The Shoulder

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Orthopedic Surgeon

Understanding Shoulder Injuries

- History
  - Traumatic
  - Overuse
  - Aging
  - Infection
  - Metabolic
  - Congenital
  - Neurological

History

- The most important part of the evaluation
- 80% of the diagnosis should be able to be made with a proper history
- What happened?
- How and when did it happen?
- What makes it worse or better?
- Is there any sensation of
  - Popping
  - Painful popping
  - Catching
  - Night time awakening

History (cont.)

- Loss of motion
  - Diminished abduction and flexion: look for impingement
  - Diminished internal rotation: look for adhesive capsulitis (frozen shoulder) or captured shoulder (post surgical adhesions)
- Painful overhead arc?
- Trouble lifting, reaching, throwing, etc
- Night time awakening suggests internal derangement

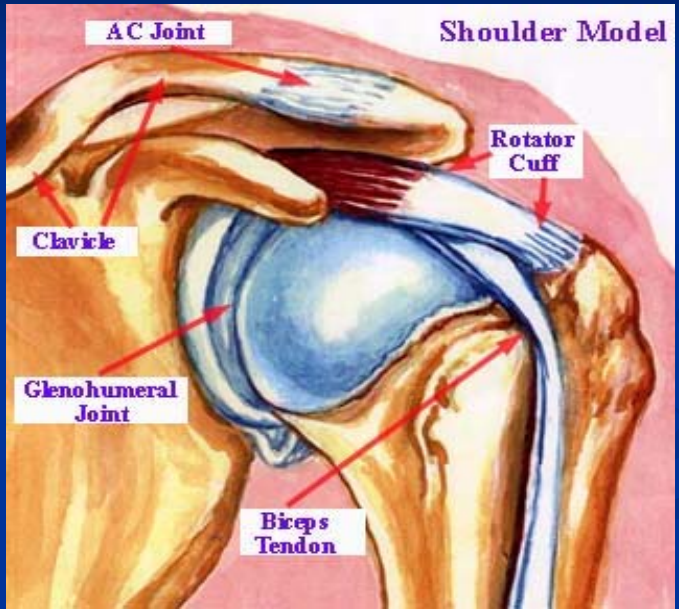
History

- Traumatic
  - Work injury
  - Falls
  - Sports
  - Motor vehicle

Overuse

- Repetitive strain
- Abnormal posture
- Overhead use
- Twisting
- Lifting
- Reaching, pushing, pulling, carrying

Basic Anatomy



Aging

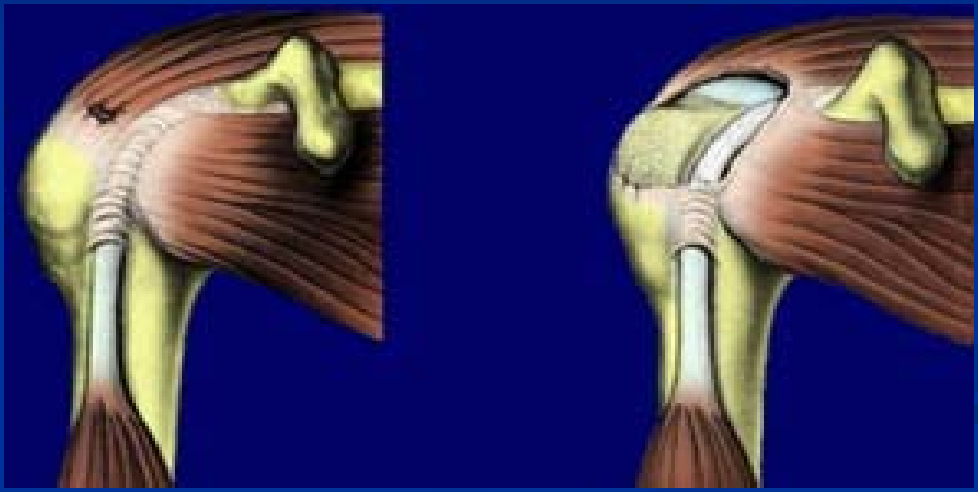
- Degenerative conditions
  - Rotator cuff tendonitis
  - Rotator cuff tears
    - Partial tears
    - Complete tears
    - Complex tears
  - Biceps tendon tears
  - Biceps tendon subluxation
  - Labral tears
  - Degenerative arthritis glenohumeral joint
  - Degenerative arthritis acromioclavicular joint
  - Calcific tendonitis of rotator cuff

Aging (cont.)

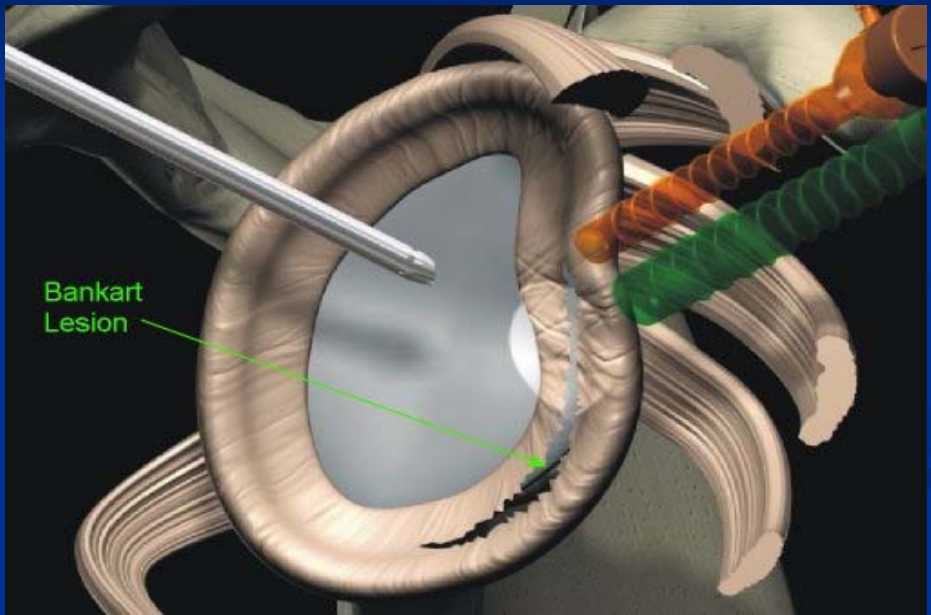
- Degenerative type 3 acromion
  - Tends to occur with chronic rotator cuff degeneration
  - Can possibly contribute to rotator cuff tearing or impingement
- Degenerative acromioclavicular joint inferior spur can lead to impingement

Calcific Tendonitis

Partial and Full thickness cuff tears



Bankart Lesion



Infection

- Usually post operative
- Rarely due to other sources

Metabolic

- Rheumatoid arthritis
- Gout
- Avascular necrosis
  - Chronic steroid use
  - Rare: sickle cell anemia
  - Rare: scuba diving

Congenital

- Ligamentous laxity
  - Multidirectional laxity, may lead to
    - Multidirectional instability
  - More easily injured
  - Usually bilateral, may or may not involve other joints
  - Sporadically involves the AC joint

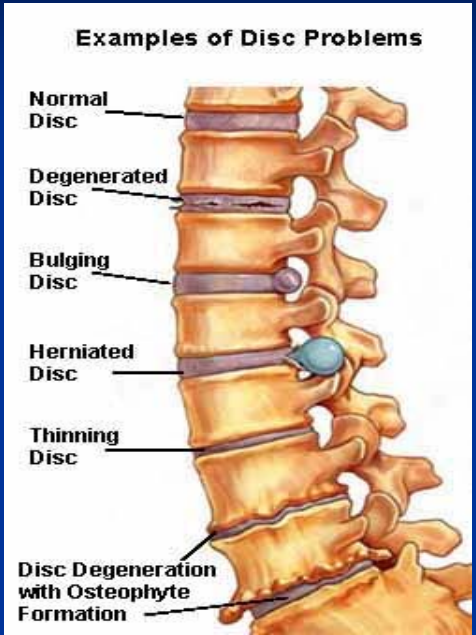
Instability Types

- Traumatic "TUBS"
  - Traumatic, Unidirectional, with Bankart lesion often needing Surgery
  - AMBRI: Atraumatic, Multidirectional, usually Bilateral, responds to Rehabilitation and rarely requires Inferior capsular shift
  - Traumatic superimposed upon pre-existing atraumatic instability
  - Mild instability: negative MR Arthrogram, seen only at arthroscopy

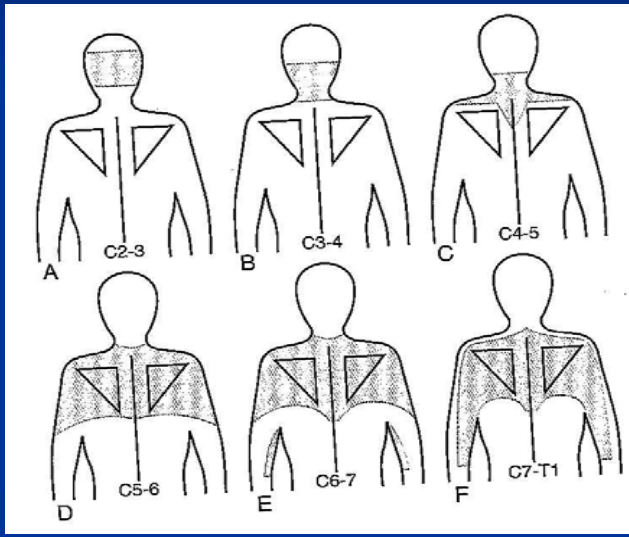
Neurologic

- Neck (Pain radiates along nerve pathways)
  - Facet syndrome
  - Degenerative spondylosis (arthritis)
  - Discogenic pain
  - Foraminal stenosis
  - Herniated disc

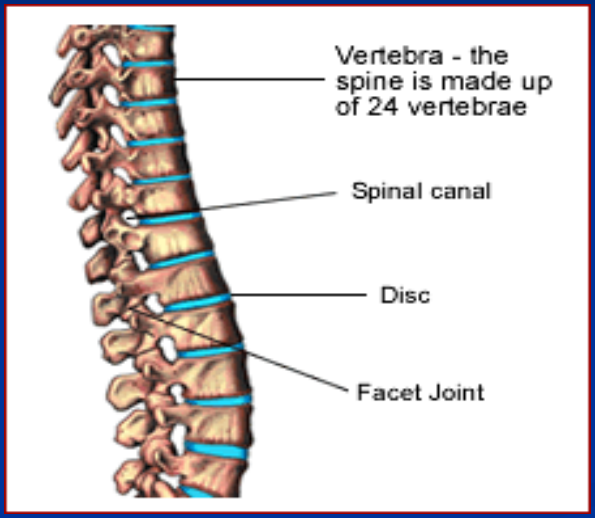
Neck Pain

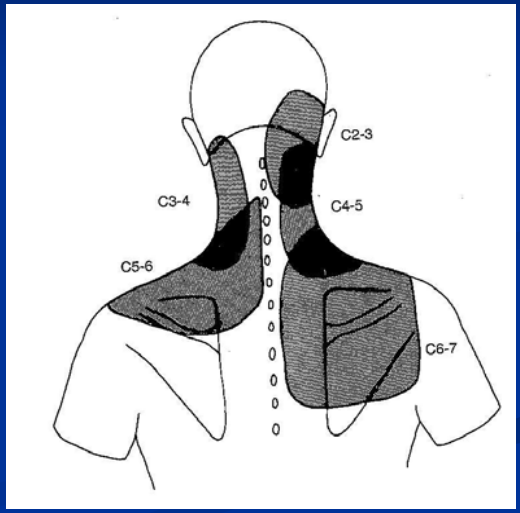


Radicular Pain



Neck Pain (cont.)
Facet Pain





Neurologic (cont.)

- Brachial plexus
  - Strain
  - Tumor
  - Myofacial pain syndrome/trigger point
- Complex regional pain syndrome (reflex sympathetic dystrophy)
  - Shoulder-hand syndrome
- Neuropathic pain

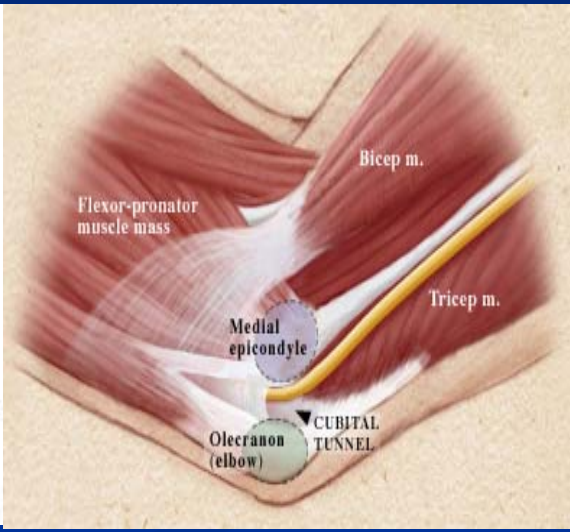
Neurologic (cont.)

- Cubital tunnel syndrome
  - Radiates pain to scapula
  - Numbness and tingling to ring and/or little fingers
  - Paresthesias increase with elbow flexion
  - Weakness
  - May awaken
- Carpal tunnel syndrome
  - Radiates pain to trapezius
  - Numbness, tingling to thumb, index, middle, and ring fingers
  - Weakness, may drop things
  - Awakens at night, has to shake hand out or move fingers

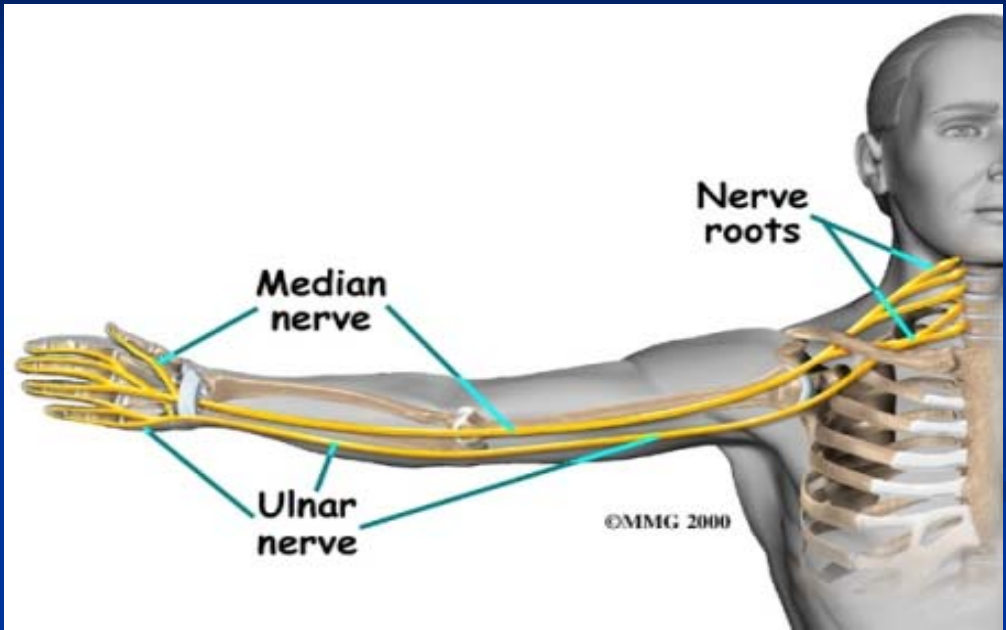
Neurological (cont.)

Median Nerve

Ulnar Nerve



Neurological (cont.)



Shoulder Injuries, Traumatic

- Traumatic injuries are often superimposed upon degenerative conditions
- Physician must try to differentiate between new and pre-existing conditions medicolegally
- Acromioclavicular sprain
  - Grade 1: no displacement
  - Grade 2: clavicle elevated 50%
  - Grade 3: clavicle elevated 100%
    - Complete tear of acromioclavicular and coracoclavicular ligaments

AC Strain

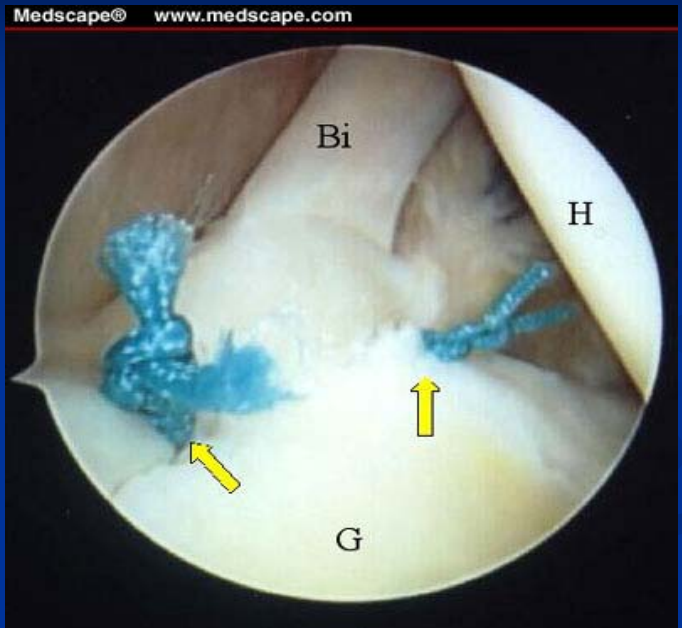
Trauma (cont.)

- Glenohumeral joint strains
  - Anterior dislocation (95%)
  - Posterior dislocation (5%)
  - Subluxation
  - Labral tear
    - Anterior
    - Inferior
    - Posterior
    - Superior—SLAP tear (superior labral tear from anterior to posterior)
    - Combinations
    - Bankart lesion (anterior labral tear, may involve fracture)
  - Capsular stretch or tear

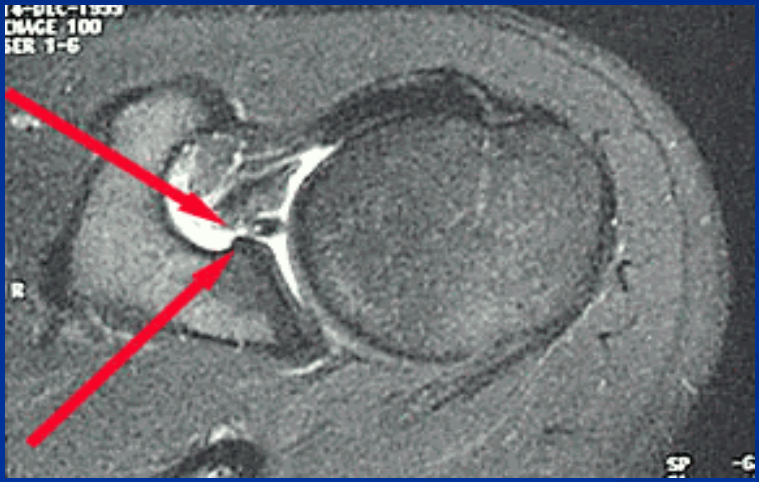
SLAP Tear

SLAP Tear at arthroscopy

Repaired SLAP Tear



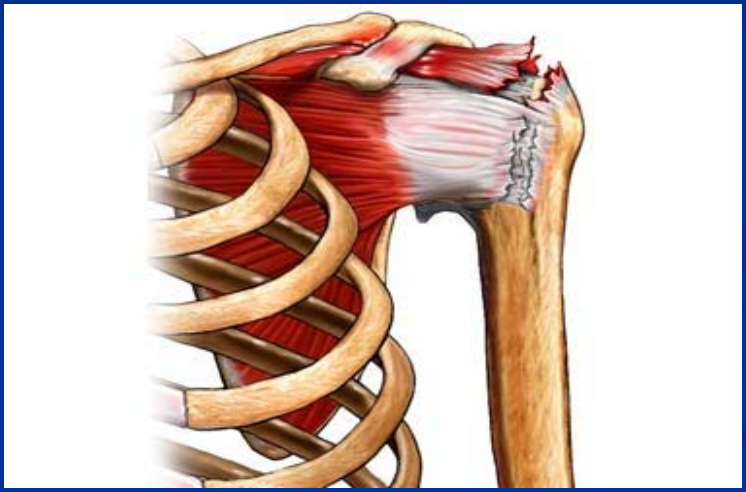
Bankart Lesion, Anterior Shoulder Dislocation



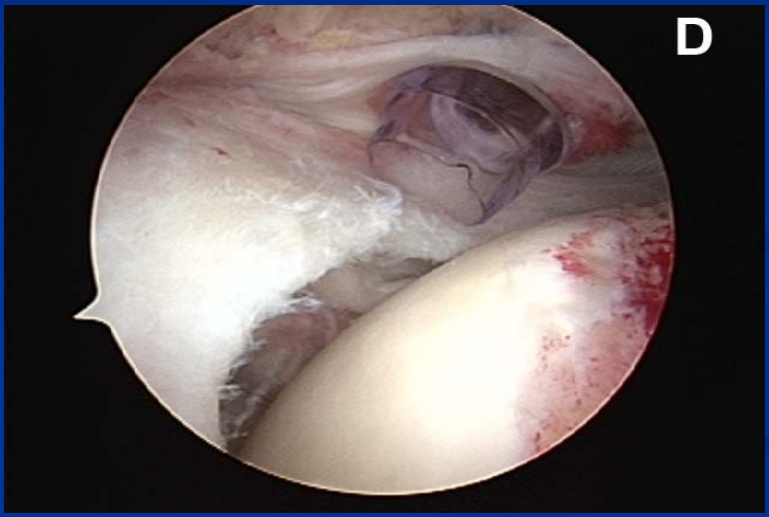
Trauma (cont.)

- Rotator cuff tears
  - Complete tear, with or without retraction
  - Partial tear, with or without retraction
  - Rotator interval tear
  - May cause instability on occasion
  - Chronic complete tears often lead to rotator cuff muscle atrophy and/or degenerative arthritis (cuff tear arthropathy)

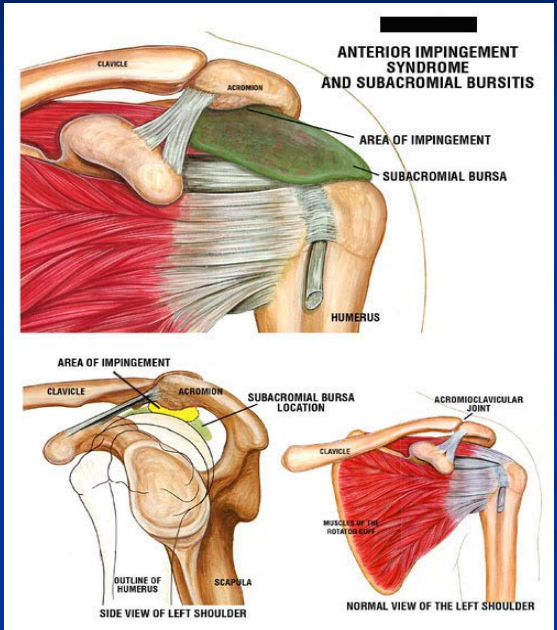
Rotator Cuff Bursal Side Tear



Rotator Cuff Tear, Arthroscopic View



Subacromial Bursitis/Impingement



Subacromial Bursitis, Partial Cuff Tear

Trauma (cont.)

- Subacromial bursitis
  - Associated with impingement or can cause impingement
  - Can cause acromioclavicular joint pain due to the fact that the AC joint becomes inflamed, since the AC joint is adjacent to the subacromial bursa
  - Chronic bursitis is more difficult to treat than acute
  - Any internal derangement of the shoulder can cause bursitis and can lead to impingement because the bursa swells, leaving less room for the rotator cuff with upward shoulder motion

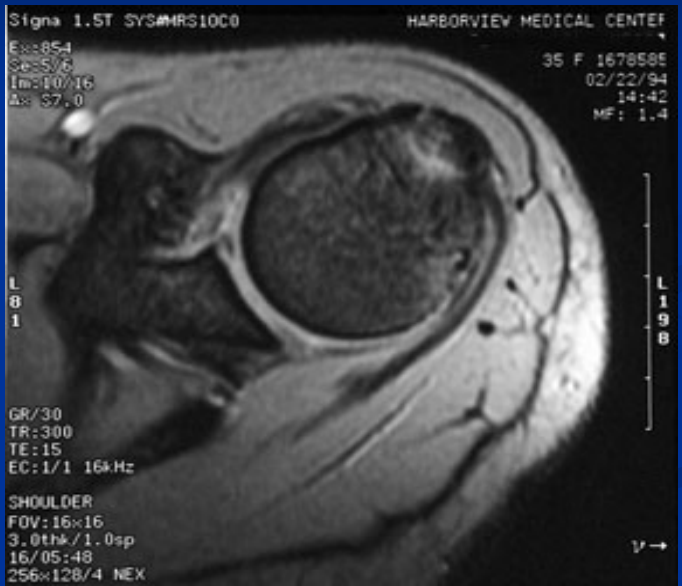
Trauma (cont.)

- Not all subacromial bursitis is related to trauma, but can also occur when there is sufficient degeneration or tearing of the rotator cuff
- Bursitis may occur spontaneously with rupture of a calcium deposit. It is usually severe, but it is often short lived

Trauma (cont.)

- Fractures
  - **Clavicle**
    - **Most are treated conservatively**
    - **Infrequently require surgical repair acutely**
    - **Chronic nonunions often require repair**
  - **Proximal Humerus**
    - **1, 2, and 3 part fractures most often will heal**
    - **Some require surgery if displaced**
    - **4 part fractures usually require hemiarthroplasty (shoulder joint replacement) due to avascular necrosis**

Greater Tuberosity Fracture



Physical Examination

- 15% of the diagnosis
- Should confirm the history
- Must be comprehensive

PAUL M. PUZISS, M.D.
SHOULDER-NECK

NAME _____ DATE _____

Ht _____ Wt _____ Slender ____ Mesopharphic ____ Obese ____ Rt handed ____ Lt handed ____

GENERAL: Healthy ____ No apparent distress ____ Appears to be in pain ____ Alert/Oriented ____

SPINAL POSTURE: Good ____ Fair ____ Poor ____ Dorsal kyphosis ____ Chin forward ____

Pelvis level ____ Shoulders level ____

SCARS _____ Remove shirt _____

SKIN: Normal ____ Other _____

C-Spine motion: Flex ____ Ext ____ R Tilt ____ L Tilt ____ R Rot ____ L Rot ____
Pain

See Inclinemeter Worksheet _____ Circumduction: Normal for age _____ Decreased for age _____ Pain _____

Stiffness _____ Tilt _____ Spasm _____

TENDERNESS	R	L
Suboccipital		
Atlanto-occipital		
TMJ		
Paravertebrals		
Facet Joint		
Trapezius		
Levator		
Rhomboids		
Scalenes		
Sternomastoid		
C-Spine		
D-Spine		
Kemp's		
Spurling's, radiating		
Spurling's, local		
SHOULDER, Palpation/Pain		
Coracoid process		
Anterior joint		
Biceps tendon		
Supraspinatus		
Posterior joint		
AC joint		
Sternoclavicular joint		
Lateral pectoral		
Other		

STABILITY	R	L	Pain R	Pain L
Apprehension Extension rot				
Apprehension (pron forearm)				
Supine Load and Shift				
Seated Load and Shift				
Apprehension augmentation				
Apprehension suppression				
Hyperabduction test				
Kim test				
Myers test				
O'Brien's test				
Sulcus sign				

MUSCLE STRENGTH		
Lateral deltoid		
Infraspinatus		
Subscapularis		
Supraspinatus		
Winging		
Triceps		
Biceps		
Extensor Carpi group		
1° dorsal interosseous		
Abductor digiti minimi		
Abductor pollicus brevis		

AC JOINT	R	L
AC joint stress		
ACJ instability		

ATROPHY		
Supraspinatus		
Infraspinatus		
Teres minor		
Deltoid		
Anterior Post		

MOTION	ACTIVE		(pain)	PASSIVE		(pain)
Flexion						
Abduction						
AB/ER						
Internal rotation						
Ext rotation						
Adduction						
Extension						
SWELLING						
CREPITUS						
ACJ						
Anterior joint						
Posterior joint						
Scapula						
Dawbarn's, pop/pain						
Dawbarn's, pain only						

BICEPS STRESS	R	L
Lower (Yergason's)		
Upper (Speeds)		

IMPINGEMENT SIGNS		
Neer		
Hawkins		
Supraspinatus		

Scapulothoracic Motion _____
Trapezius substitution _____

FUNCTIONAL INTERFERENCE Y____N____

PAIN BEHAVIOR Y____N____

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ELBOW - FOREARM - WRIST

NAME _____ DATE _____

ARM	R	L
Tender lateral		
other		
MEDIAN NERVE		
Tinel		
Med. Nerve Compress.		
Prayer		
Tender carpal tunnel		
ULNAR NERVE		
Tinel		
Elbow Flexion Test		
Subluxation		
RADIAL NERVE		
Tender		
Supinator Tender		
Supination Resist. Test		
Middle Finger Ext.		
Forced Pronation		
Sup. Rad. Nerve Tinel		
ELBOW		
ROM		
Pronation		
Supination		
Crepitus		
Tender		
Med. Epicondyle		
Common Flex Origin		
Pronator Resist Test		
Cubital Tunnel		
Lat. Epicondyle		
Common Ext Origin		
Radiocapitellar Joint		
Resisted Wrist Ext.		
Olecranon		
FOREARM		
Elbow Extension-Wrist/Finger Flex.		
Volar Tender		
Dorsal Tender		
Elbow Extension-Wrist/Finger Ext.		
WRIST		
Flexion		
Extension		
Ulnar Dev.		
Radial Dev.		
Tender		
Ficklenstein		
Crepitation		
Instability		

DEEP TENDON REFLEXES		
Triceps		
Biceps		
Brachioradialis		
Hoffman Reflex		
PULSES		
Radial		
Adson Plain		
Adson Aug		
SENSORY Pinprick		
Finger 1.		
2.		
3.		
4.		
5.		
Shoulder		
Arm		
Forearm		
Hand		
MEASUREMENTS:		
Arm		
Forearm		
Wrist		
Pinch		
Grip (Jamar Dynamometer)		
Grip (Jamar) (Elbow Flexed)		
Grip (Jamar) (Elbow Ext.)		

OTHER CENTRAL NEUROLOGIC	
Gait	
Romberg	
Tandem Gait (eyes closed)	
Finger to Finger	
Babinski	
Clonus, Ankle	
Cranial nerves II-XII	

AC Joint Stress Compression

Load and Shift: Supine

Supraspinatus Impingement Sign

Neer Test: Impingement

FIGURE 2

In the Neer test, the examiner forward flexes the arm maximally. Reproduction of the shoulder discomfort is a positive test, consistent with rotator cuff tendinopathy.

Hawkins: Impingement

FIGURE 1

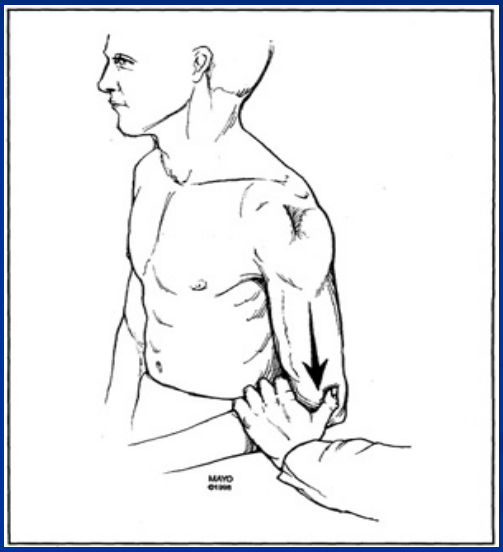
The Hawkins test involves shoulder abduction to 90 degrees, slight forward flexion, and internal rotation of the humerus performed by the examiner. Reproducing the patient's discomfort is a positive finding, consistent with rotator cuff tendinopathy.

ALL IMAGES EUGENE HONG, MD

O'Brien Test: SLAP tear (? Impingement)

Apprehension: Anterior Instability (Suppression/Relocation)

Sulcus Sign: Inferior laxity

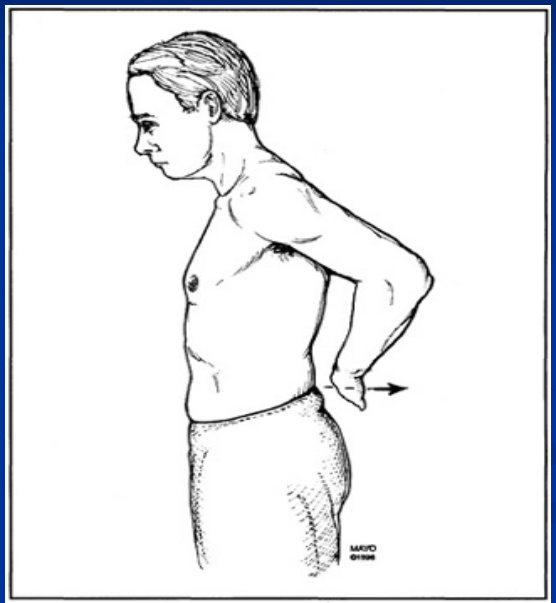


Sulcus Sign

Speeds Test: Bicipital Tendonitis (?Impingement)

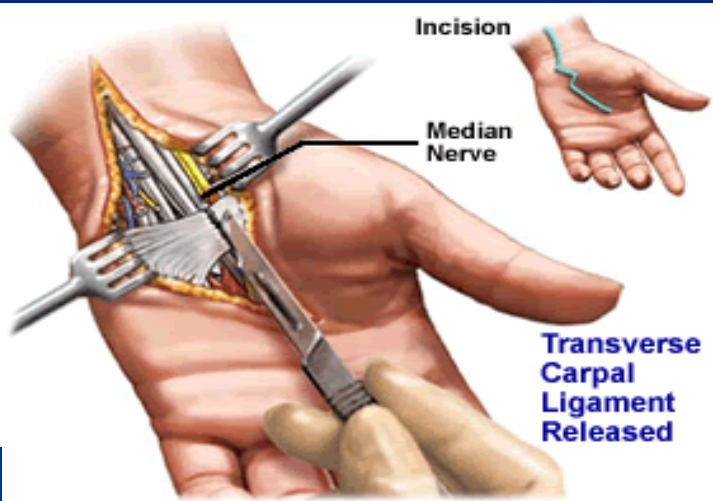
Winging: Serratus Weakness

Subscapularis Lift off Test

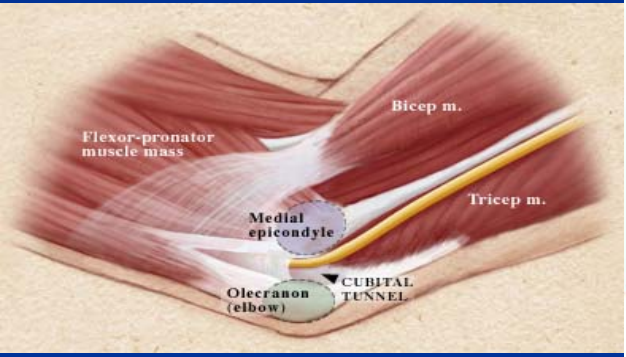


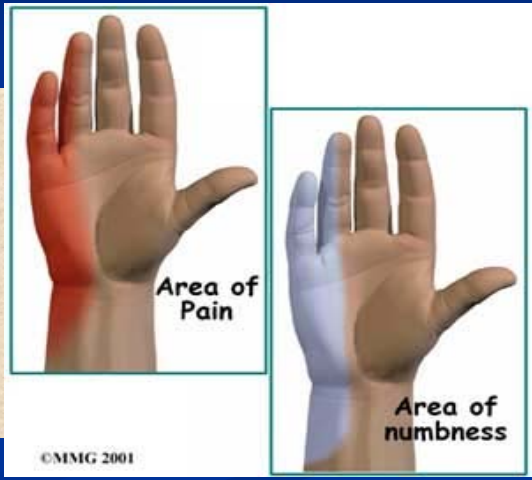
Spurling's Sign: Nerve root compression (Kemp's Test, with out axial loading = facet syndrome)

Median Sensory Distribution/Carpal Tunnel Release



Cubital Tunnel Syndrome

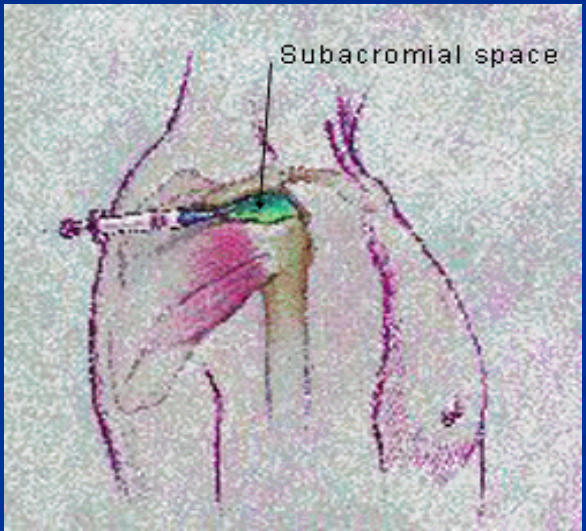




Injection Tests

- Subacromial injection, local anesthetic, with or without cortisone: repeat impingement signs.
  - If impingement signs disappear, then one has a positive IMPINGEMENT TEST.
  - Helps to differentiate between impingement or bursitis and frozen shoulder or even myofacial pain
- AC joint injection similarly helps to localize pain of the AC joint and distinguish it from local myofacial pain

Subacromial Injection



Imaging Studies

- X-Ray
- MRI scan
  - By itself a good test for subacromial bursitis
  - But alone is not the gold standard now
- MR/Arthrogram (possibly with CT scan)
  - Most accurate in diagnosing rotator cuff tears, labral and SLAP tears, or loose bodies
- Ultrasound
  - Cheaper, good for rotator cuff, not much used.

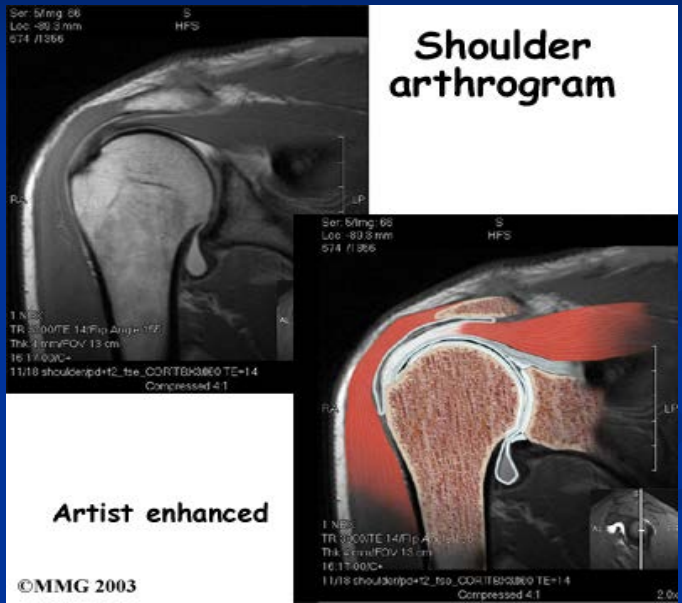
X-ray

- Normal

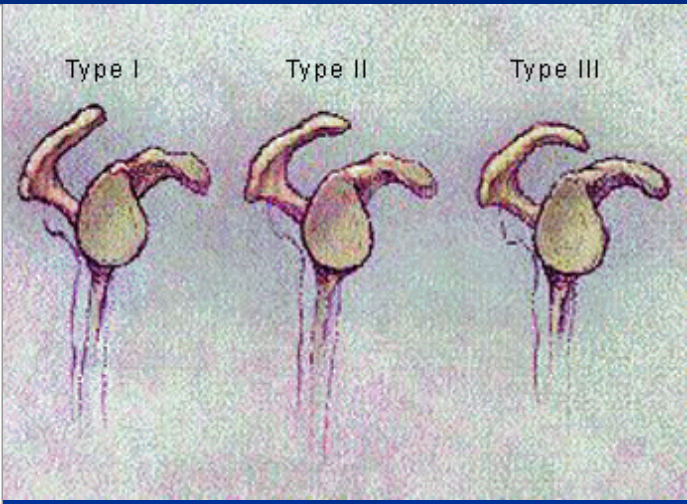
Osteoarthritis

Arthrogram: Torn Rotator Cuff

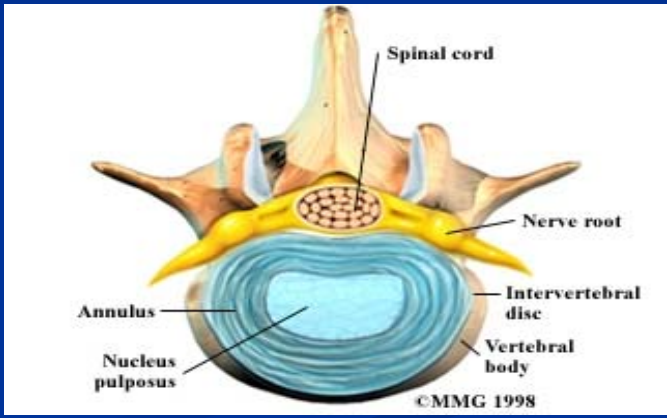
MR Arthrogram



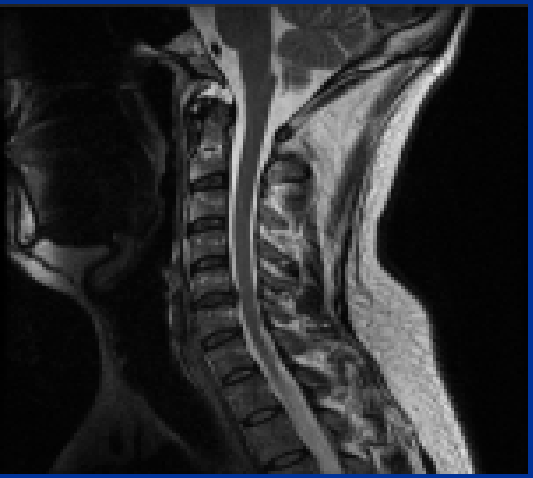
Arch (Outlet) View



Normal Cervical MRI



Cervical Herniated Disc



MRI full thickness rotator cuff tear

Other Studies

- Nerve conduction studies for carpal and cubital tunnel syndromes and possibly radial tunnel syndrome
- EMG studies to look for nerve impingement
- Psychological studies as needed
- Ergonomic studies at work

Treatment

- Non-operative
  - Exercises, stretching, postural changes
  - Physical therapy
  - Chiropractic
  - Injections
    - Corticosteroids and/or local anesthetic
    - Subacromial bursa, AC joint, trigger points, carpal tunnel
    - AC joint, shoulder joint
    - Neck: foramenal epidural steroids, facet injections (discograms)

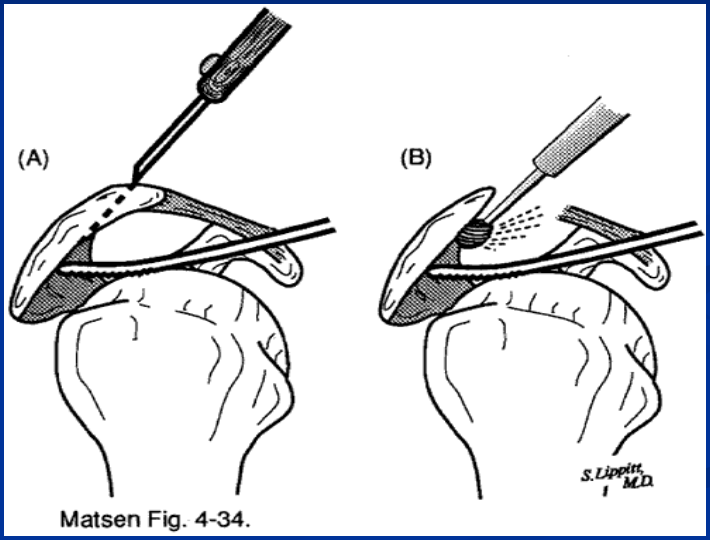
Treatment (cont.)

- NSAID's
  - Celebrex, Mobic, Relafen, Lodine, Voltaren, Naprosyn, Motrin, etc
- Oral corticosteroids, e.g.. Prednisone, Medrol Dose Pack
- Acupuncture
- Supplements
- Dynasplint for frozen shoulder

Treatment, Surgical

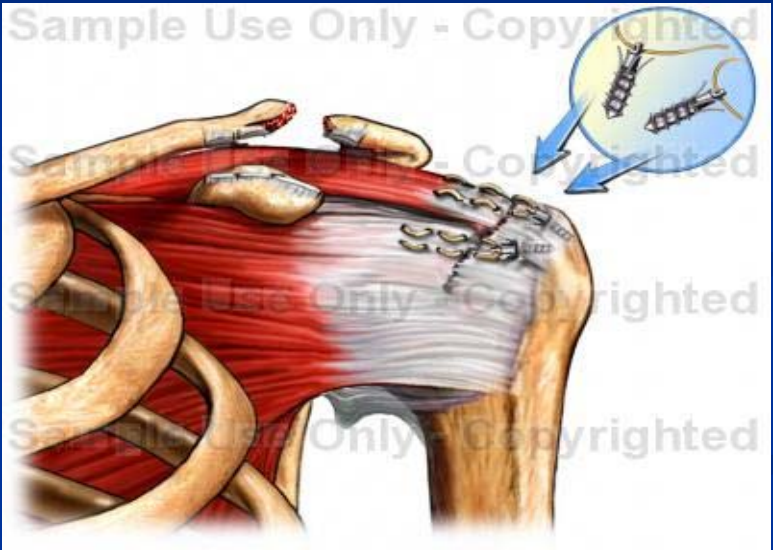
- Impingement
  - **Acromioplasty vs bursectomy and subacromial smoothing**
  - **Smoothing/bursectomy 95% as good as acromioplasty but fewer complications**
- Rotator cuff partial tears
  - **Arthroscopic debridement, subacromial decompression, bursectomy,**
  - **If >50%, consider repair**
  - **Acromioplasty if cuff abraded from acromion, e.g. type 3 acromion or thick, abraded coracoacromial ligament**
  - **Subacromial smoothing is otherwise adequate**
- Rotator cuff full thickness tears
  - **Arthroscopic or mini open repair**
  - **+/- acromioplasty**

Open/Arthroscopic Acromioplasty



Matsen Fig. 4-34.

Rotator Cuff Repair



Treatment, Surgical (cont.)

- Instability, glenohumeral
  - Dislocation: Labral repairs, Bankart Lesions
  - Multidirectional: Capsular repair
  - Avoid acromioplasty when impingement present, since acromion provides stability
  - SLAP repair
- Instability, biceps tendon
  - Repair SLAP tear
  - Biceps tenodesis

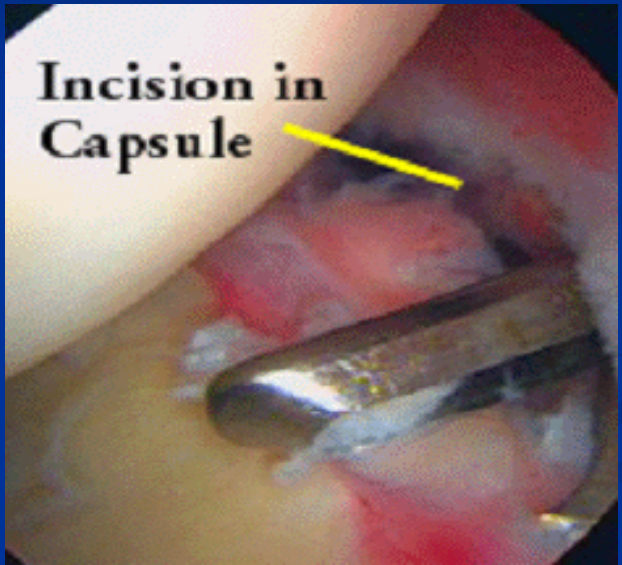
Treatment, Surgical (cont.)

- Instability, acromioclavicular joint, chronic
  - Grade 3 sprain: Modified Weaver-Dunn vs no surgery
- Instability, AC joint, acute:
  - Grade 3: repair all ligaments
- Degenerative arthritis
  - AC joint: arthroscopic or open distal clavicle resection
  - Shoulder joint: Arthroscopic debridement. If severe, total joint replacement
  - Avoid acromioplasty if believe total shoulder replacement eventually likely (need to preserve coracoacromial arch so that shoulder is stable when joint replaced)
- Chronic acromioclavicular strain: Arthroscopic distal clavicle resection
- Biceps tendonitis: Treat as impingement
- Biceps subluxation: Biceps tenodesis

Treatment, Surgical (cont.)

- Loose body: Arthroscopic removal
- Adhesive capsulitis (frozen shoulder)
  - **Surgery indicated when conservative treatment fails, e.g. injections, Dynasplint, PT, passage of time**
  - **Manipulation under anesthesia with Depo Medrol injection**
  - **Arthroscopic capsulotomies**
    - **If manipulation does not provide full motion**
    - **Arthroscopy if other pathology suspected**
    - **If frozen shoulder is recurrent**
    - **If prior repair**
- Captured shoulder: (Adhesions from previous surgery)
  - **Arthroscopic debridement, adhesion lysis**
  - **Possible mini open adhesion lysis**

Arthroscopic Capsulotomy for Adhesive Capsulitis



Independent Medical Examinations

- Defense medical examinations
  - Are not independent in many cases
  - Some independent examiners appear to feel that it is their role to help the insurance company rather than find the truth
  - Often fail to make proper diagnoses in the face of good histories when their physical examination may be inadequate
    - May not discuss what impingement signs were performed or even if they were performed
    - Often Spurling's Test is not done, and Kemp's Test is virtually never done
    - Tests for labral instability, biceps tendonitis often not performed
    - Claim that since passive motion is greater than active motion, that therefore there must be poor effort. However, active motion is lost with impingement and bursitis due to pain.
    - Grip and pinch testing must be done with the Jamar Dynamometer and pinch meter to obtain proper curves, to look for objective losses of strength. A single grip or pinch

My Practice

- Performed surgery through 2004
- Approximately 4,000 shoulder cases
- Approximately 1,750 knee cases
- Arthroscopy of the shoulder, elbow, wrist, hip, knee, and ankle
- Assisted in approximately 1,000 neck and back neurosurgical cases
- 1,000 carpal tunnel releases
- Many cubital and radial tunnel releases

My Practice (cont.)

- Independent Medical Examinations for insurers 1980-1990
- Second Independent Medical Examinations for State of Alaska, 2003-current
- State of Oregon Arbiter Examinations, current
- Independent Medical Examinations from any source
  - A proper IME requires the entire file/images
- I welcome cases as a treating physician
  - If the patient is not progressing satisfactorily
  - If the patient's current physician is closing a claim prematurely

Hippocratic Oath—Modern Version

I swear to fulfill, to the best of my ability and judgment, this covenant:

I will respect the hard-won scientific gains of those physicians in whose steps I walk, and gladly share such knowledge as is mine with those who are to follow.

I will apply, for the benefit of the sick, all measures [that] are required, avoiding those twin traps of overtreatment and therapeutic nihilism.

I will remember that there is art to medicine as well as science, and that warmth, sympathy, and understanding may outweigh the surgeon's knife or the chemist's drug.

I will not be ashamed to say "I know not," nor will I fail to call in my colleagues when the skills of another are needed for a patient's recovery.

I will respect the privacy of my patients, for their problems are not disclosed to me that the world may know. Most especially must I tread with care in matters of life and death. If it is given me to save a life, all thanks. But it may also be within my power to take a life; this awesome responsibility must be faced with great humbleness and awareness of my own frailty. Above all, I must not play at God.

Hippocratic Oath (cont.)

I will remember that I do not treat a fever chart, a cancerous growth, but a sick human being, whose illness may affect the person's family and economic stability. My responsibility includes these related problems, if I am to care adequately for the sick.

I will prevent disease whenever I can, for prevention is preferable to cure.

I will remember that I remain a member of society, with special obligations to all my fellow human beings, those sound of mind and body as well as the infirm.

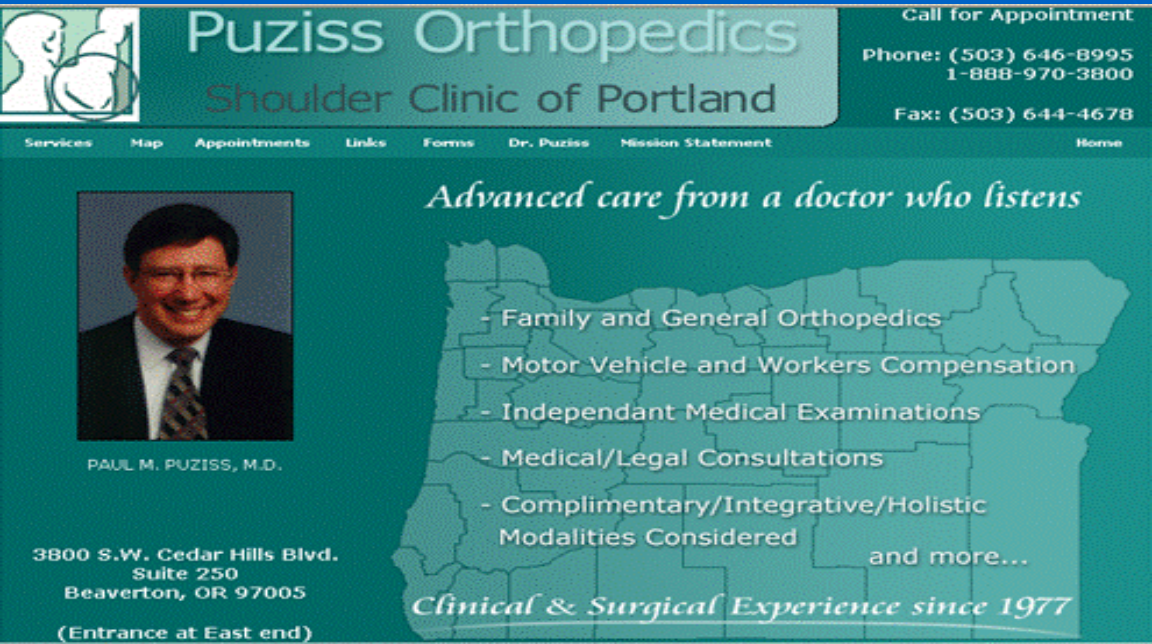
If I do not violate this oath, may I enjoy life and art, respected while I live and remembered with affection thereafter. May I always act so as to preserve the finest traditions of my calling and may I long experience the joy of healing those who seek my help.

Maimonides Prayer for the Physician (Excerpt)

Before I begin the… work of healing and creations of your hands, I place my entreaty…that you grant strength of spirit and fortitude to faithfully execute my work. Let not desire for wealth or benefit blind me from seeing truth. Deem me worthy of seeing in the sufferer who seeks my advice-- a person-- neither rich nor poor. Friend or foe, good man or bad, of a man in distress, show me only the man.

If doctors wiser than me seek to help me understand, grant me the desire to learn from them, for the knowledge of healing is boundless. But when fools deride me, give me fortitude. Let my love for my profession strengthen my resolve…Illuminate the way for me, for any lapse in my knowledge can bring illness and death upon your creations… Strengthen me in body and soul, and instill within me a perfect spirit.

Thank You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