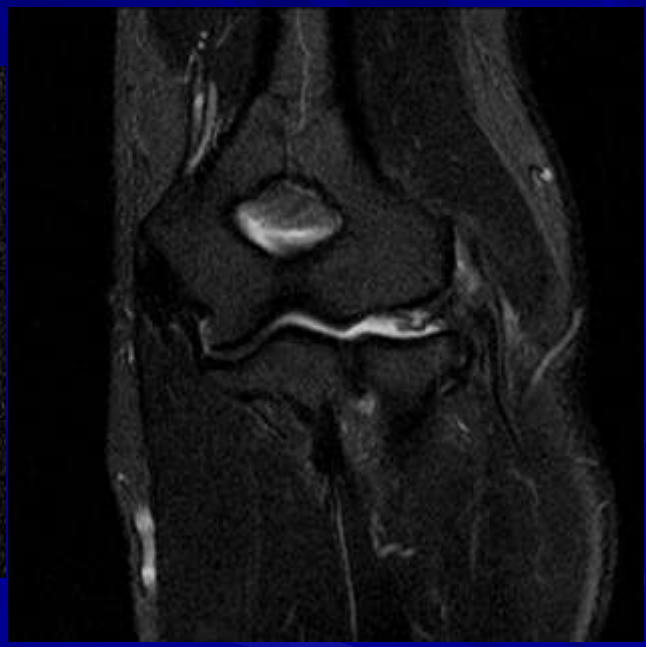


Fukase N, Skelet Radiol 2005 Jun 7

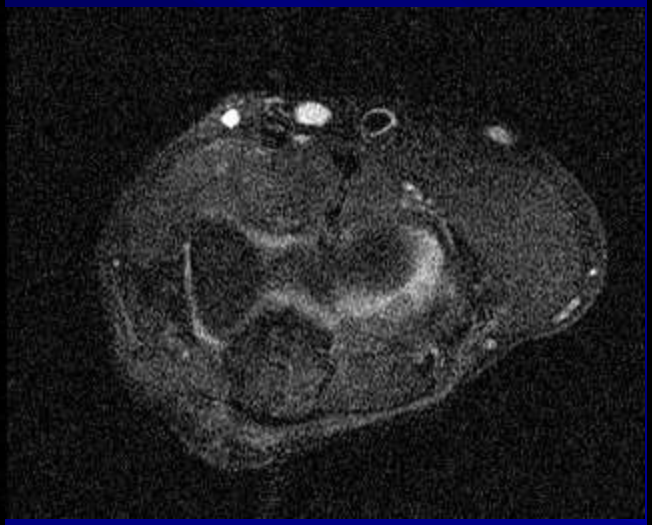
Lateral elbow pain

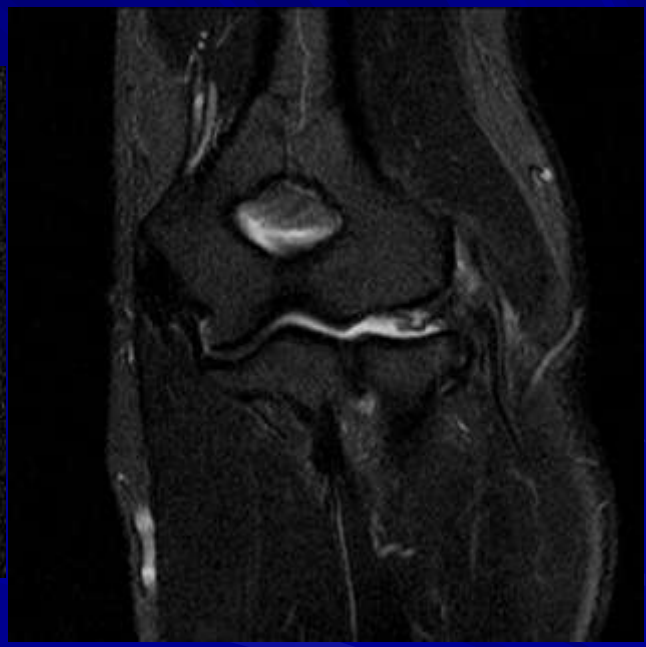




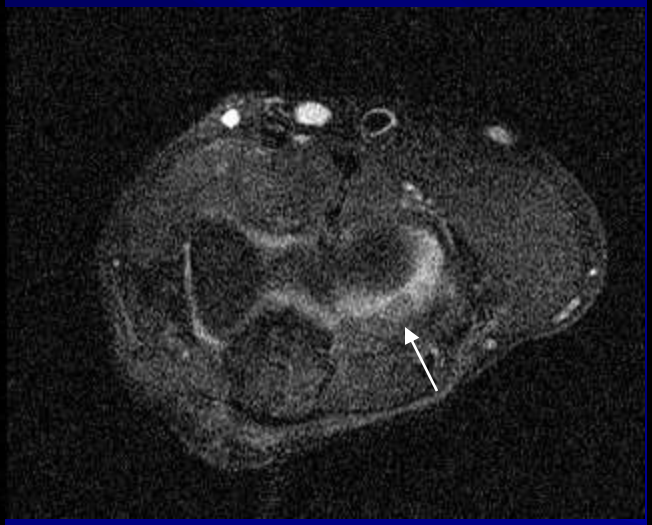


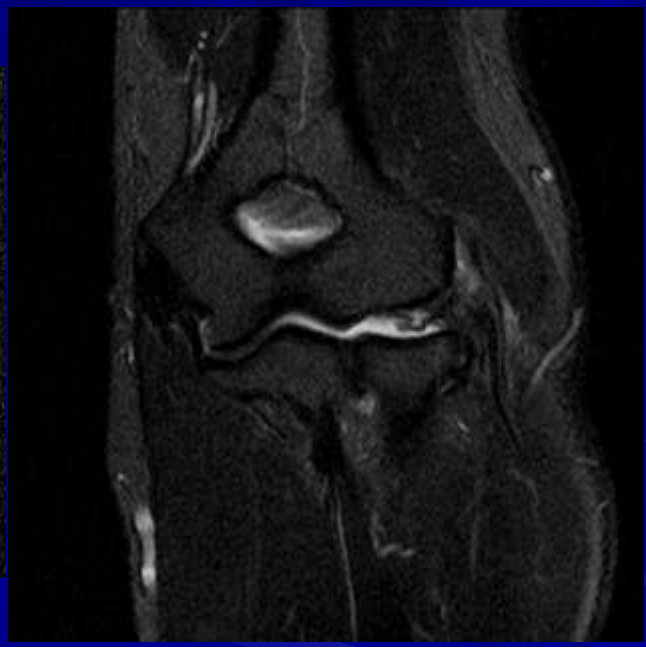
Lateral elbow pain



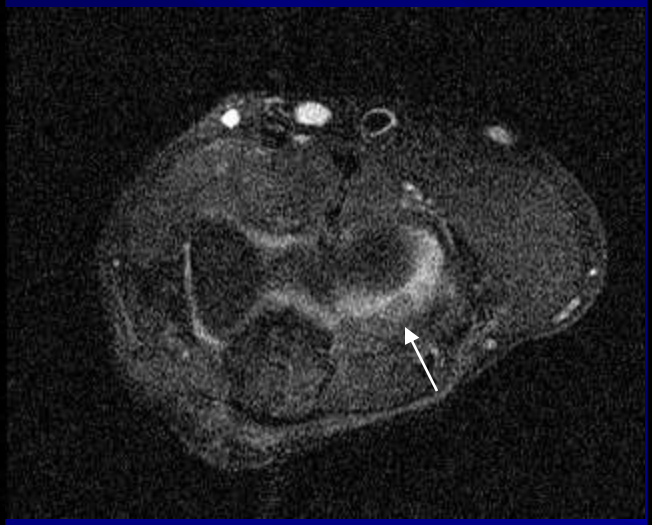


Lateral elbow pain

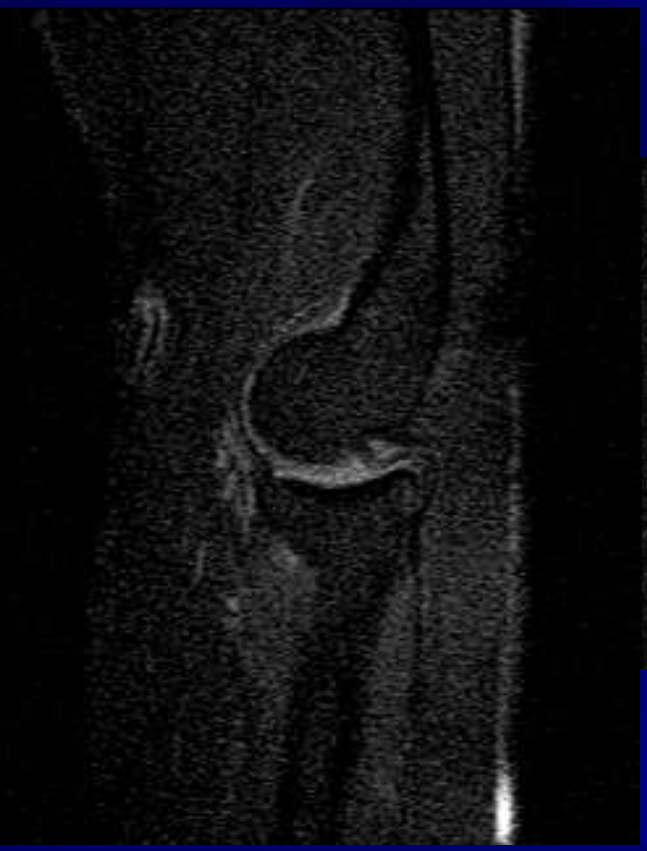


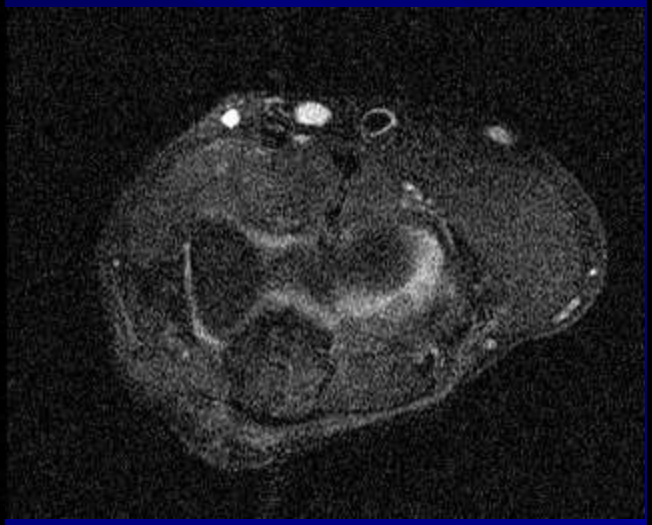


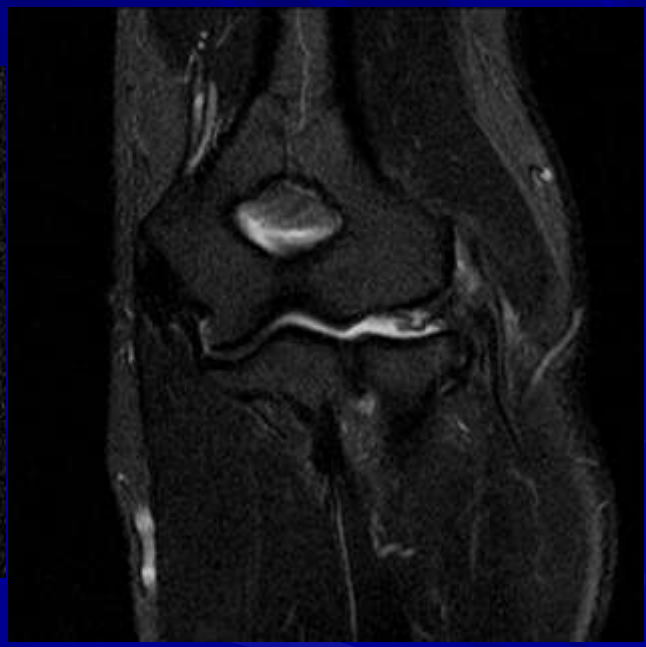
Lateral elbow pain



Lateral elbow pain







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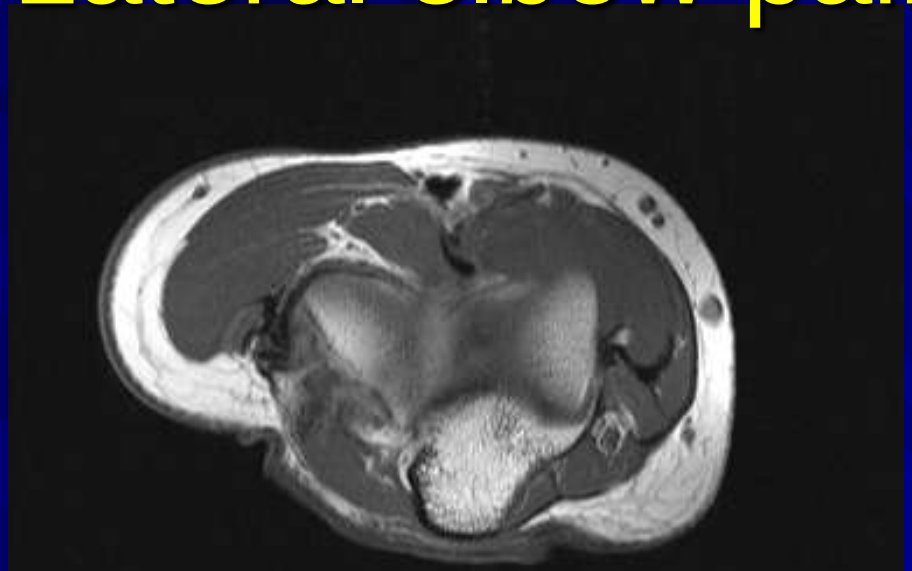
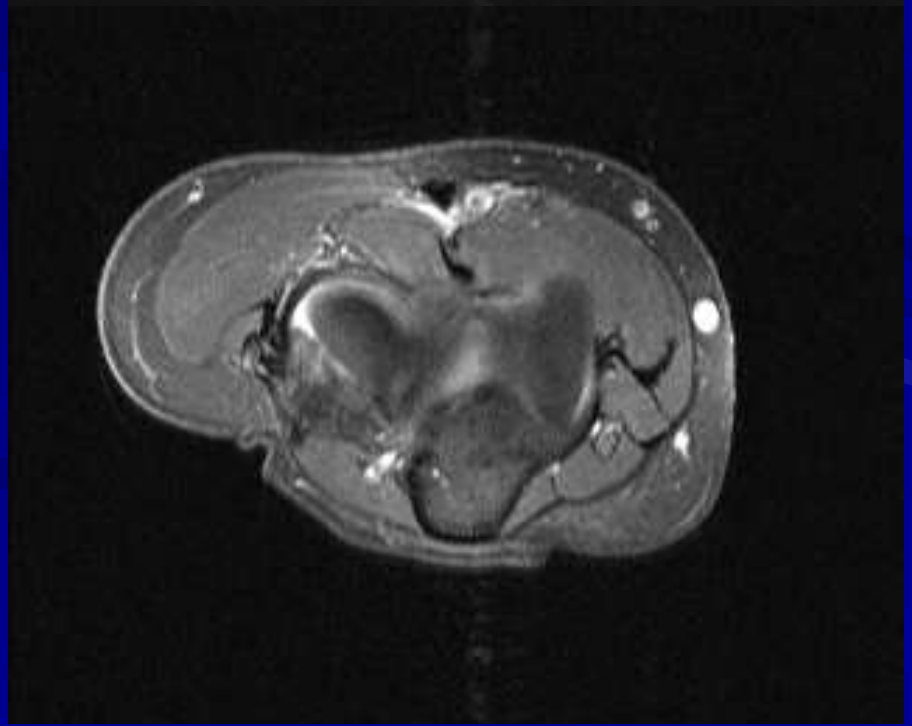
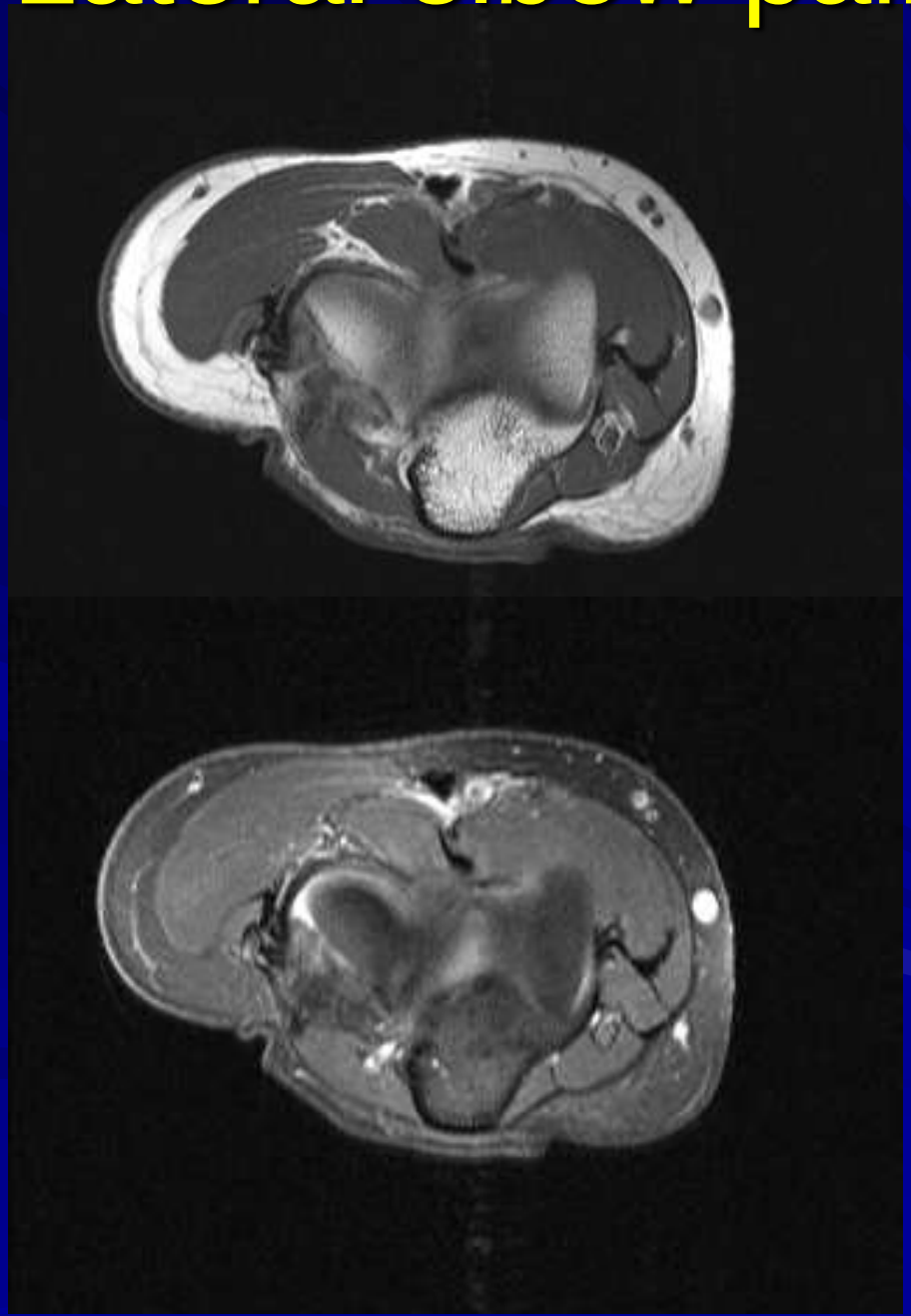
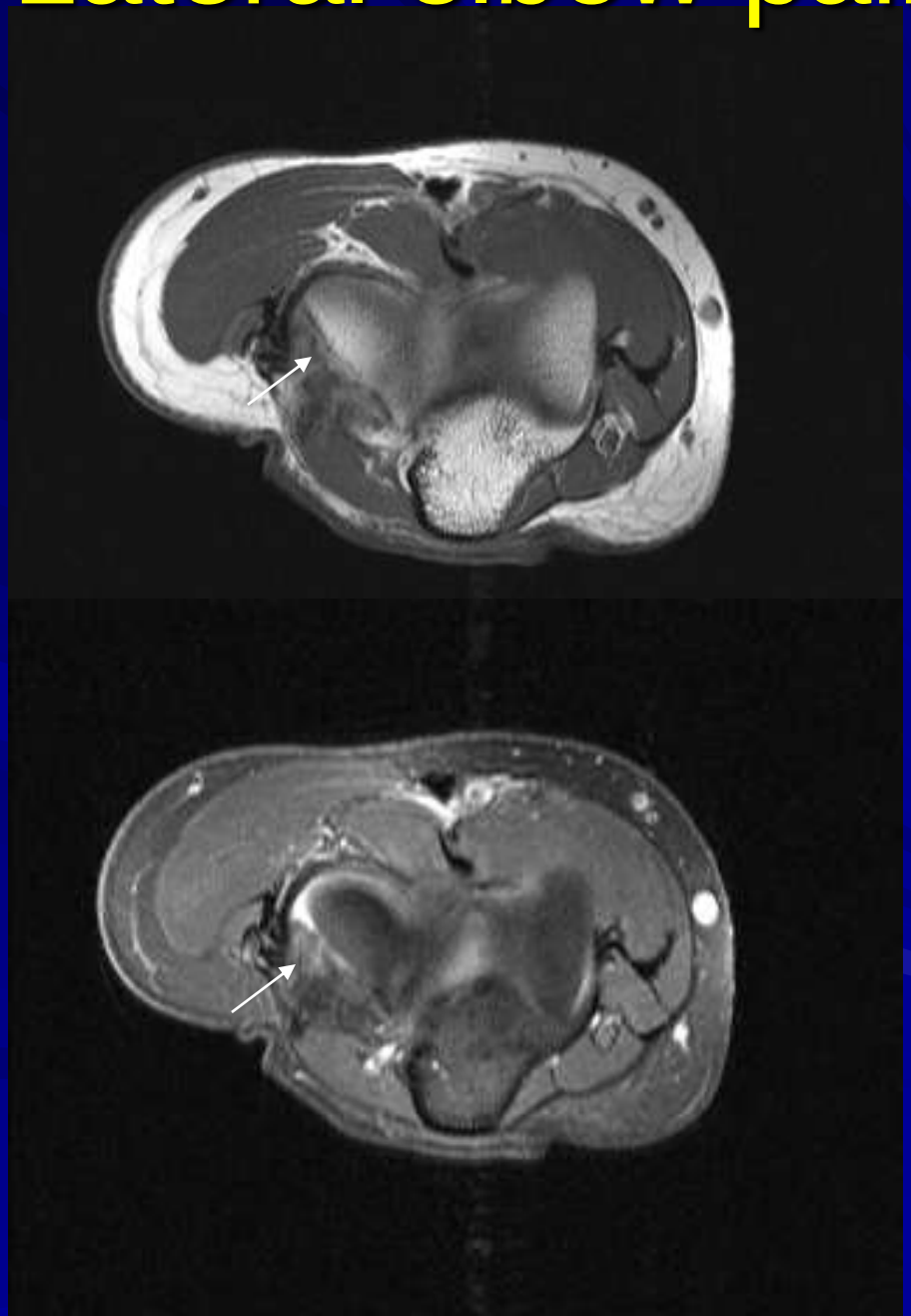




Lateral elbow pain



Lateral elbow pain



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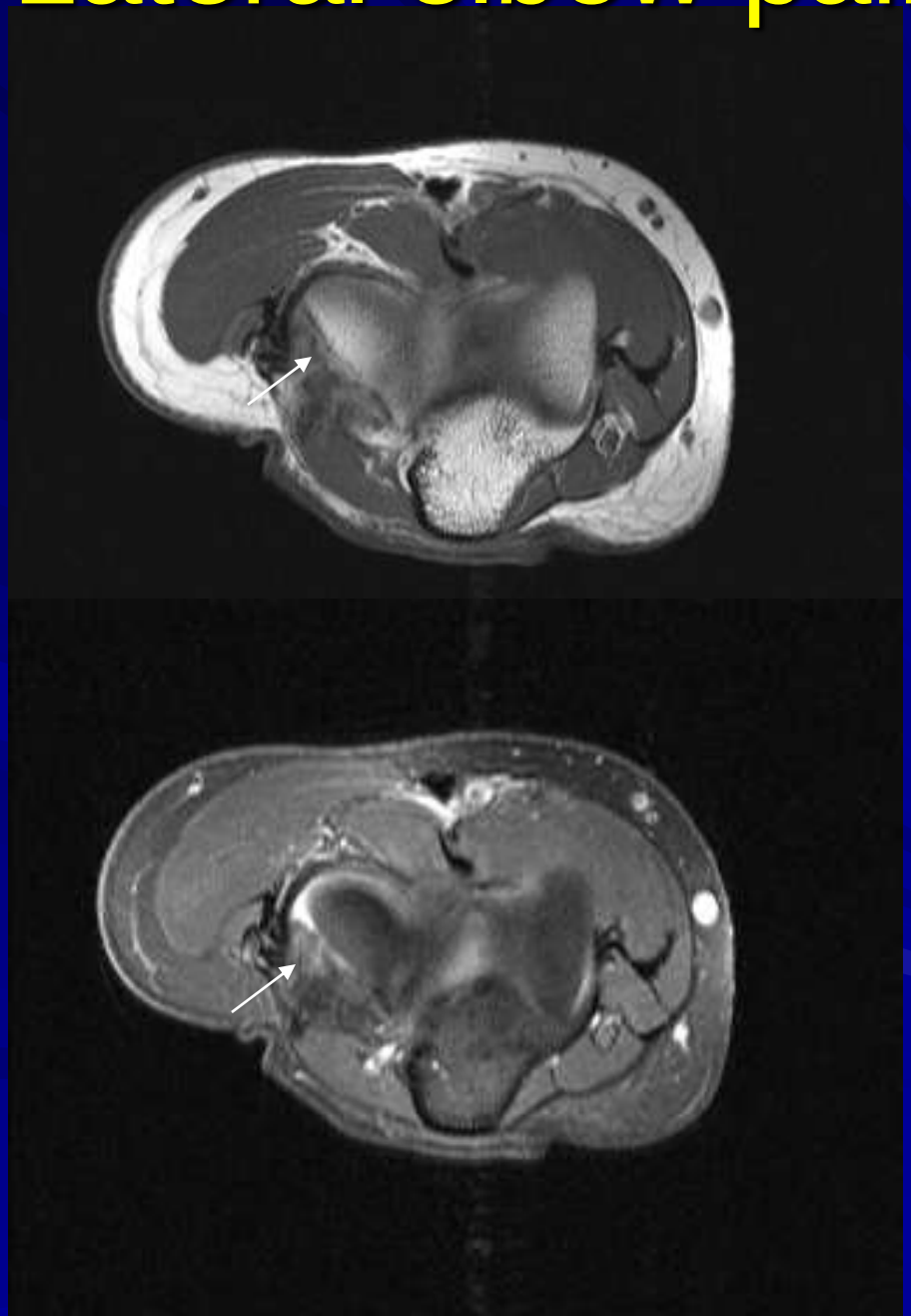
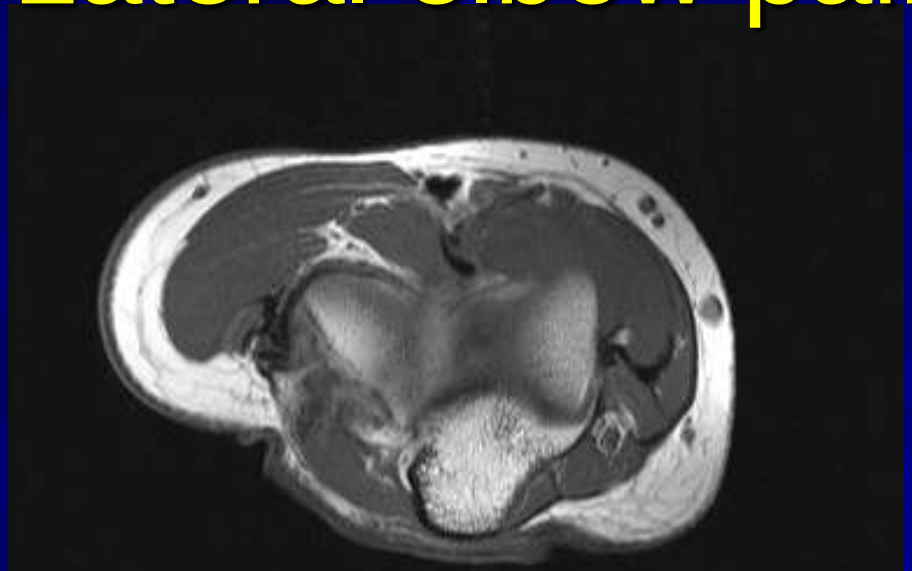
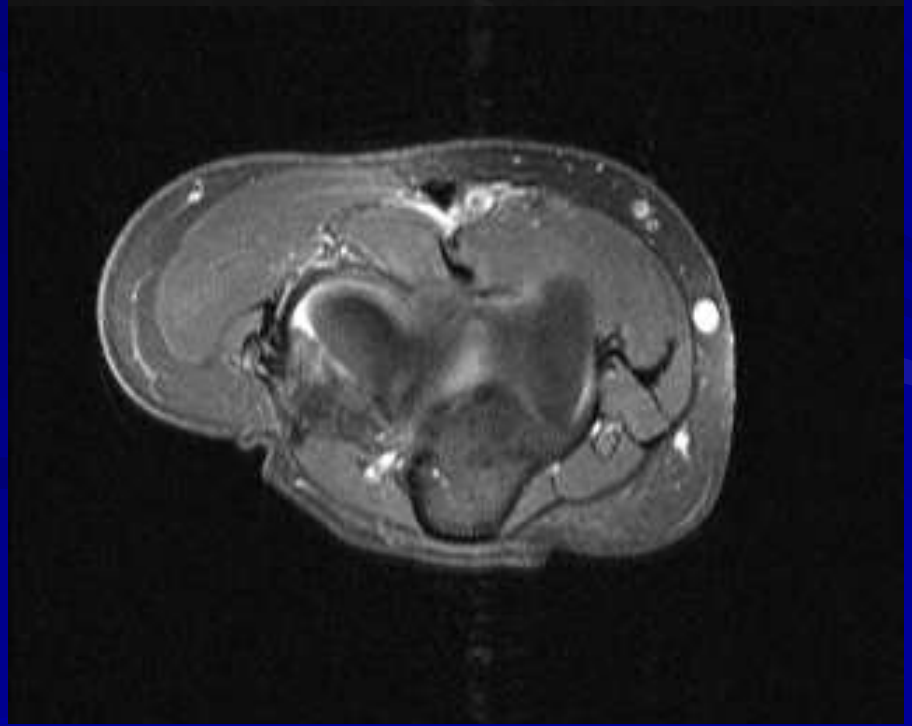
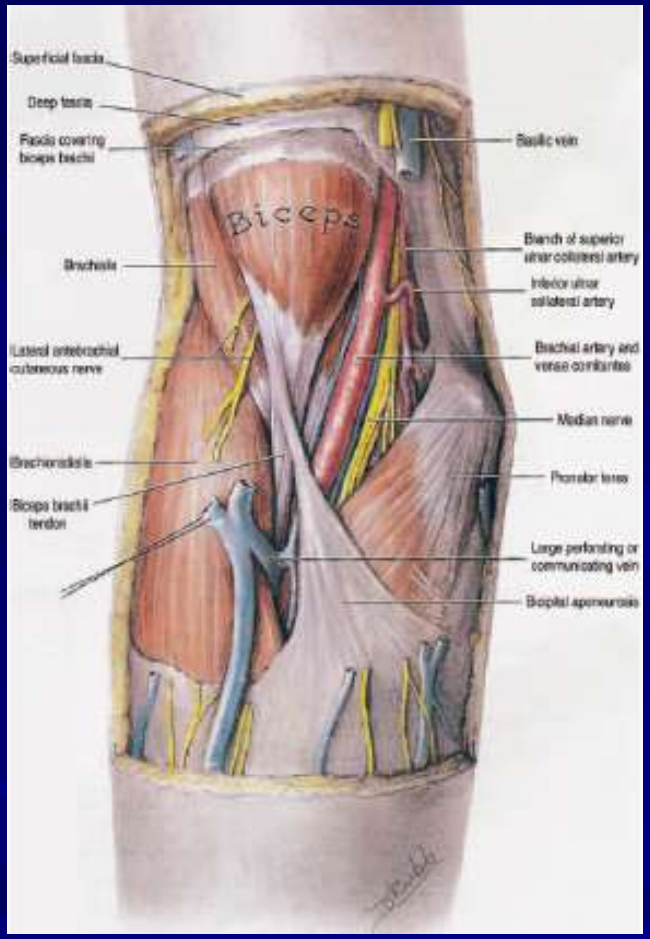


Lateral elbow pain





Biceps Tendon Anatomy



- Above elbow, flat surface faces anterior.
- As the tendon courses distally, it moves in a more posterior and lateral position and twists 90^0, so that the anterior surface faces laterally.
- Distal attachments to the radial tubercle and the fibrosus lacertus (bicipital aponeurosis)

Chew ML. Radiographics 2005; 25:1227-1237

FABS

- *F*lexed elbow
- *AB*ducted shoulder
- *S*upination of the forearm
- Minimizes partial voluming effects
- Improved visualization of insertion
- Center of the magnet optimizes fat supression

FABS

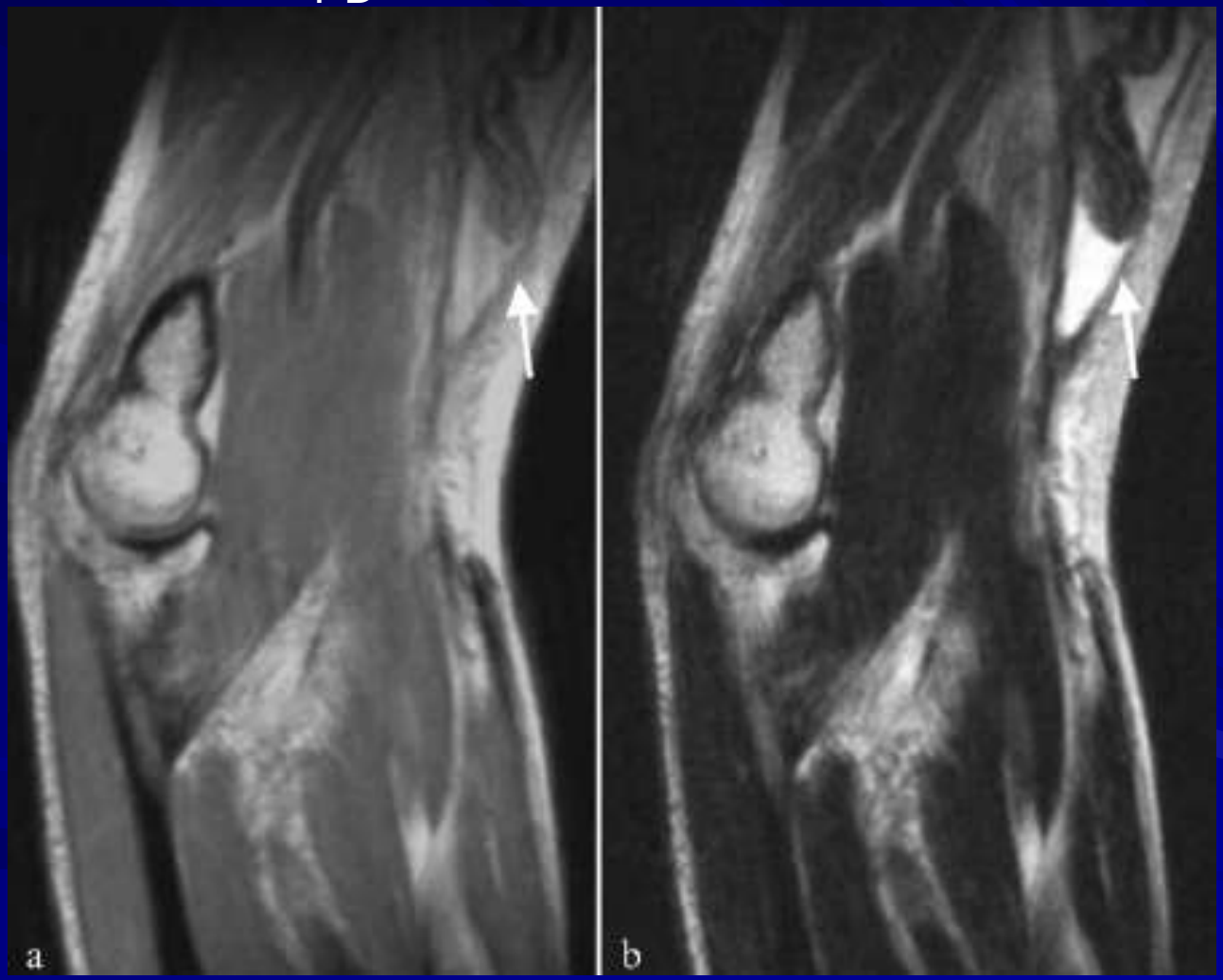
Chew ML. Radiographics 2005; 25:1227-1237

Biceps Brachii

- Injury typically seen in weighlifters
- Forced hypertension applied to a flexed and supinated forearm
- With complete tear, muscle may retract or be held in place by the lacertus fibrosis (bicipital aponeurosis)
- Tear can be mimicked by a partial tear, tendonosis, and cubital bursitis

Biceps tear

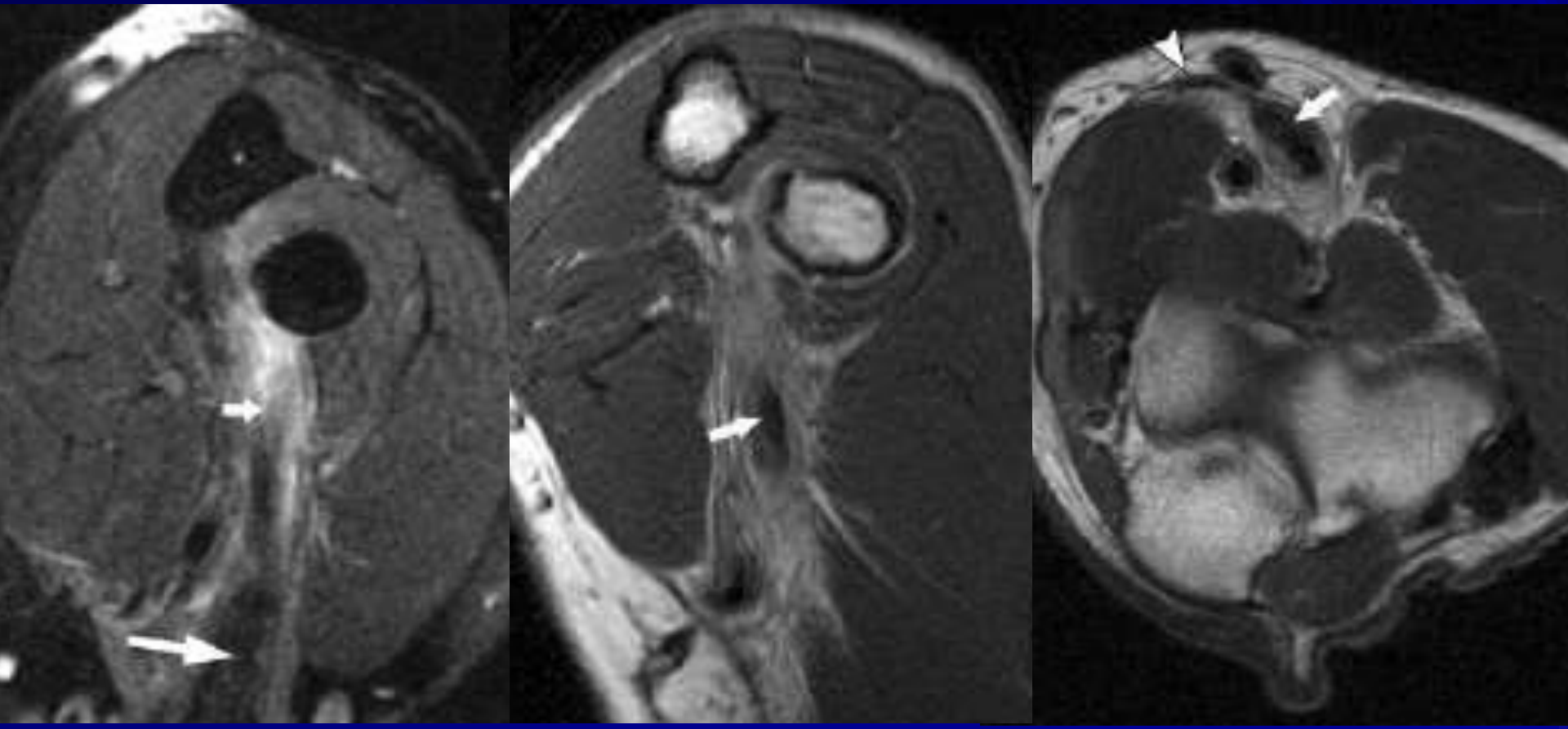
PD T2



Melloni P. Eur J Radiol 54 (2005) 303-313.

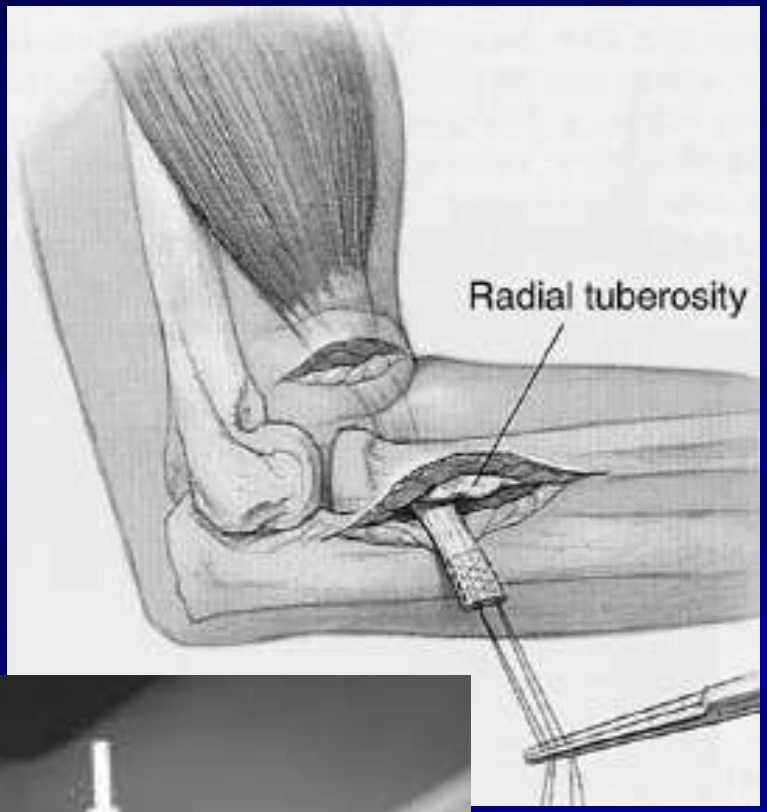
Complete tear biceps

Intact lacertus fibrosus



Chew ML. Radiographics 2005; 25:1227-1237

Complete tear repair

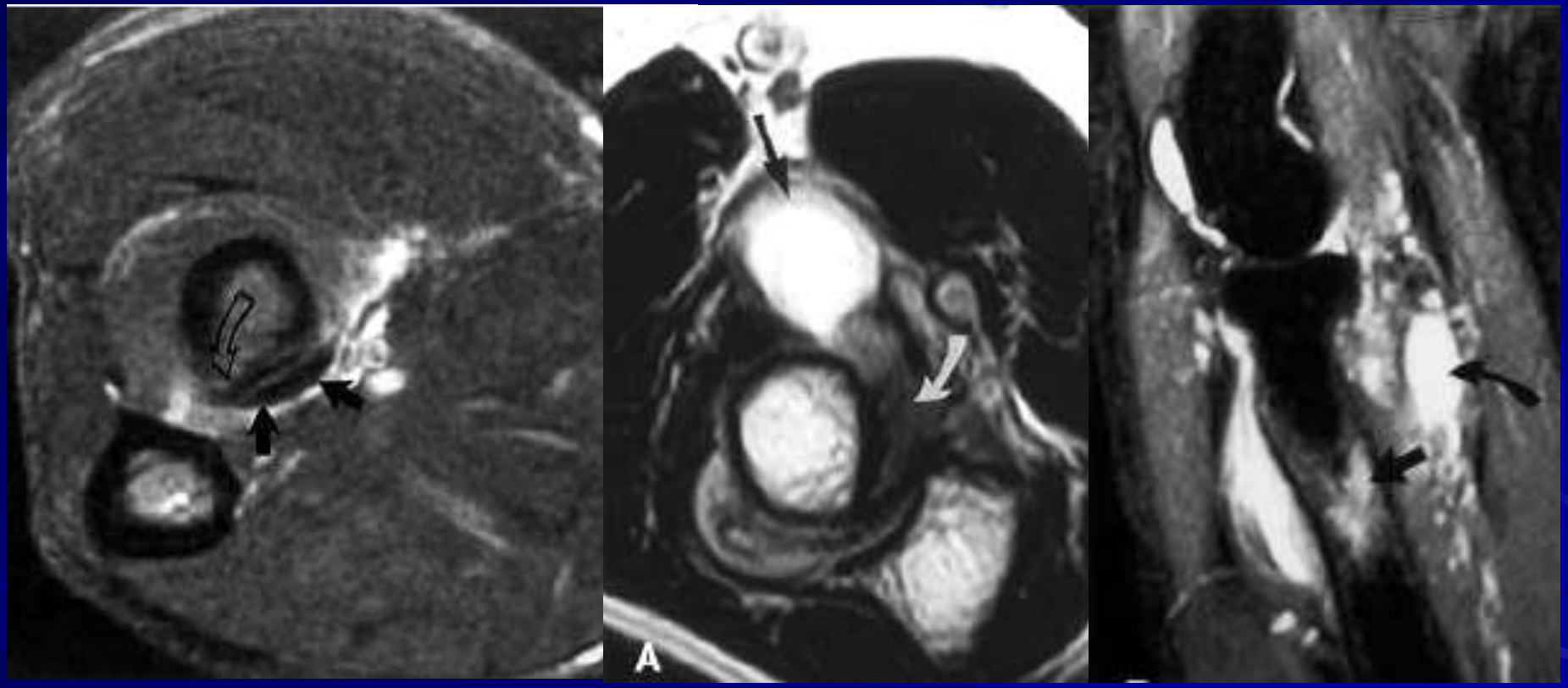


Chew ML. Radiographics 2005; 25:1227-1237

Partial tears of the biceps brachii

- Increase signal within the distal biceps tendon
- 55% demonstrated bicipioradial bursitis
- Insidious onset was more common than an acute traumatic onset of pain
- No echymosis or loss of function

Partial tears of the biceps brachii

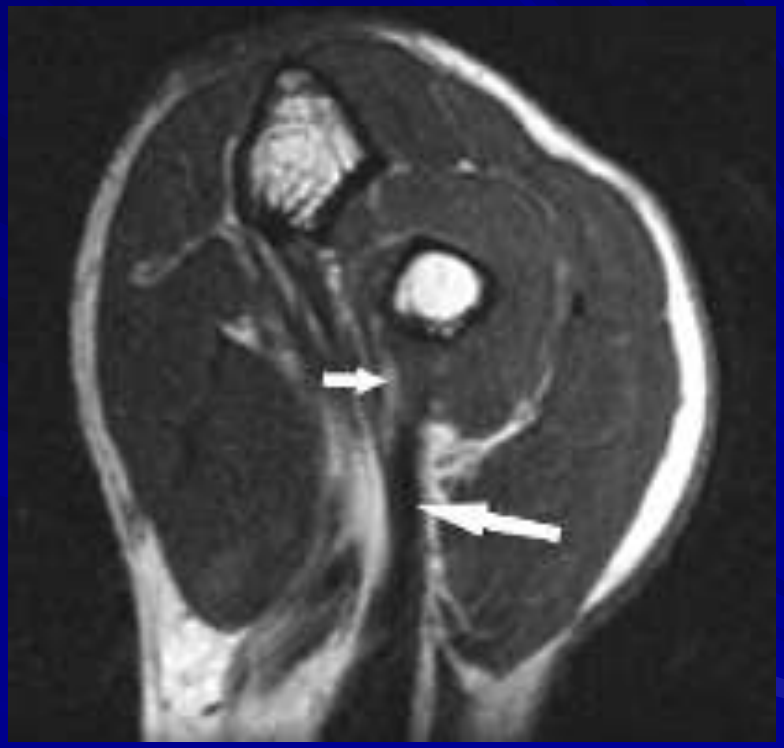


Williams BD. Skelet Rad (2001) 30:560-564.

Partial tear--FABS

PD FS

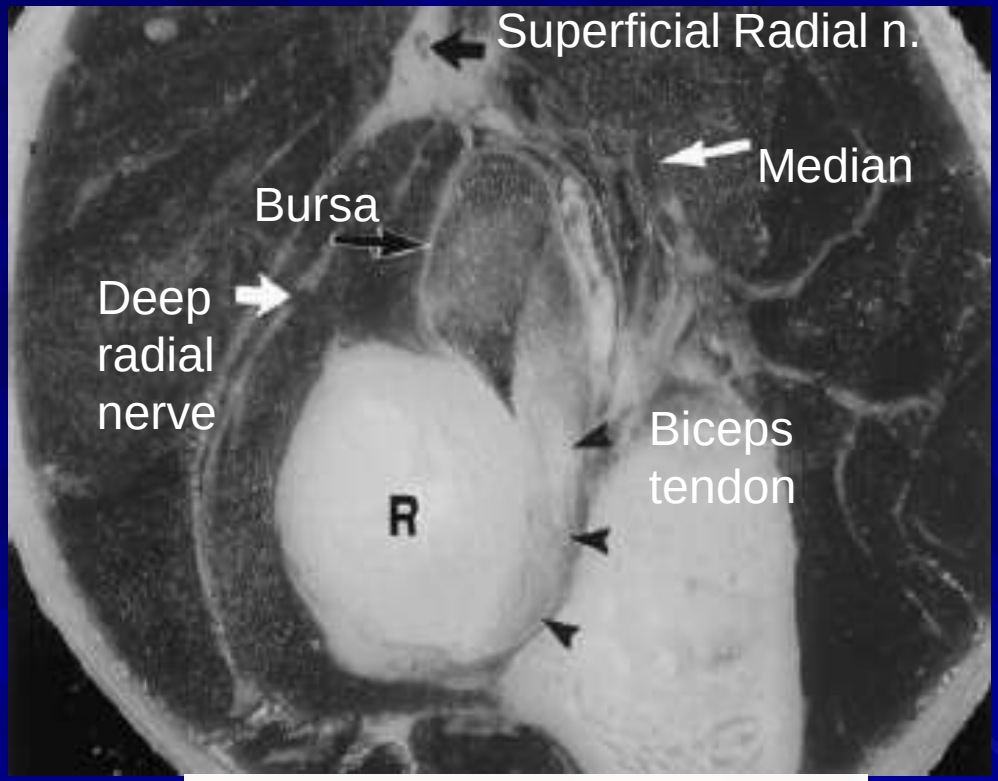
PD

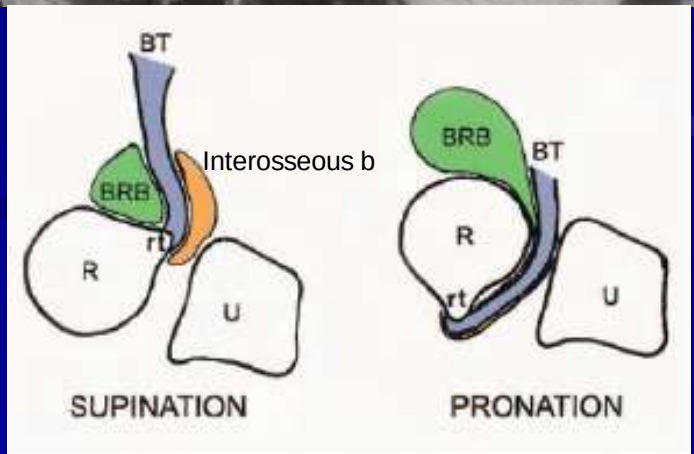


Chew ML. Radiographics 2005; 25:1227-1237

Bicipitalradial bursa

- No tendon sheath.
- There is a paratenon surrounded by the bicipitoradial bursa.
- Becomes more compressed with pronation.





Shaf AY. Radiology 1999;212:111-116

Bicipitoradial Bursa

Bursography

Shaf AY. Radiology 1999;212:111-116

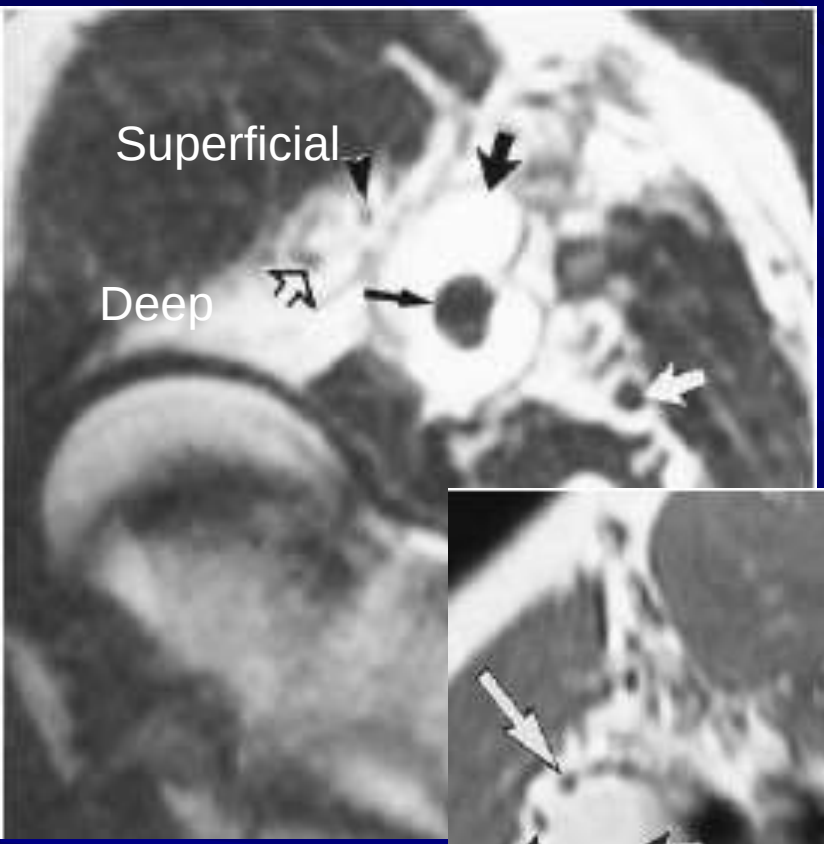
Chung C. Clin Ortho:383, pp. 162-174

Bicipitoradial bursitis

- Mass in cubital fossa
- Most have pain
- Some experience impairment in motion
- If there is extensor muscle weakness, look for compression of the deep and superficial branches of the radial n.
- Etiologies include RA, partial tear of the biceps tendon, and repetitive trauma

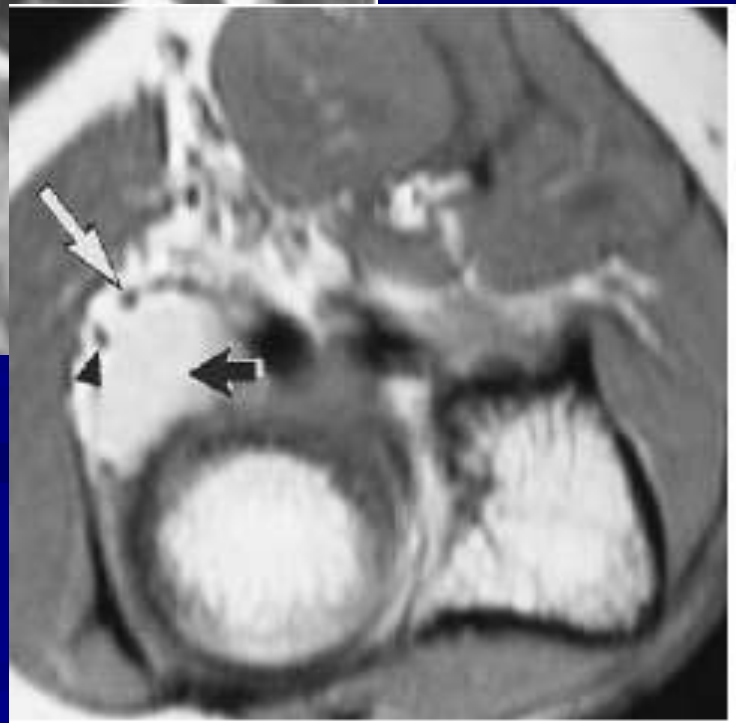
Shaf AY. Radiology 1999;212:111-116

Bicipitoradial bursitis



No contact with adjacent nerves

Displaces radial d. and s. branches in a woman who presented with forearm pain, a mass, and extensor m. weakness.



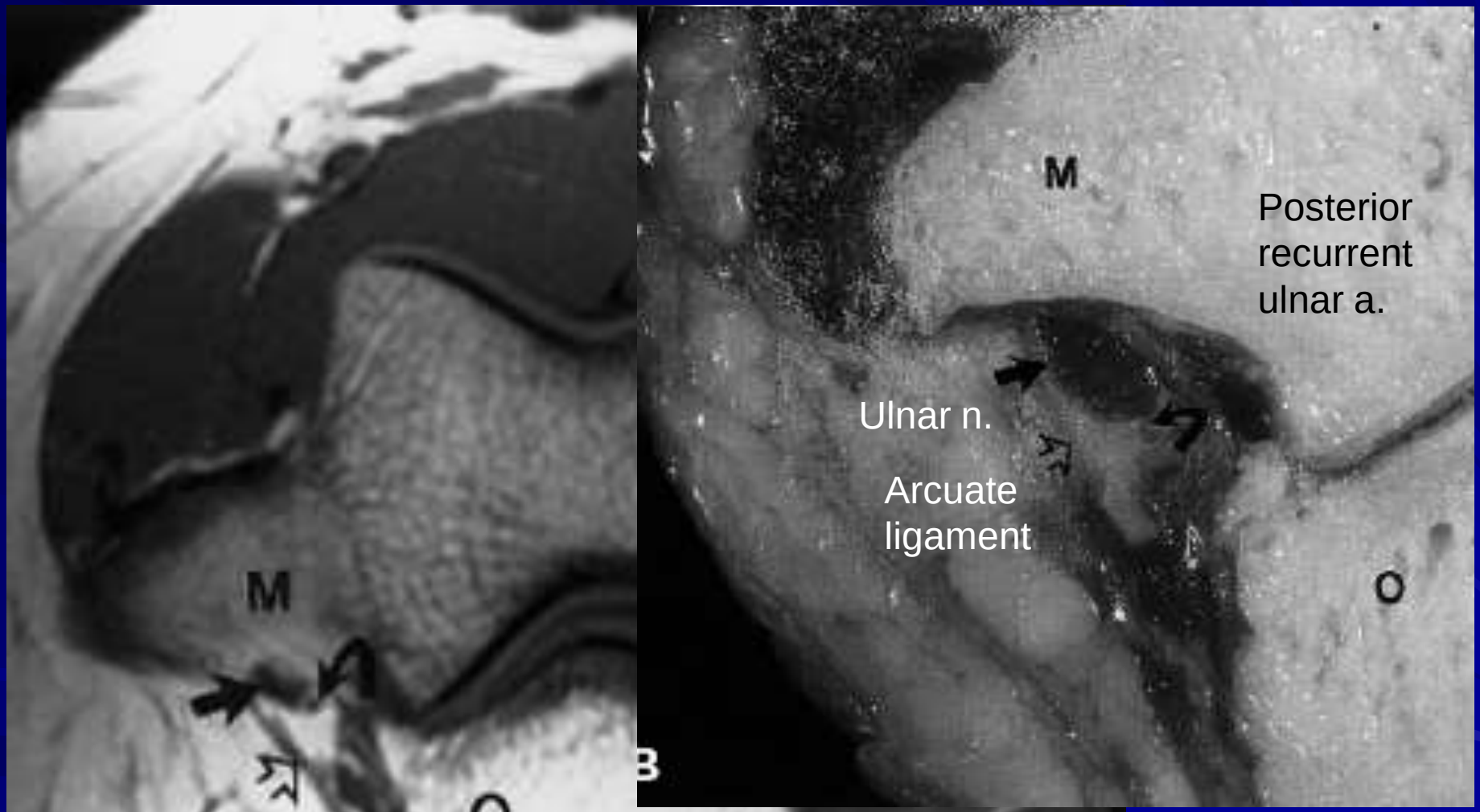
Shaf AY. Radiology 1999;212:111-116

Cubital Tunnel

- Deep borders are the medial epicondyle, the trochlea and the posterior band of the ulnar collateral ligament
- Roof is the arcuate or Osborne's ligament, a retinaculum between the ulnar and humeral heads of the flexor carpi ulnaris muscle—extends from the olecranon to the medial epicondyle

Cubital tunnel

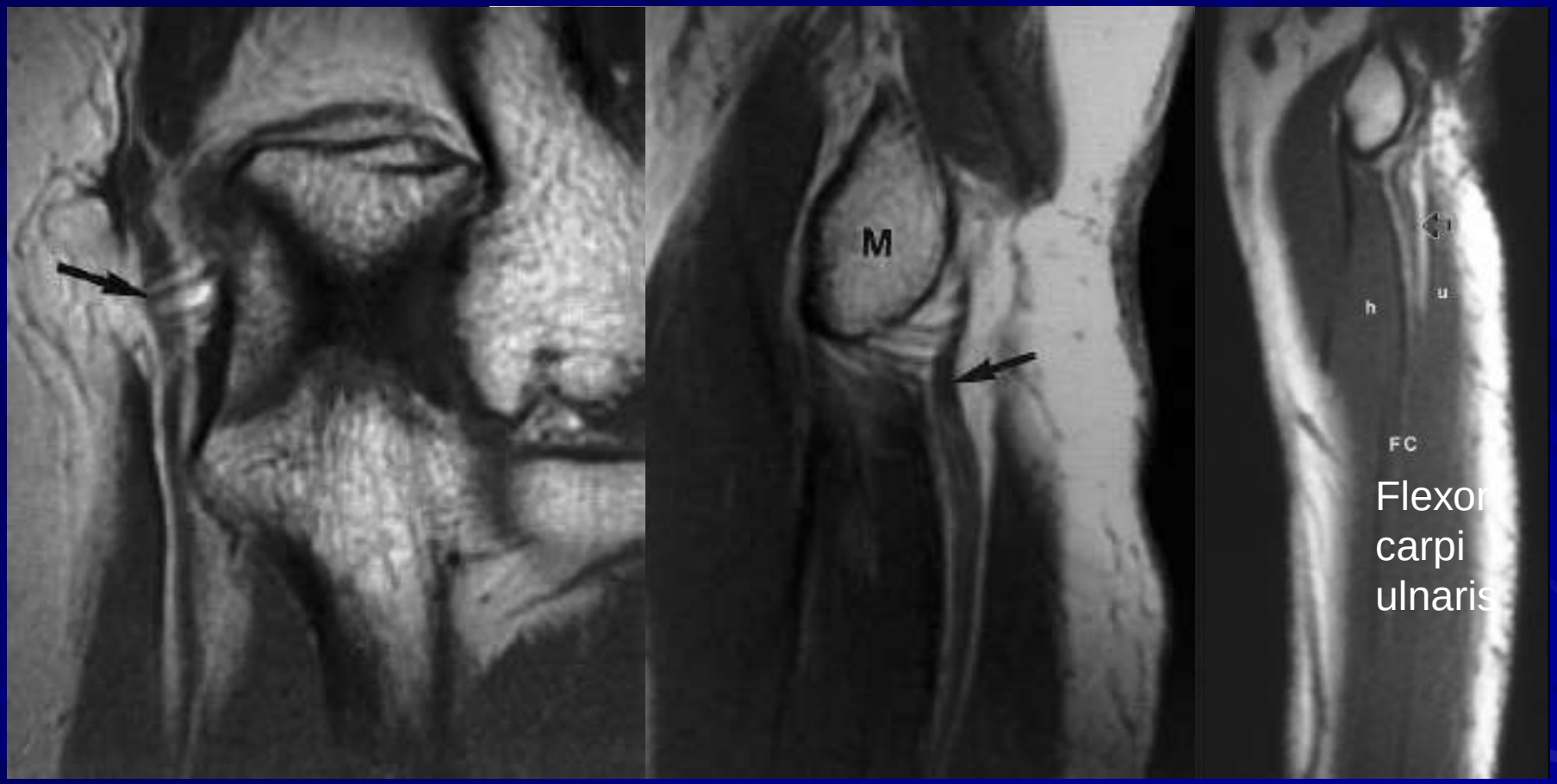
T1



Kim YS. Skelet Radiol 1998.; 27:419-426.

Cubital Tunnel

T1 T1 T1



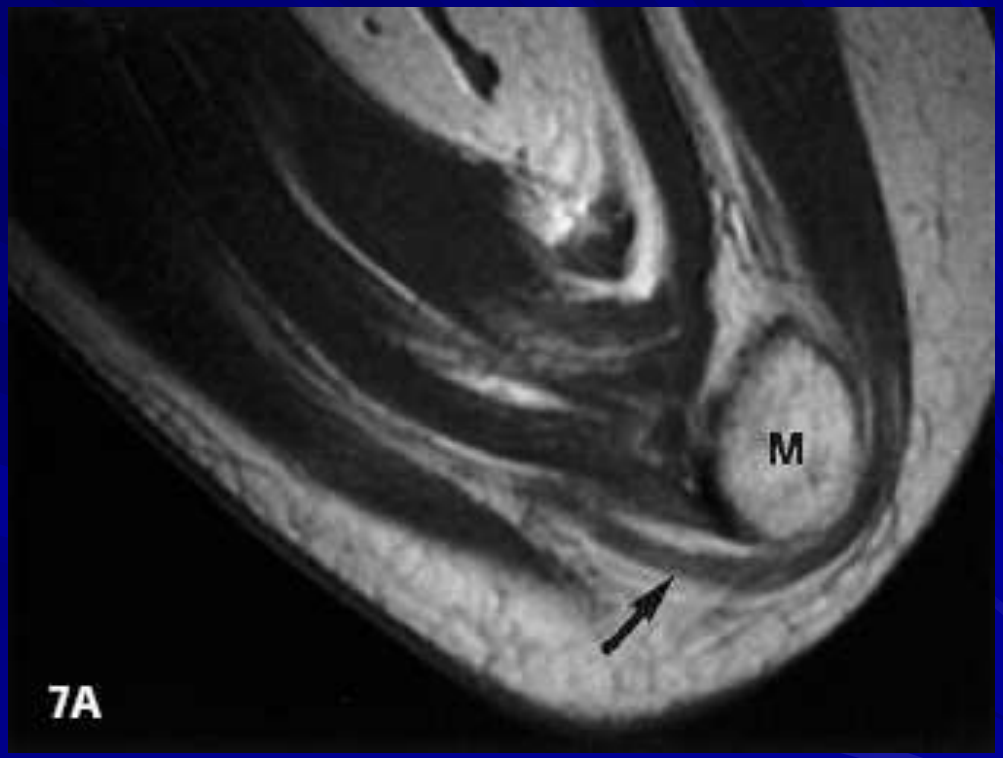
Kim YS. Skelet Radiol 1998.; 27:419-426.

Boles CA. AJR:174, Jan 2000

Flexion

T1

T1



Kim YS. Skelet Radiol 1998.; 27:419-426.

Flexion

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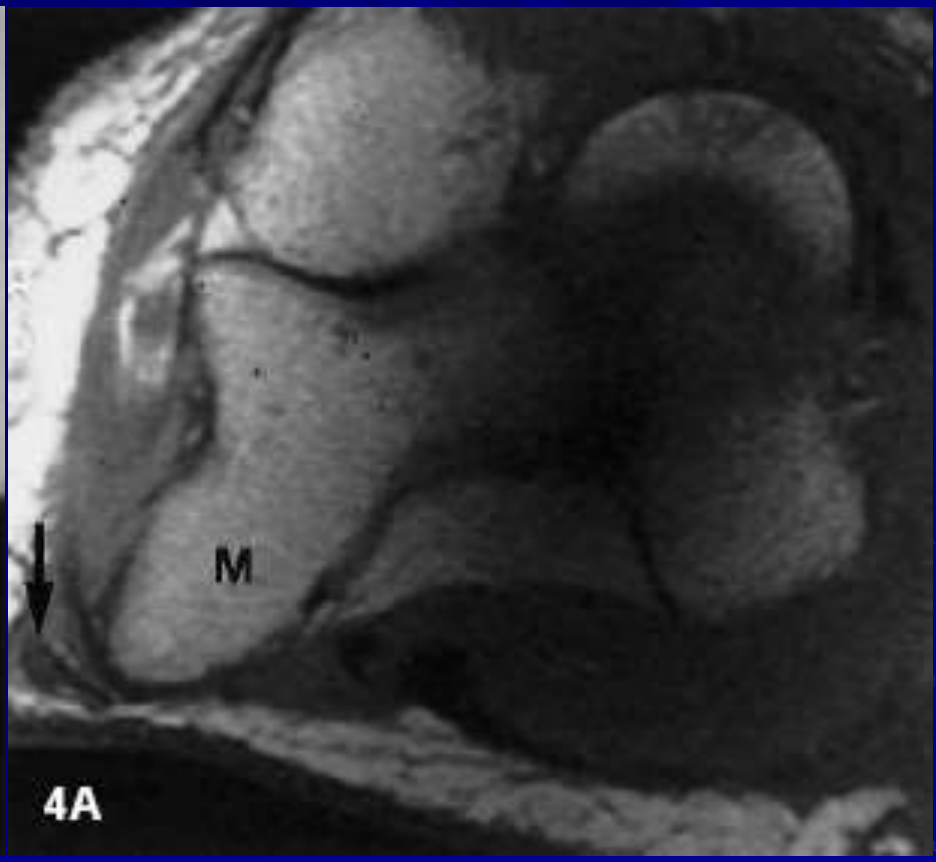

Kim YS. Skelet Radiol 1998.; 27:419-426.

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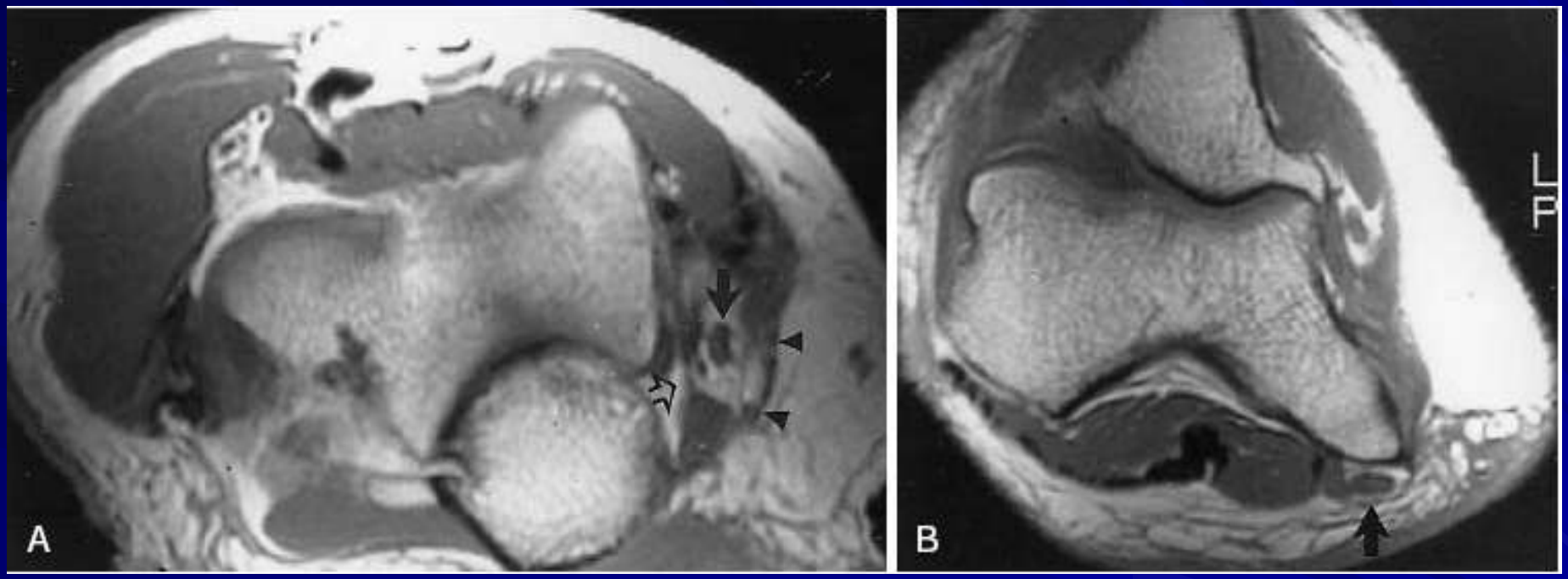


Chung C. Clin Ortho:383, pp. 162-174

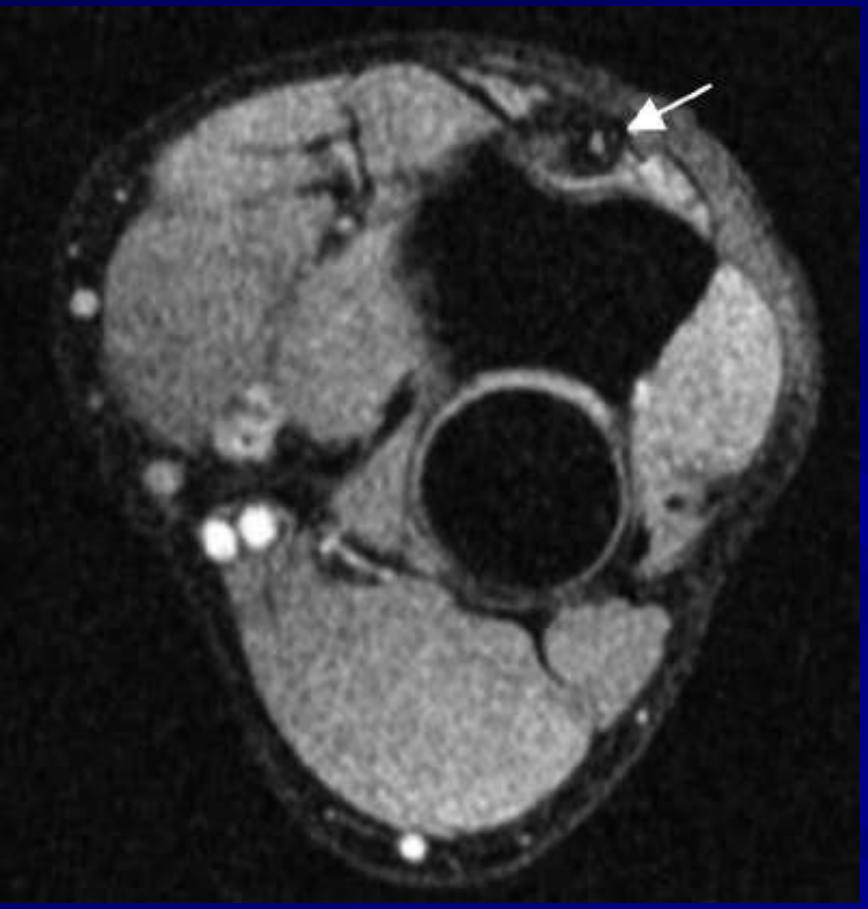
Ulnar nerve entrapment

- Most frequent nerve at the elbow due to its fibro-osseous tunnel
- Ganglion, accessory muscle or abnormal muscular insertion, pannus, osteophyte, etc.
- Ulnar n. often thickened above and within tunnel, and tapering more distally

Melloni P. Eur J Radiol 54 (2005) 303-313.

Ulnar n. entrapment

T1 FS GRE



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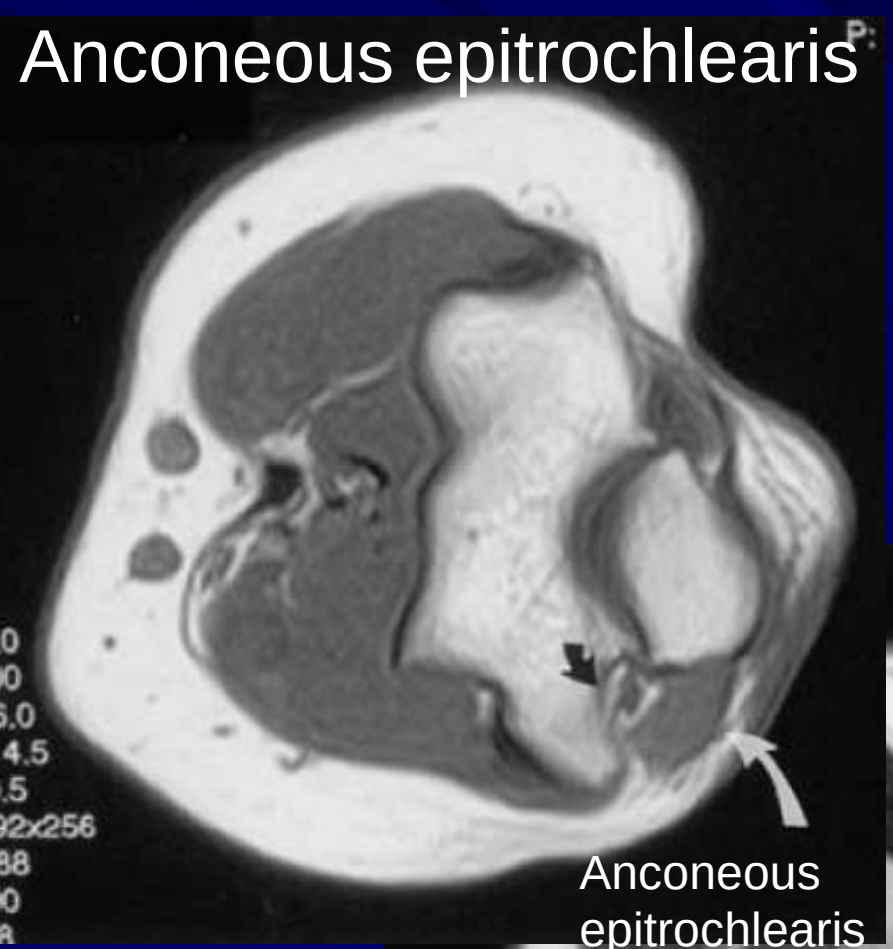
Ly JQ. J Clin Imag 29 (2005) 278-282

Melloni P. Eur J Radiol 54 (2005) 303-313.

Anconeous epitrochlearis



Anconeous epitrochlearis

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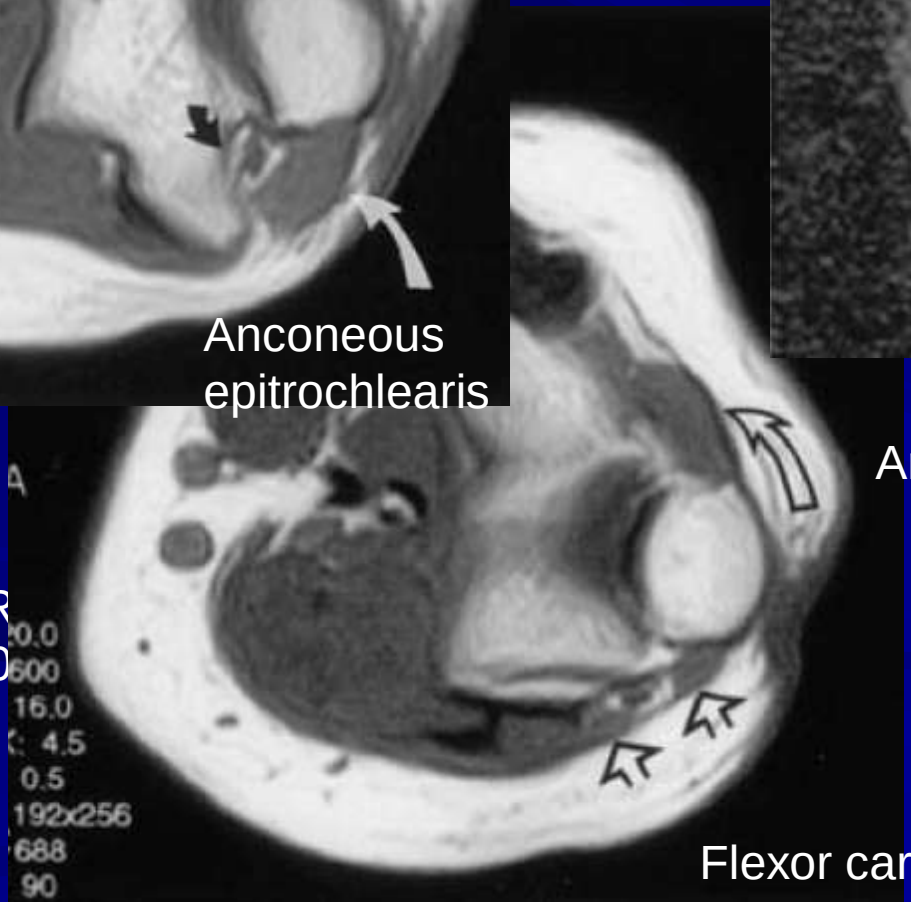
Jeon IH. Skelet R (2005) 34:103-10



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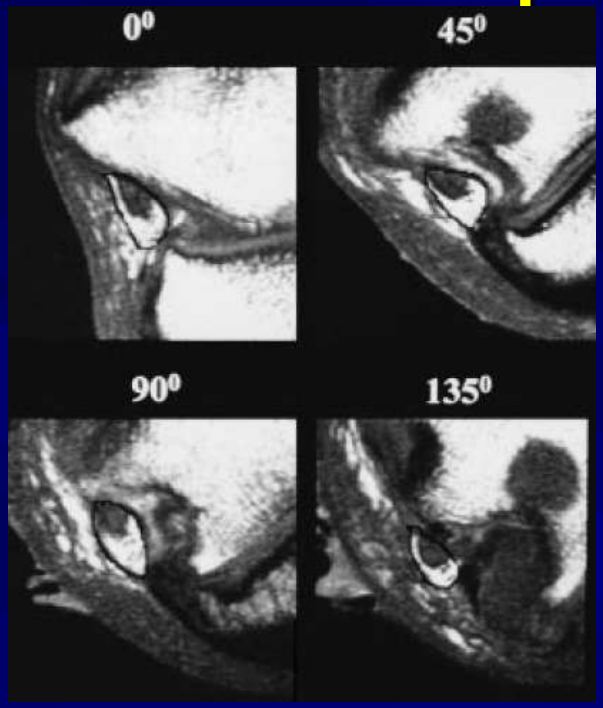
Flexor carpi ulnaris h. and u. heads

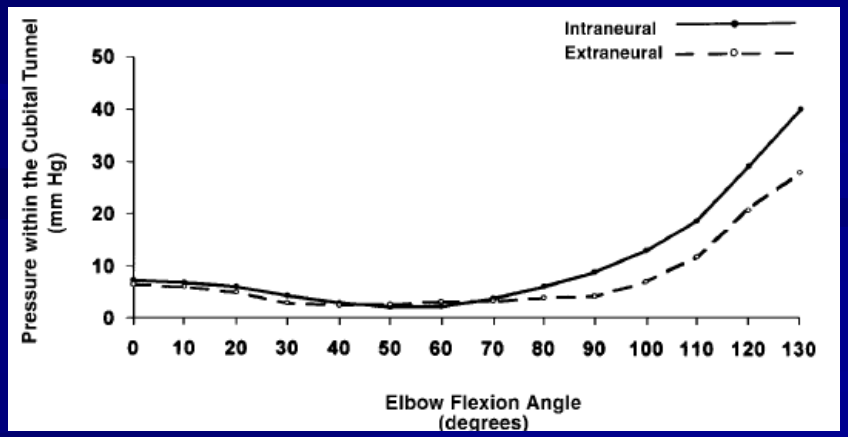
Cubital tunnel syndrome

- 2nd most common compression neuropathy of the upper extremity after carpal tunnel
- Causes include medial trochlear osteophyte, incongruity between trochlea and olecranon, soft tissue mechanical compression during flexion, and traction

Compression or traction?

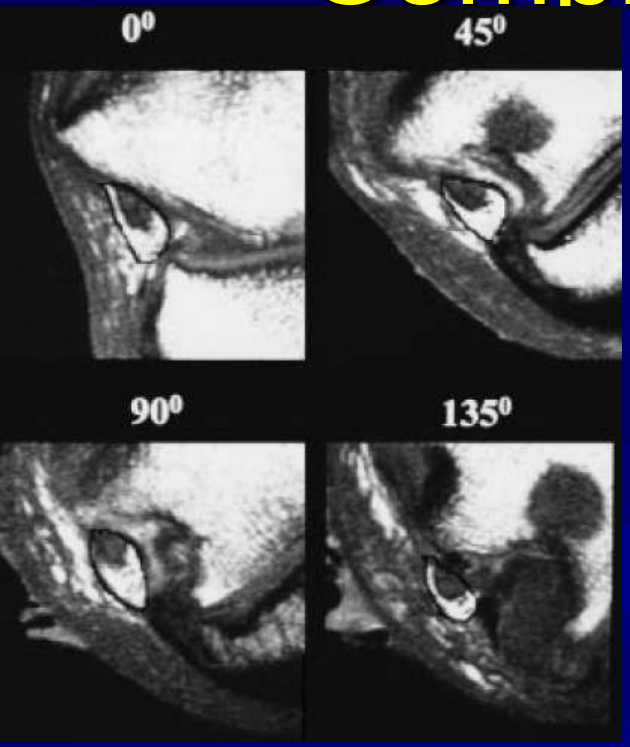


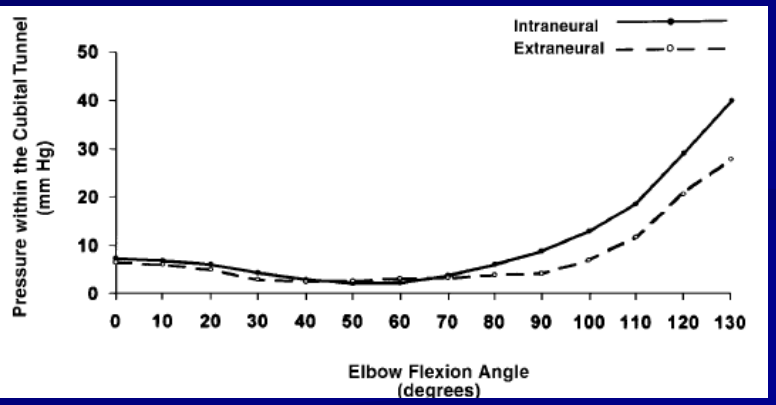
- Cadavers without cubital tunnel stenosis
- Cubital tunnel decreases in size with flexion
- Extra and intraneural pressures are lowest at about 45 degrees



Gelberman RH. J Bone Joint Surg. 1998:80-A;4, 492-501.

Compression or traction?





- Pressures rise quickly at flexion greater than 90 degrees
- Intraneural pressures rise faster and higher than extraneural pressures
- Ulnar n. cross-sectional area decreased as the cubital tunnel decreased without effacement of surrounding fat
- Suggests traction may be more important than compression in many symptomatic patients

Gelberman RH. J Bone Joint Surg. 1998:80-A;4, 492-501.

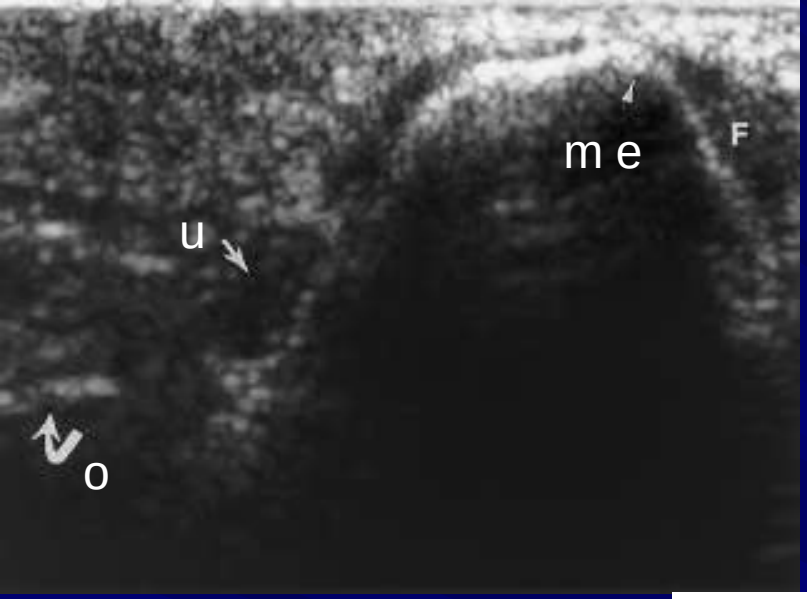
Implications?

- Decompressing the ulnar n. without transposing it out of the cubital tunnel or decompressing it through a medial epicondylectomy would not likely treat any symptoms arising from traction.
- Lack of fat effacement within the cubital tunnel at imaging does NOT exclude cubital tunnel syndrome, even in the flexed position

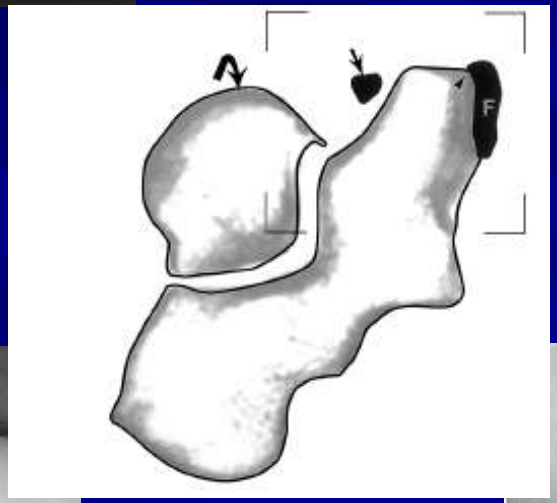
Ulnar nerve dislocation

- Can be a cause of medial elbow pain or snapping/catching sensation
- Medial dislocation over the medial epicondyle
- Absent arcuate ligament between the ulnar and humeral heads of the flexor carpi ulnaris

Jacobson, JA. Radiology 2001;220:601-605



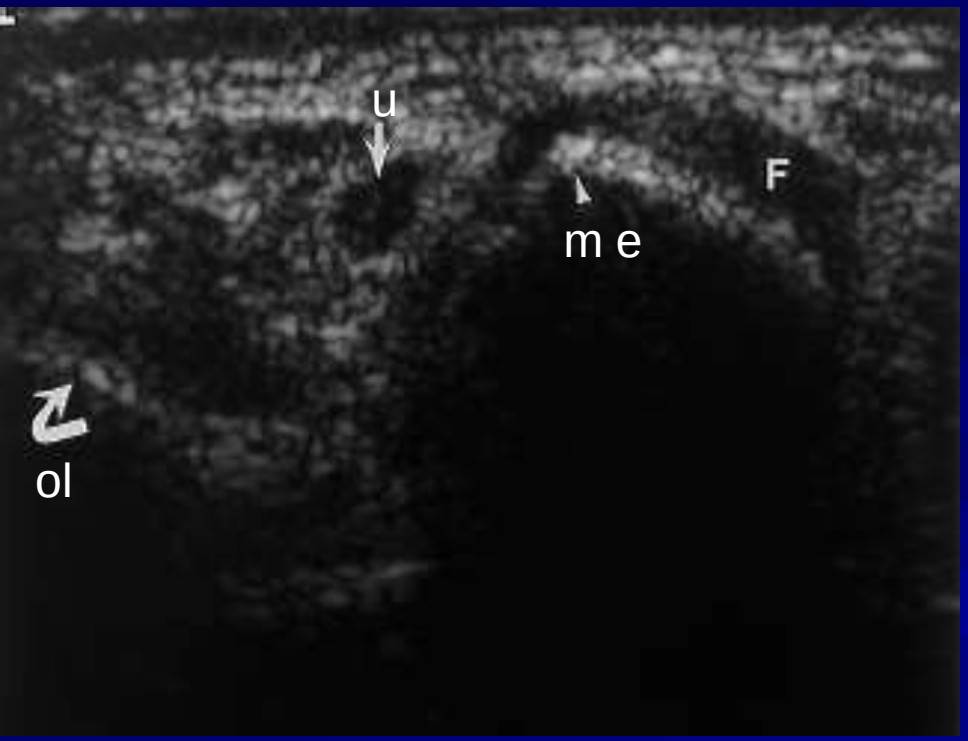
Extension



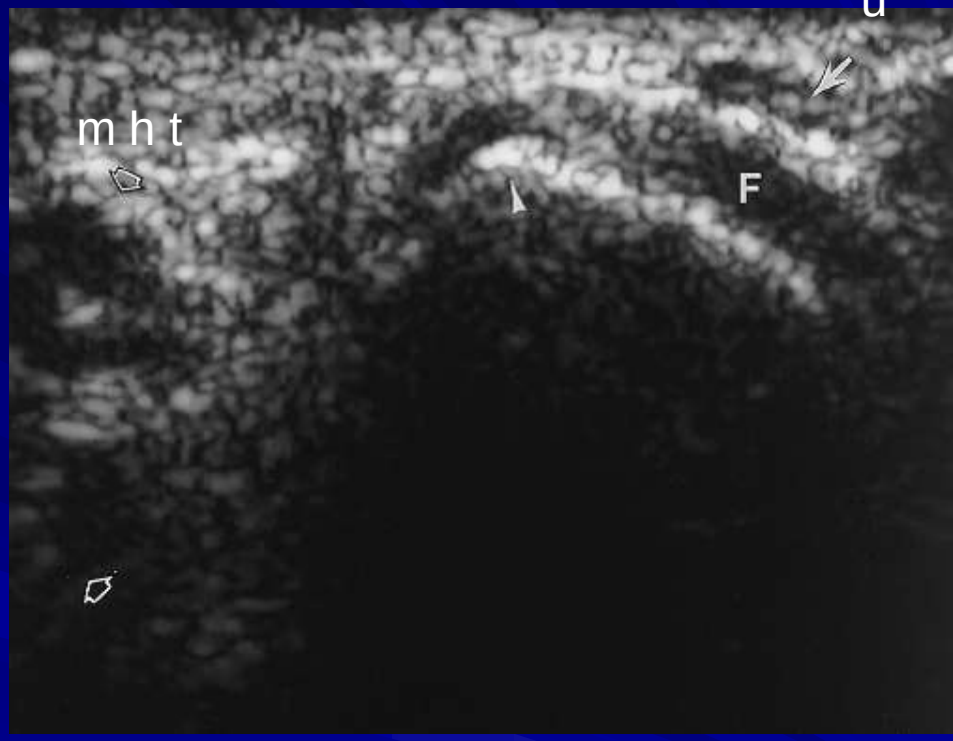
Flexion

Jacobson, JA. Ra

Extension



Flexion



Jacobson, JA. Radiology 2001;220:601-605

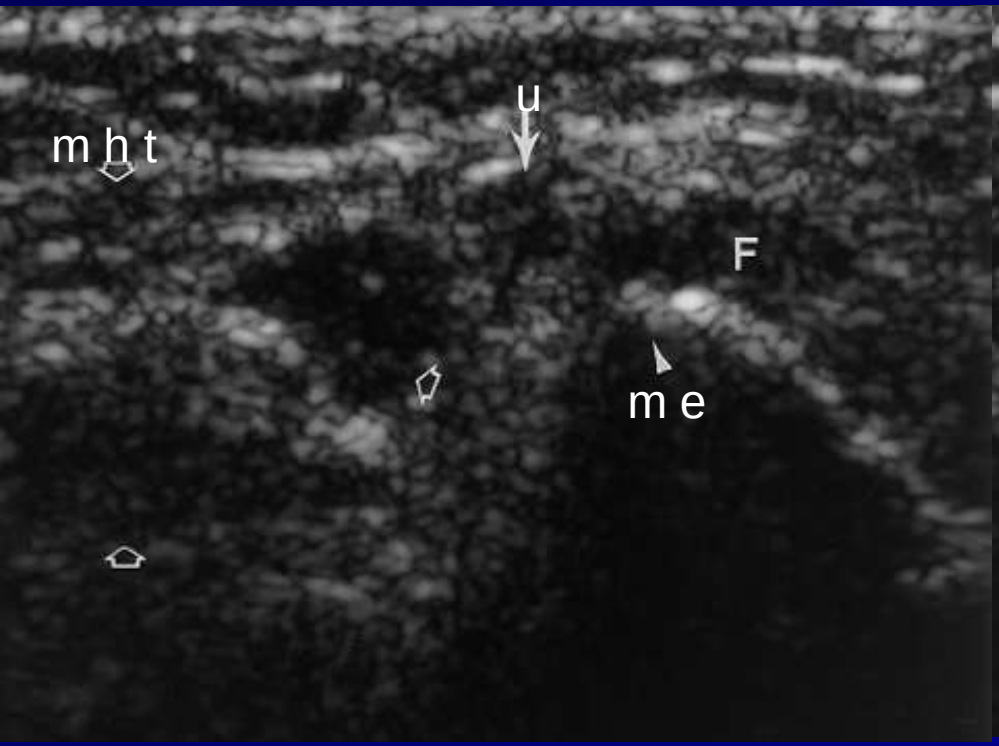
Snapping triceps syndrome

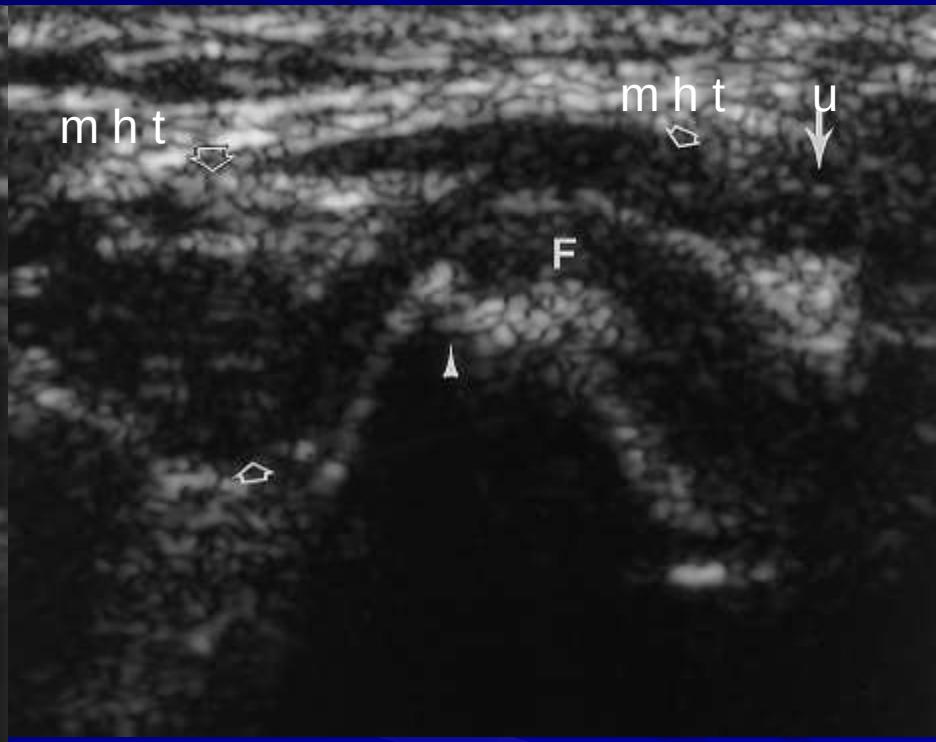
- Medial subluxation/dislocation of both the ulnar nerve and the medial head of the triceps over the medial epicondyle
- Difficult to distinguish clinically from ulnar nerve dislocation
- Isolated ulnar nerve translocation in the setting of snapping triceps syndrome will not stop the problem

Jacobson, JA. Radiology 2001;220:601-605

Extension

Flexion





Jacobson, JA. Radiology 2001;220:601-605

Awaya H. AJR:177, Dec 2001

Boles CA. AJR:174,Jan 2000

Cain EL. Amer J Sports Med 2003; 3(4):621-635

Chew ML. Radiographics 2005; 25:1227-1237

Chung C. Clin Ortho:383, pp. 162-174

Duparc F. Surg Radiol Anat (2002) 24:302-307

Fukase N, Skelet Radiol 2005 Jun 7

Gelberman RH. J Bone Joint Surg. 1998:80-A;4, 492-501.

Huang G. Eur Radiol (2005) 15: 2411-2414

Isogai S. J Shoulder Elbow Surg. 2001; 10:169-181

Jacobson, JA. Radiology 2001;220:601-605

Jeon IH. Skelet Radiol (2005) 34:103-107

Kijowski R Skeletal Radiol(2005) 34:1-8

Kim D. Amer J Sports Med. 2006, Vol 34, Num 3, p. 438-444

Munshi M. Radiology 2004; 231:797-803

Shaf AY. Radiology 1999;212:111-116