

# The Shoulder

Thomas Souza, D.C., DACBSP

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What Does the Literature Say?

# Dutch College of General Practitioners

- A physical examination is not sufficient for determining which anatomical structure is affected.
- The Cyriax diagnostic system has been abandoned and replaced by a classification system based on the presence or absence of a limited passive range of motion.
- Movement testing has been simplified and now consists of one active test and two passive tests.
- Additional examinations (x-ray, MRI, CT, ultrasonography) are not useful.
- The problem is managed step-by-step: first, with information and advice, supported by analgesics if necessary, then a local corticosteroid injection if necessary, and then after 6 weeks physical therapy, if there is loss of function.

**NHG Practice Guideline 'Shoulder complaints (May 1999)**

*J.C. Winters, A.C. de Jongh, D.A.W.M. van der Windt, M. Jonquière, A.F. de Winter, G.J.M.G. van der Heijden, J.S. Sobel, A.N. Goudswaard*

# Dutch Guideline Specifics

Shoulder complaints *with* and *without* limited passive range of motion.[8](#)

*Shoulder complaints without limited passive range of motion*

- Pain occurs during or at the end of a movement trajectory, most often active and/or passive abduction, without limiting the movement result. The pain is thought to involve one or more structures in the subacromial space.

*Shoulder complaints with limited passive range of motion*

- This is a passive, painful limitation of movement of the glenohumeral joint in one or more directions. It is assumed to be caused by aseptic inflammation of the glenohumeral joint capsule[11](#) or subacromial structures.[12](#)
- If there are no shoulder movement patterns, examine the neck and upper thoracic spine

- It is generally assumed that disorders of the cervical or cervicothoracic spine can create not only neck pain but also radiating pain in the shoulder area. In an observational study among 101 patients with shoulder complaints, Sobel et al. were unable to determine an intrinsic cause in 20% of the cases.<sup>1</sup>
- However, manual examination of the cervical and thoracic spine and the adjoining ribs did reveal abnormalities, which they called dysfunctions of the cervical and thoracic spine.
- They suggested that their findings concur with the observations of Stenvers & Overbeek<sup>2</sup> and Jirout,<sup>3 4</sup> who showed a direct relationship between movements of the upper arm and rotation of the lower cervical and upper thoracic vertebrae.

- A study by Norlander et al. showed that reduced mobility of the cervicothoracic spine in individuals without complaints tripled their chances of developing neck or shoulder complaints.<sup>5</sup> Furthermore, this study showed that the mobility of the cervicothoracic spine was reduced in 84% of all patients with shoulder complaints.

- Based on these data, it seems possible that reduced mobility of the cervicothoracic spine plays a role in the development of complaints in the shoulder area.
- *Sobel JS, Winters JC, Arendzen JH, Groenier KH, Meyboom-de Jong B. Schouderklachten in de huisartspraktijk. [Shoulder complaints in general practice]. Huisarts Wet 1995;38:342-7.*
- *Stenvers JD, Overbeek WJ. Bestaat bij de frozen shoulder toch ook een benige beperking? [Is there also a bony limitation of movement in the frozen shoulder?] Ned Tijdschr Geneesk 1978;122:1081-7.*
- *Jirout J. Röntgenstudie der Dynamik der ersten Rippe [Radiological examination of the first ribs]. Manuelle Medizin 1983;21:20-2.*
- *Jirout J. Röntgenbewegungsdiagnostik der Halswirbelsäule und der Kopfgelenke [Radiological movement diagnosis of the cervical vertebrae]. Manuelle Medizin 1969;7:121-8.*
- *Norlander S, Gustavsson BA, Lindell J, Nordgren B. Reduced mobility in cervico-thoracic motion segment. A risk factor for musculoskeletal neck-shoulder pain: a two-year prospective follow-up study. Scan J Rehabil Med 1997;29:167-74.*

# Manipulation in Addition to Usual

## Medical Care – The Shoulder

- RCT of 150 patients with shoulder symptoms
- Treatment group received 6 treatments in a 12-week period which involved spinal manipulation and/or mobilization of the cervical and thoracic spine
- 43% of the intervention group and 21% of the control group reported full recovery after the 12-weeks
- Treatment effect differences lost at one year

Bergman, G. J., Winters, J. C., Groenier, K. H., et al. Manipulative therapy in addition to usual medical care for patients with shoulder dysfunction and pain: a randomized, controlled trial. Arch Int Med 2004;141:432-439.



# Comparison of Physiotherapy, Manipulation or Corticosteroid Injection for Shoulder Pain

- Follow-up study from 1994-1995 to determine long-term effects
- Initial study indicated manipulation of the C and T spine was superior to physiotherapy for general shoulder complaints in general practice
- Follow-up was a questionnaire to 172 patients
- No significant differences at 2-3 years

Winters, J. C., Jorritsma, W., Groenier, K. et al. Treatment of shoulder complaints in general practice: long term results of a randomised, single blind study comparing physiotherapy, manipulation, and corticosteroid injection. BMJ 1999;318:1395-1396.

# Newest Shoulder Info

- Philadelphia Panel EB Practice Guidelines – Only recommendation was that ultrasound was clinically proven to relieve pain with calcific tendinitis (Physical Therapy Vol. 81, No. 10, 2001)
- Systematic Review of RCTs – Conclusion is that there is no evidence to support or reject the efficacy of common interventions for the shoulder (BMJ Vol 316, 1998)

- BMJ, May 1998 – Study comparing results for physiotherapy, manipulation and corticosteroid injection found support for injection and also separately for manipulation in the short term (Winters JC et al.)

# Natural History

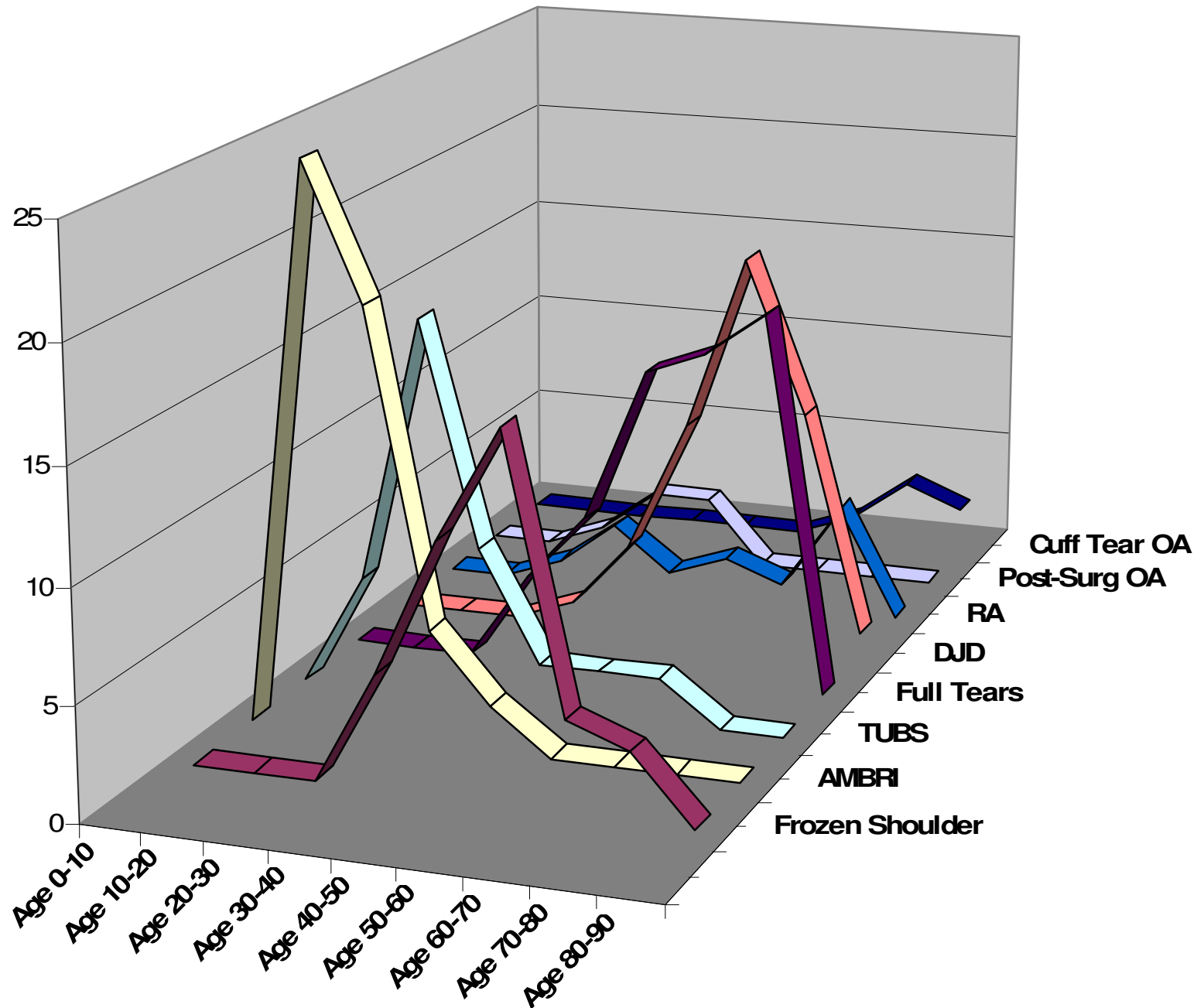
- Shoulder pain in the general population has been reported as high as 50% in some countries<sup>12</sup>.
- The range is between 20-50%. In a systematic review by Luime et al.<sup>13</sup> (2004), eighteen studies were evaluated for prevalence and one on incidence.
- The incidence range was relatively narrow at 0.9-2.5% which varied due to age.
- Prevalence figures, however, had a wide range from 6.9 to 26% for point prevalence, 18.6-31%, for 1-month prevalence, 4.7-46.7% for 1-year prevalence and 6.7-66.7% for lifetime prevalence.

- Chronic shoulder pain appears to be common. At 6 months following initial evaluation 34% to 79% of patients report still having shoulder symptoms 14 15 16 17 18 with 24% to 61% reporting pain 6 to 18 months beyond the initial 6 month follow-up.
- Only about half of the elderly who reported having shoulder symptoms sought treatment.
- Poor recovery from shoulder pain was associated with increasing age, severe symptoms or recurrent symptoms, restricted range of passive abduction, or with concomitant neck pain
- The presentation of mild trauma or overuse occurring before the onset of shoulder pain, acute onset, and early presentation to a care giver indicated a favorable outcome.

- A prognostic study by Thomas et al. (2005) indicated that baseline characteristics rather than treatment rendered were a better predictor of outcome
- Evaluating 316 subjects in two RCTs, baseline characteristics that independently reduced the likelihood of recovery were being female, reporting a gradual onset, or higher baseline disability scores.

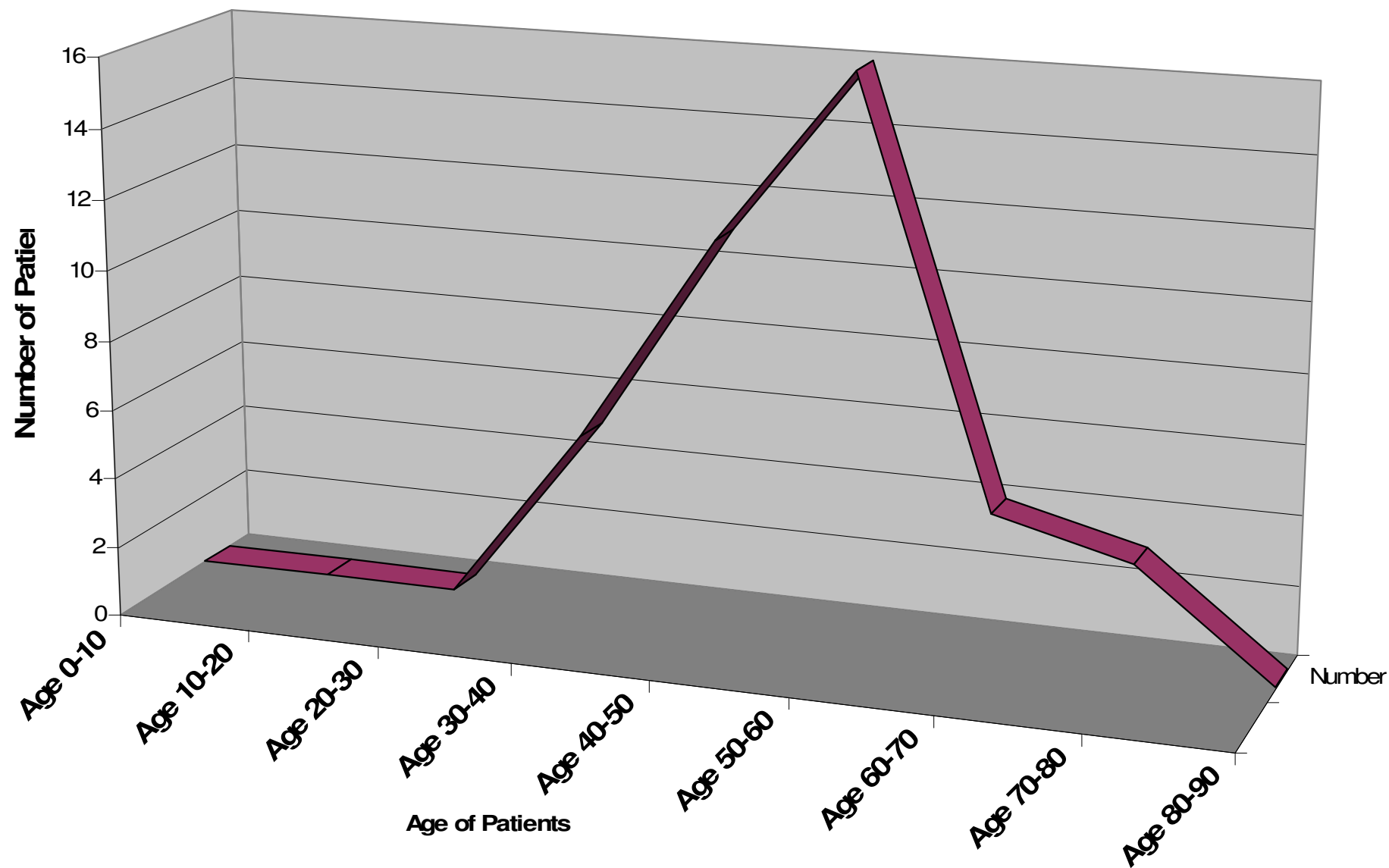
- A study by Largacha et al. attempted to determine the value of patient perception with regard to function and its relationship to the final diagnosis.
- Those with instability seemed to present to a specialist around age 20-35 years.
- Patients with full-thickness tears present 15 years later than those with partial cuff tears.
- Those individuals with cuff tear arthropathy presented 13 years later than full-thickness tears.
- The conditions with greatest female prevalence were RA and adhesive capsulitis

## Conditions Related to Age

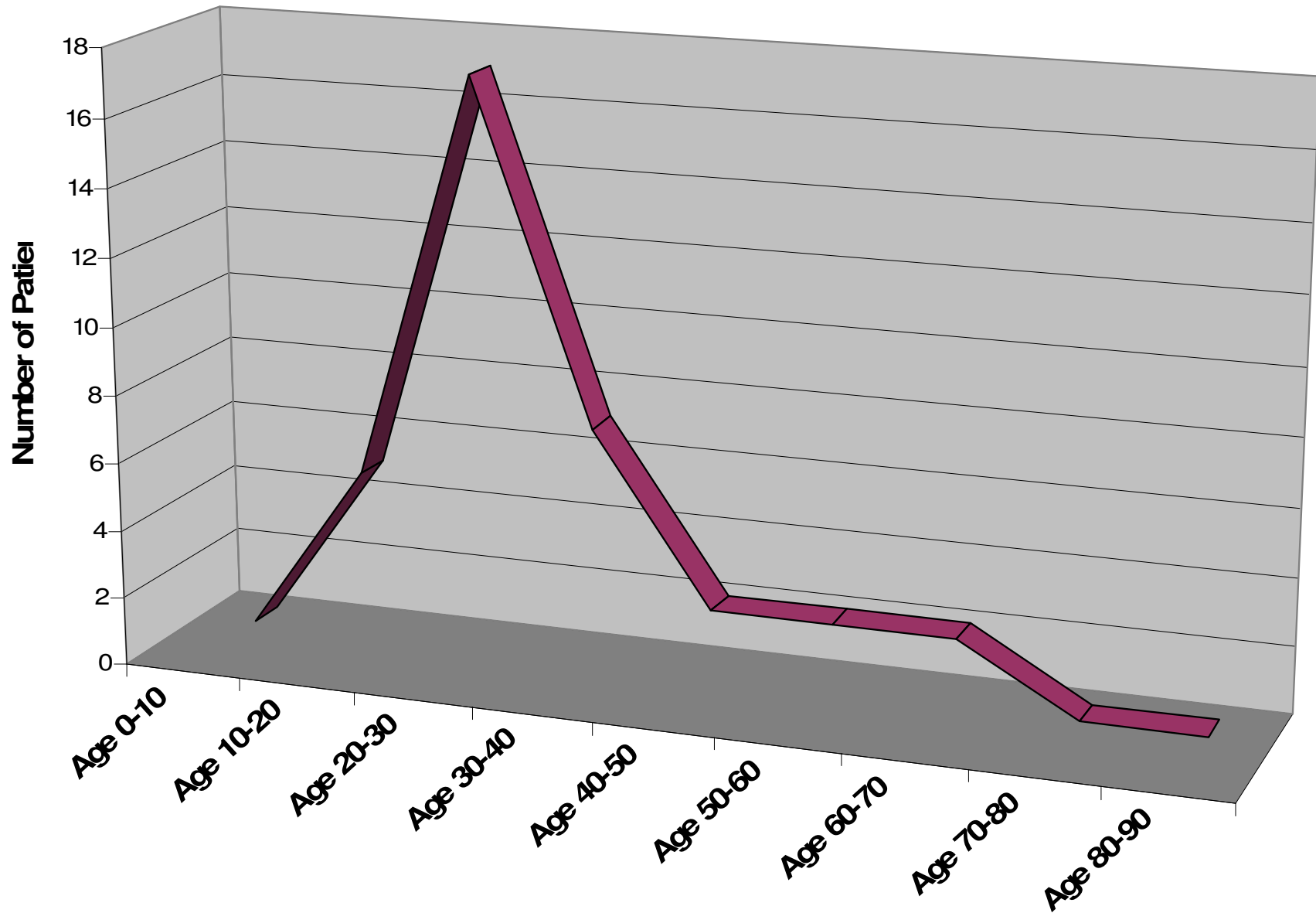




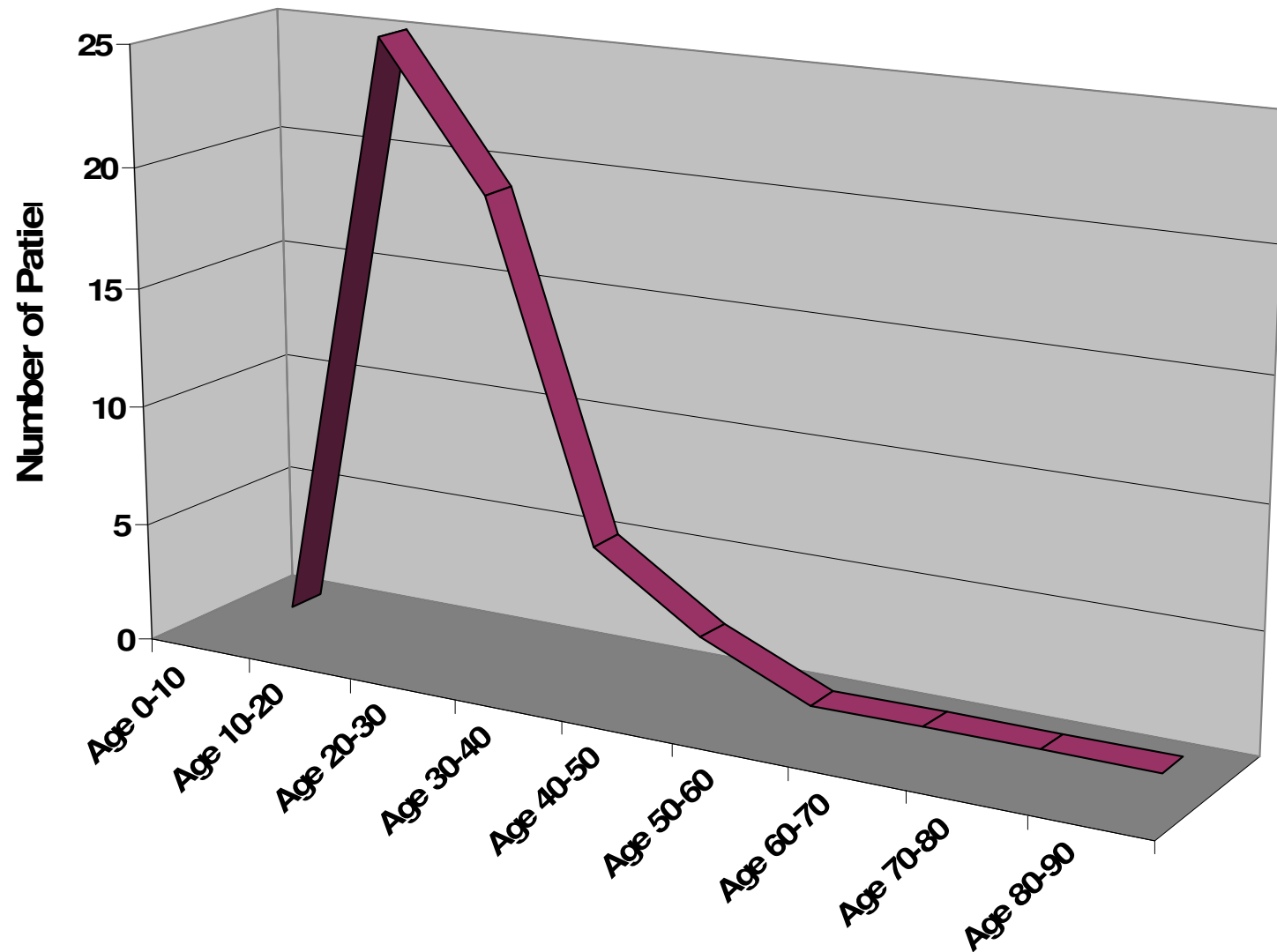
# Age at Presentation - Frozen Shoulder



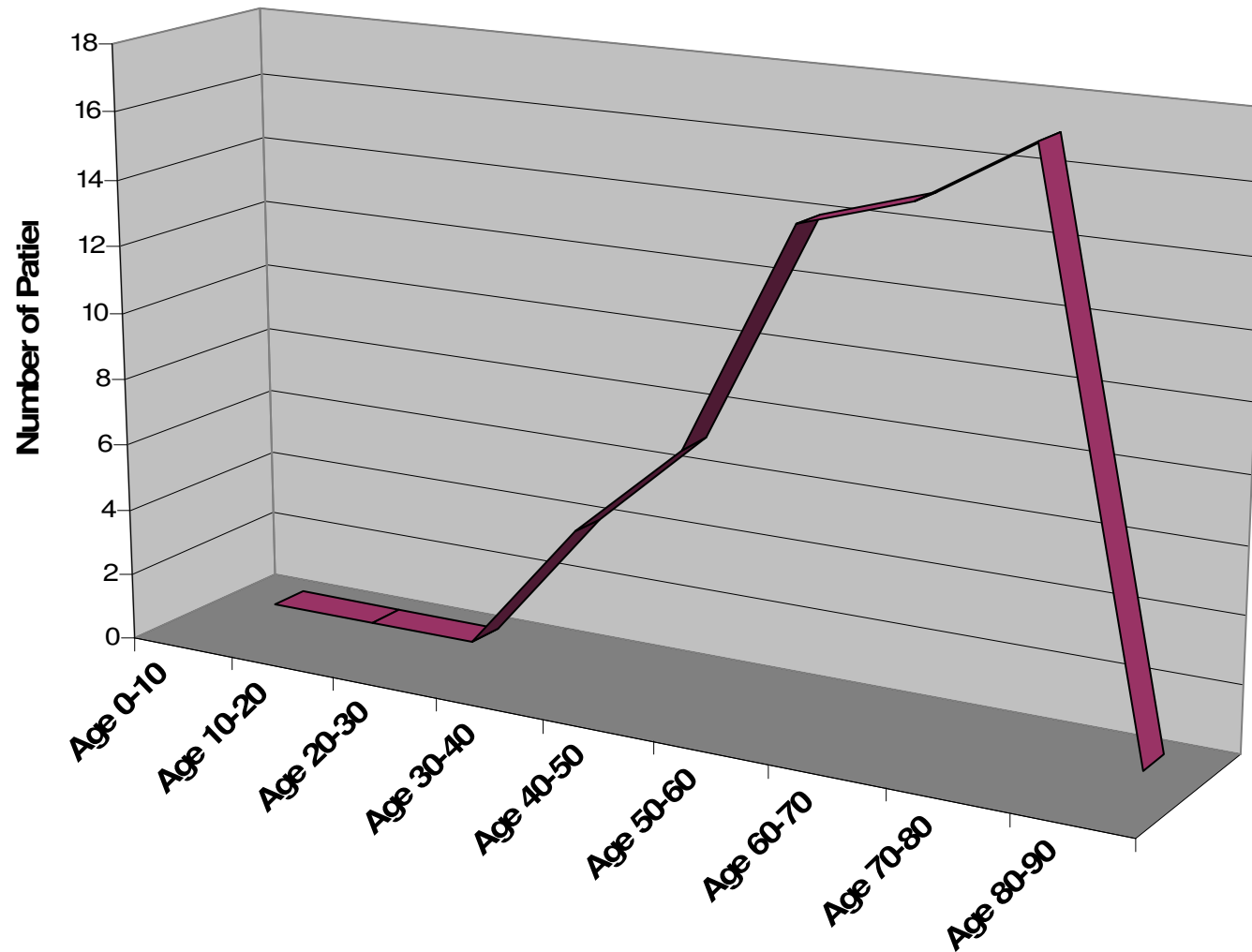
# Age at Presentation - TUBS



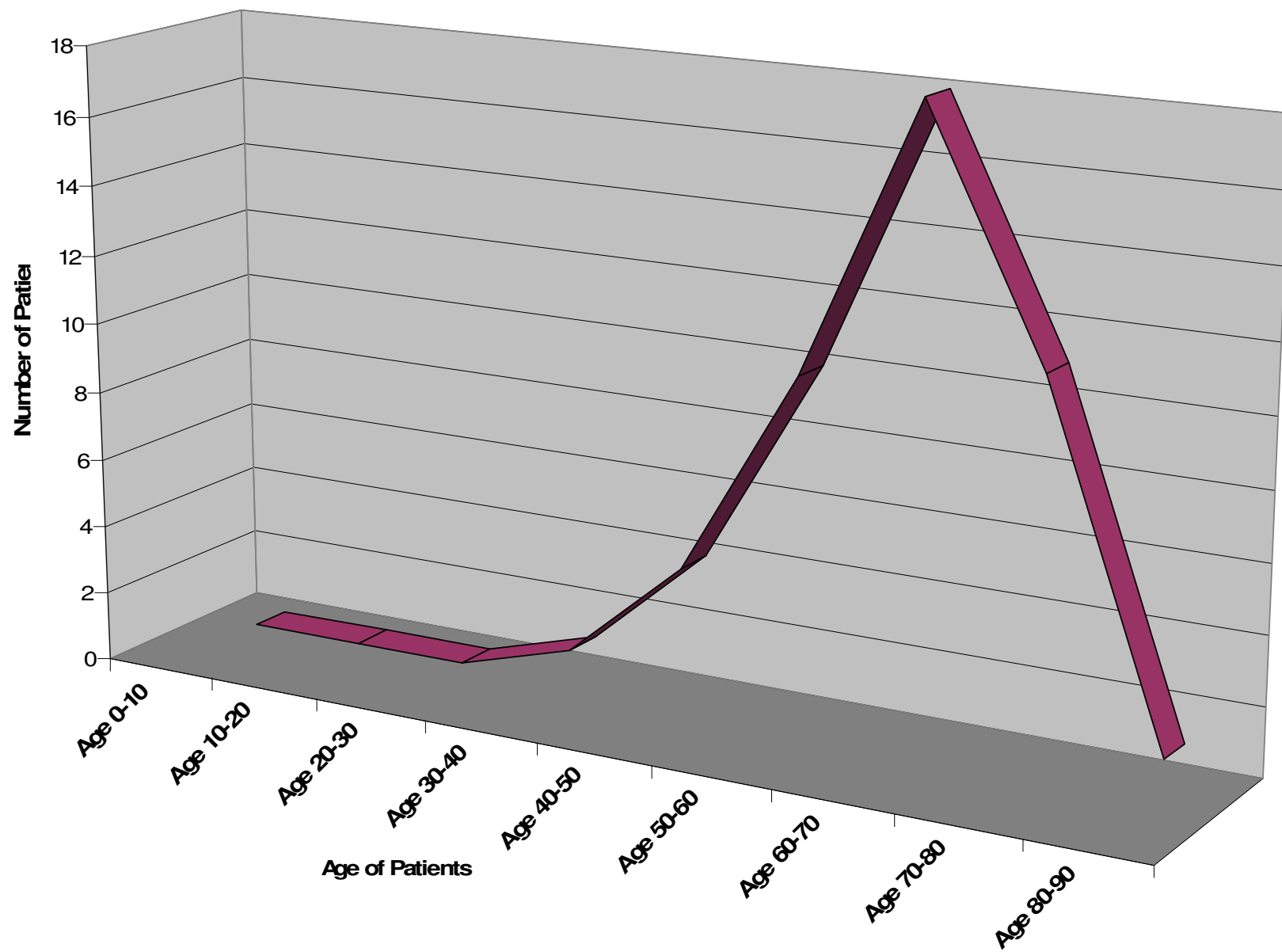
## Age at Presentation - AMBRI



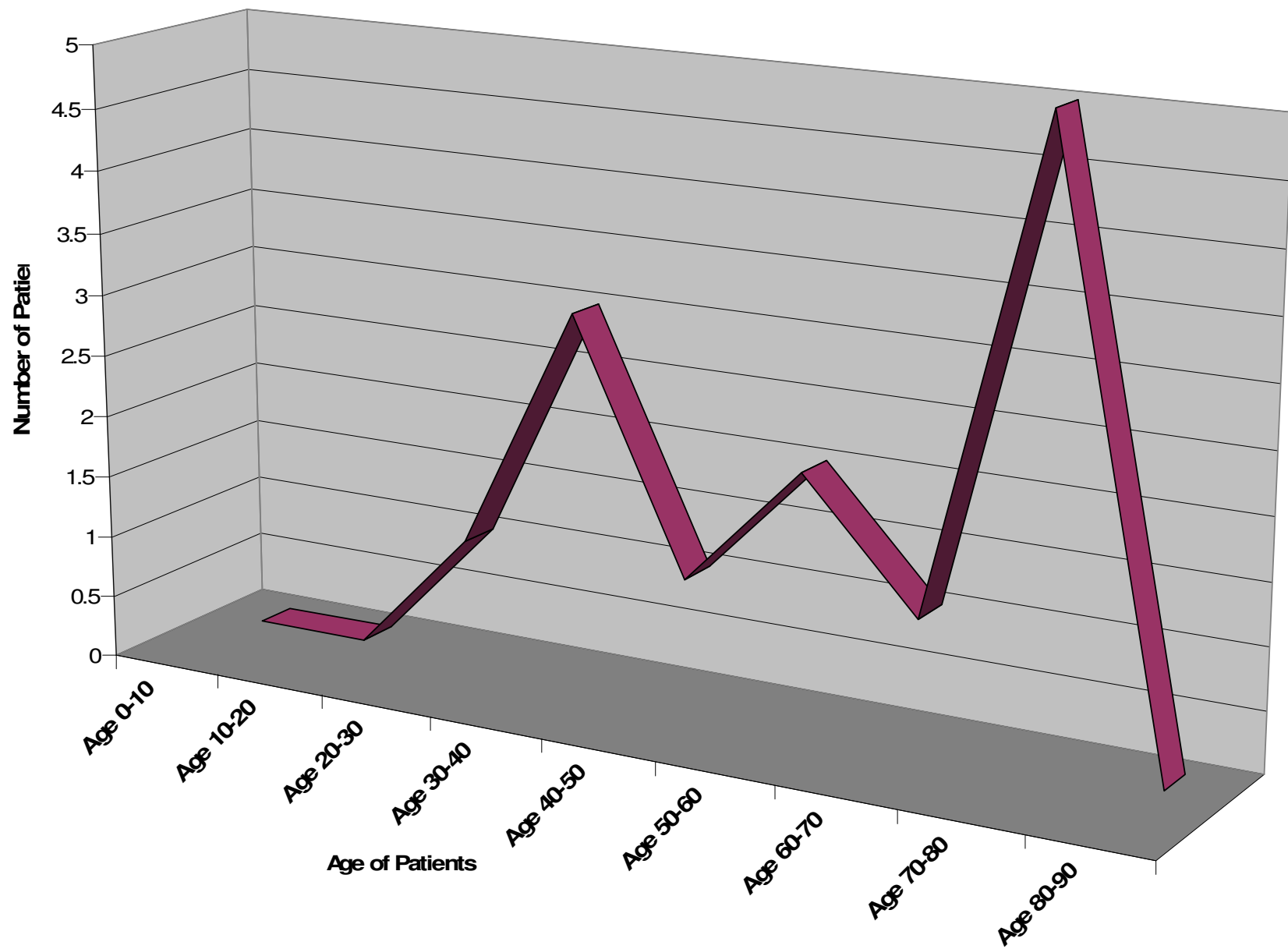
## Age at Presentation - Full-Thickness Cuff Tears



## Age at Presentation - DJD



## Age at Presentation - RA

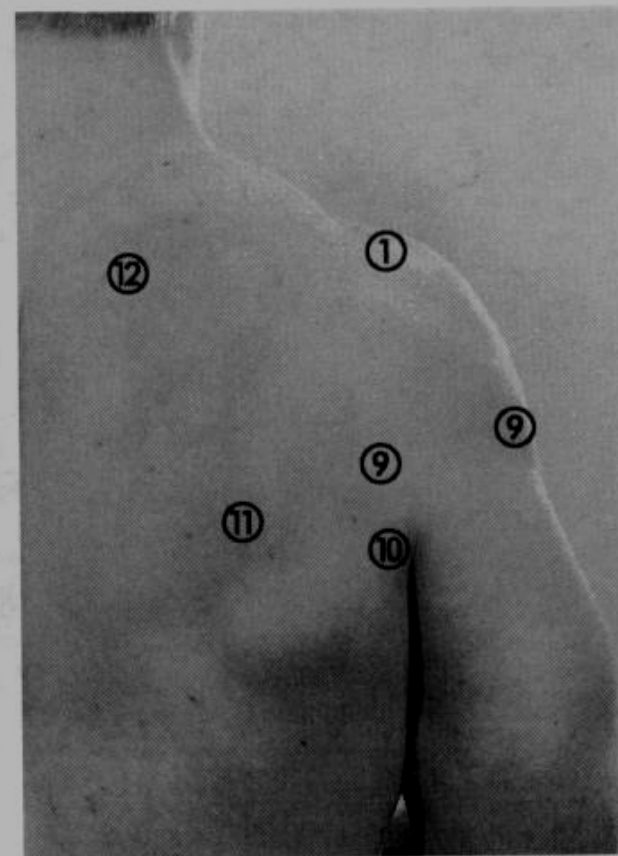
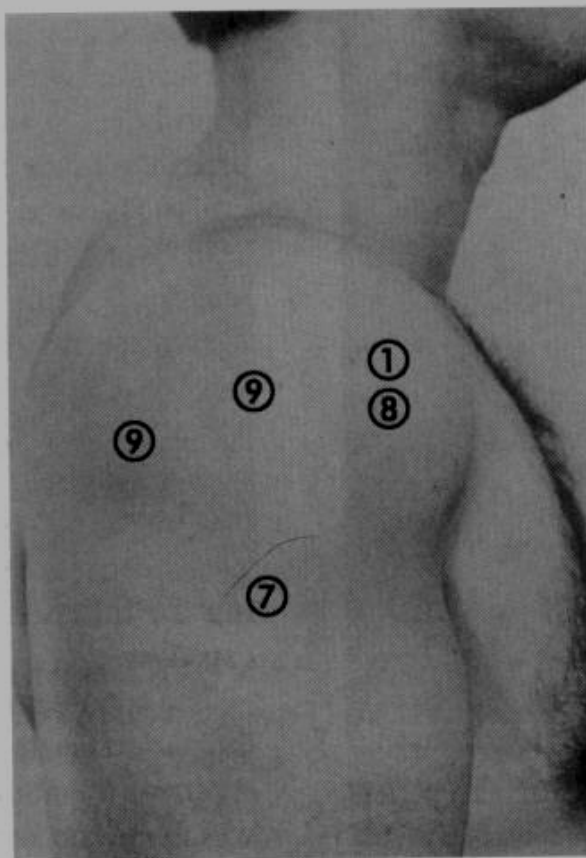
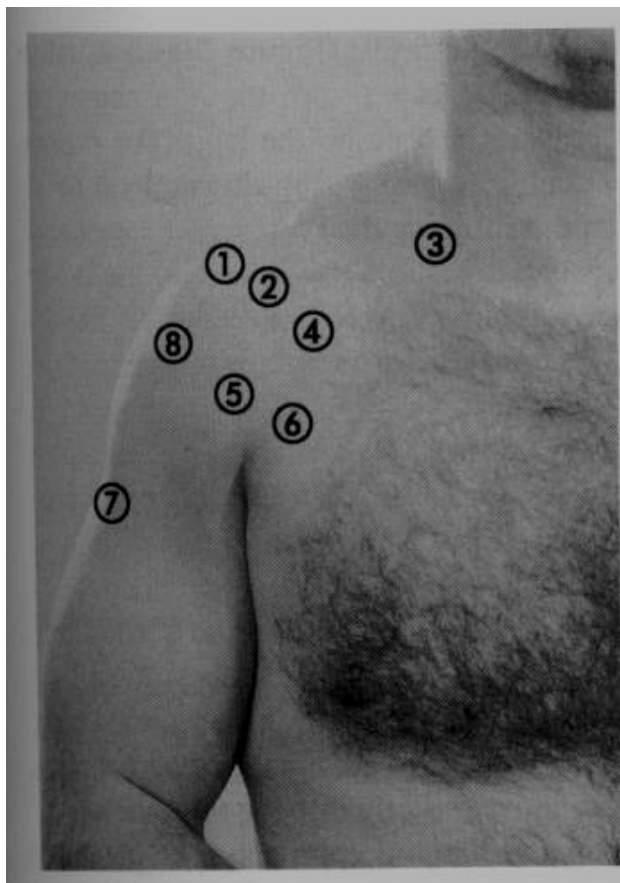


# Common Mistakes in Evaluating the Shoulder

# The History

- Potential location of pain mistakes:
  - Pain vs. tenderness
  - “shoulder” pain is shoulder pain
  - Location of pain indicates involved structure
  - Radiation = radicular





# History

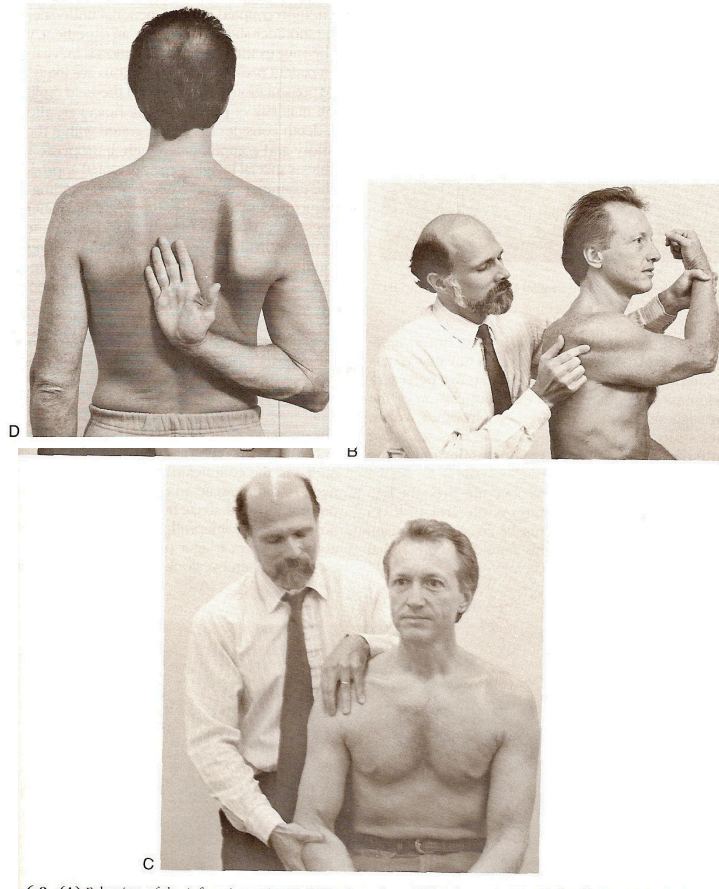
- Potential weakness complaint misinterpretations/mistakes:
  - Painless versus painful weakness
  - Restricted ROM misinterpretation
  - Instability or looseness misinterpretation

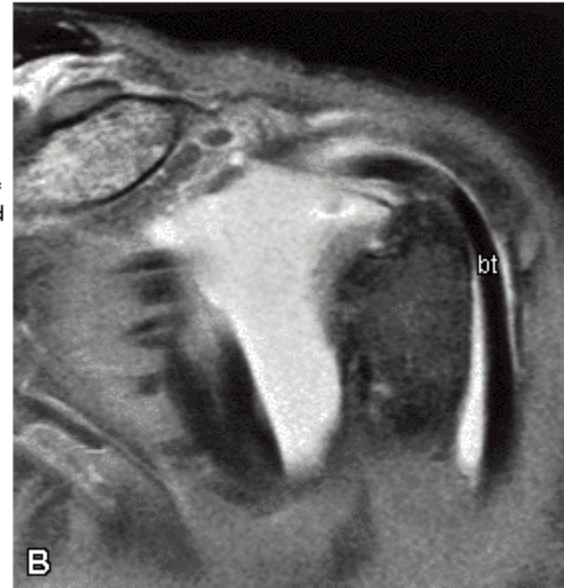
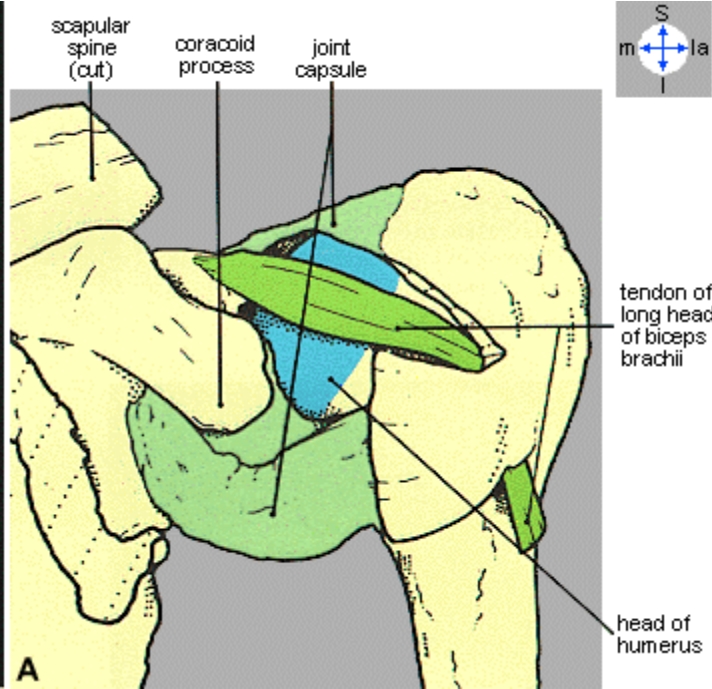
# Palpation Mistakes

- Insertions are distinct and palpable
- Not positioning the shoulder to expose insertional areas of tenderness
- Biceps palpation
- Accessory motion palpation relationship to capsular tightness

# Palpation

- Infraspinatus/Teres Minor (upper right)
- Supraspinatus (upper left)
- Biceps and Anterior Capsule (bottom)





# The Basics

- Use of orthopedic tests is intended to do one of the following:
  - Reproduce pain (specifically by either reproducing the mechanism of injury or challenging a specific soft-tissue structure [selective tension approach])
  - Reveal any instability
  - Reveal restrictions to active and passive ROM
  - Identify sites of tenderness
  - Identify sources of referred pain
- Orthopedic tests are often used to evaluate structures that can not be palpated

# Common Interpretation Mistakes

- Not understanding that pain invalidates a test for “neurologic” testing of weakness
- Using instability tests as pain provocative testing
- “Positives” are often not clarified by further questioning

- Orthopedic tests challenge only the intended structure
- Muscle tests “isolate” a muscle
- Multiple tests better than one test
- All orthopedic tests for a given area should be performed



The effectiveness of diagnostic tests for the assessment of shoulder pain due to soft tissue

disorders: a systematic review

- In the included studies, the prevalence of rotator cuff disorders was generally high, partial verification of patients was common and in many cases patients who were selected retrospectively because they had undergone the reference test. Sample sizes were generally very small.

Dinnes, J, Loveman, E, McIntyre, L, Waugh, N. The effectiveness of diagnostic tests for the assessment of shoulder pain due to soft tissue disorders: a systematic review. Health Technol Assess 2003;7:1-166.

- Reference tests were often inappropriate with many studies using arthrography alone, despite problems with its sensitivity.
- For clinical assessment, 10 cohort studies were found that examined either the accuracy of individual tests or clinical examination as a whole
- individual tests were either good at ruling out rotator cuff tears when negative (high sensitivity) or at ruling in such disorders when positive (high specificity), but small sample sizes meant that there was no conclusive evidence

- **CONCLUSIONS:** The results suggest that clinical examination by specialists can rule out the presence of a rotator cuff tear, and that either MRI or ultrasound could equally effective for detection of full-thickness rotator cuff tears, although ultrasound may be better at picking up partial tears.

- Ultrasound also may be more cost-effective in a specialist hospital setting for identification of full-thickness tears.
- Further research suggestions include the need for large, well-designed, prospective studies of the diagnosis of shoulder pain, in particular a follow-up study of patients with shoulder pain in primary care and a prospective cohort study of clinical examination, ultrasound and MRI, alone and/or in combination.

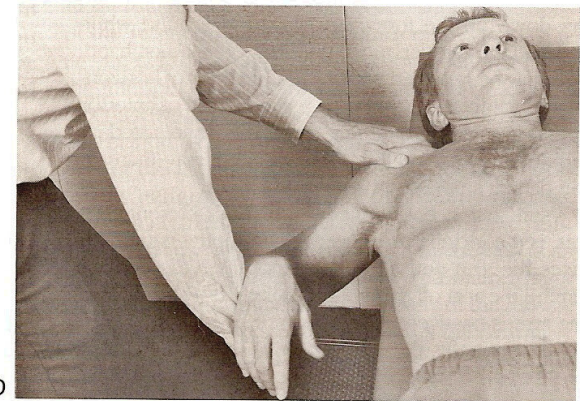
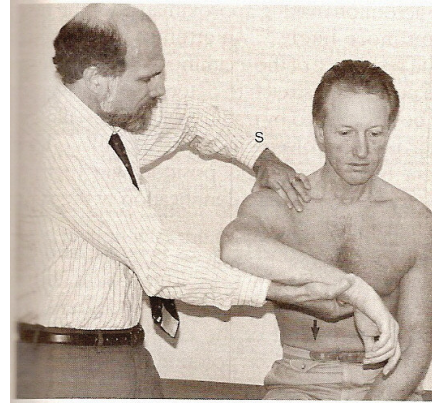
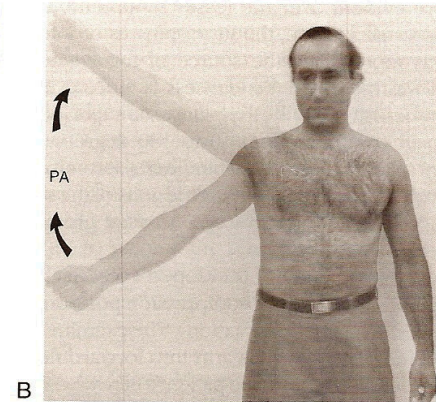
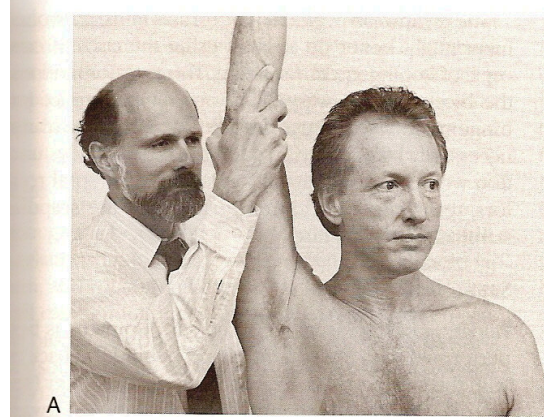
# Scapular Protraction Effect on Muscle Strength

- Acute changes in scapular positioning significantly effect isometric strength
- Scapular protraction reduces internal rotation strength by 13-24%
- Scapular protraction increases external rotation strength with IR and decreases 20% in ER

Smith J, Dietrich CT, Kotajarvi BR, Kaufman KR. The effect of scapular protraction on isometric shoulder rotation strength in normal subjects. *J Shoulder Elbow Surg.* May-Jun 2006;15(3):339-343.

# Impingement

- Speed's
- Painful Arc
- Kennedy Hawkins
- Locking Maneuver



## Value of Impingement Tests

- In the Park study, 913 patients underwent physical examination and diagnostic arthroscopy
- Results indicated that the combination of the Hawkins-Kennedy, painful arc, and infraspinatus muscle tests yielded the best post-test probability (95%) for any degree of impingement.
- The combination of the painful arc, drop-arm sign, and infrapsinatus muscle test produced the best post-test probability (95%) for a full-thickness rotator cuff tear.

Park HB, Yokota A, Gill HS, El Rassi G, McFarland EG. Diagnostic accuracy of clinical tests for the different degrees of subacromial impingement syndrome. *J Bone Joint Surg Am.* Jul 2005;87(7):1446-1455.

# Value of Tests for Tears

- In a retrospective study by Ito et al. common sites of pain were evaluated using clinical charts of 149 patients diagnosed with either rotator cuff tears or adhesive capsulitis confirmed by arthroscopic findings
- The lateral and anterior shoulder were the most common sites of pain regardless of the existence of whether there was a tear or where the tear existed. Motion pain was more common than pain at rest for patients with rotator cuff tendonitis or tears.
- The authors conclude that pain location is not useful in locating the site of a tear, however, the physical exam based on positive results to muscle tests with appropriate thresholds for muscle weakness was clinically useful.

Itoi E, Minagawa H, Yamamoto N, Seki N, Abe H. Are pain location and physical examinations useful in locating a tear site of the rotator cuff? *Am J Sports Med.* Feb 2006;34(2):256-264.



- Specifically;
- Supraspinatus - the full can test and empty can test showed the higher accuracy when assessed with muscle weakness (78% and 79% respectively) then when assessed with pain (74% and 71% respectively)
- Infraspinatus – external rotation strength showed accuracy of 50% using pain and between 58% and 74% using weakness as a positive.
- Subscapularis – lift-off test accuracy was 65% with pain and 62%-85% when using strength.

# Instability

- Load and Shift Testing (seated)
- Patient's arm rests on lap, patient relaxes
- Scapula/AC stabilized

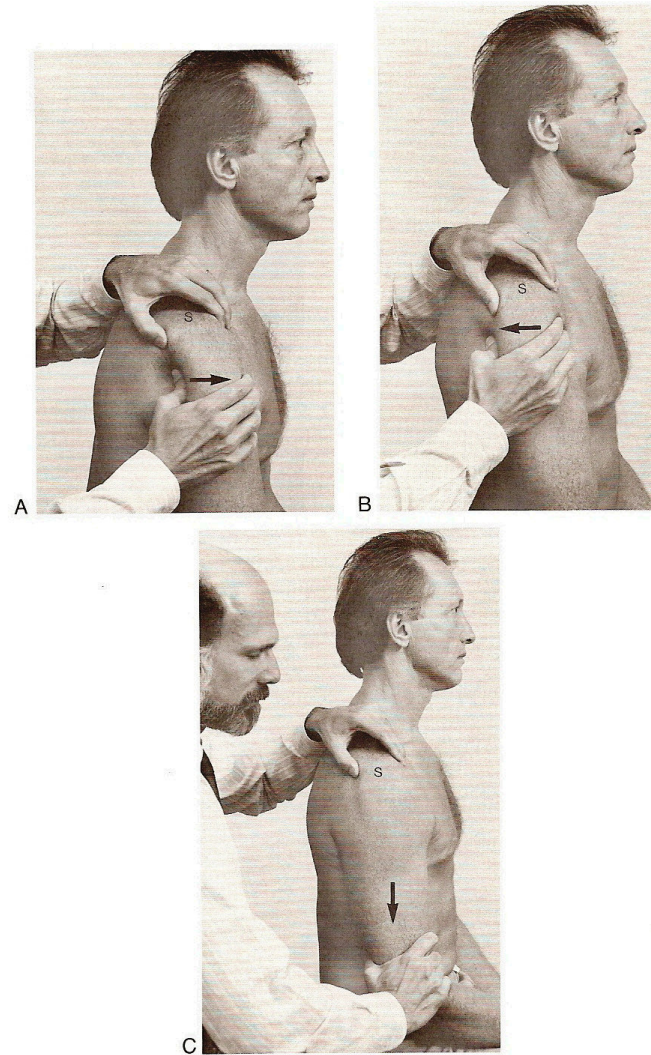


Fig. 6-20. Seated load and shift tests for instability. (A) Anterior. (B) Posterior. (C) Inferior. S, stabilize.

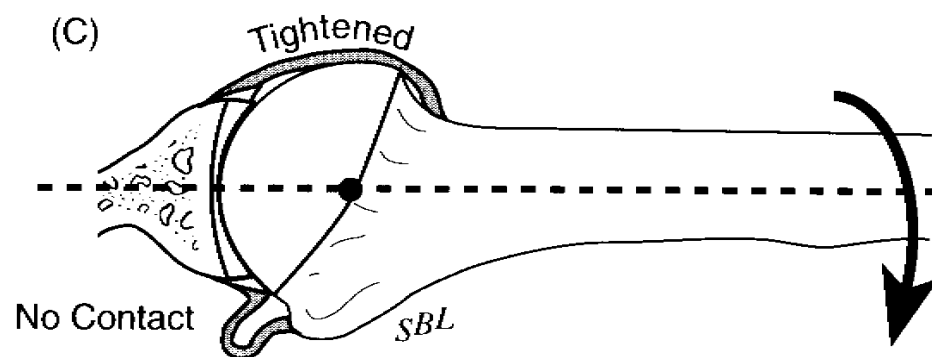
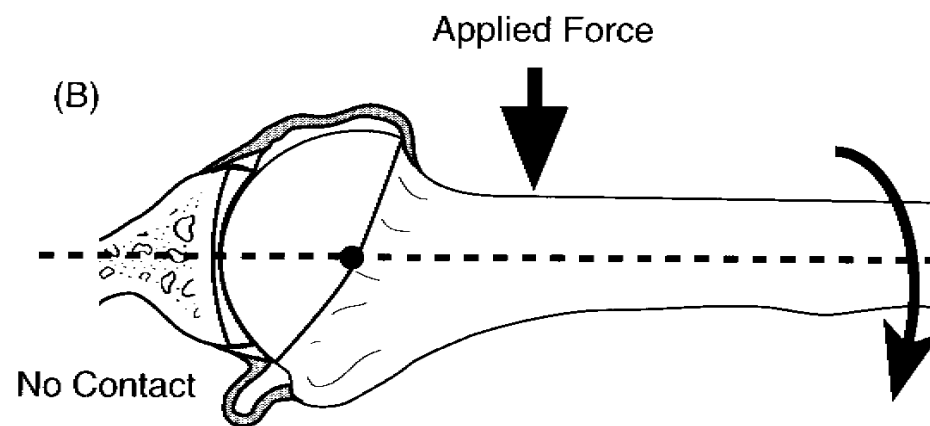
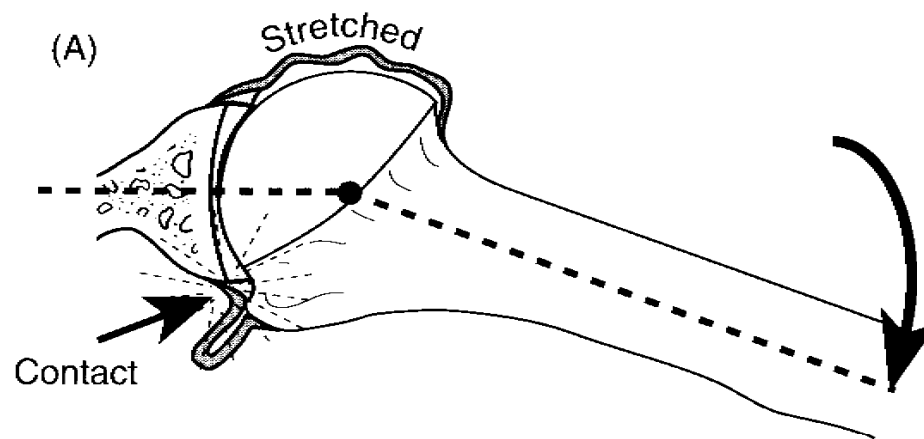
# Instability/Posterior Impingement

- Apprehension test

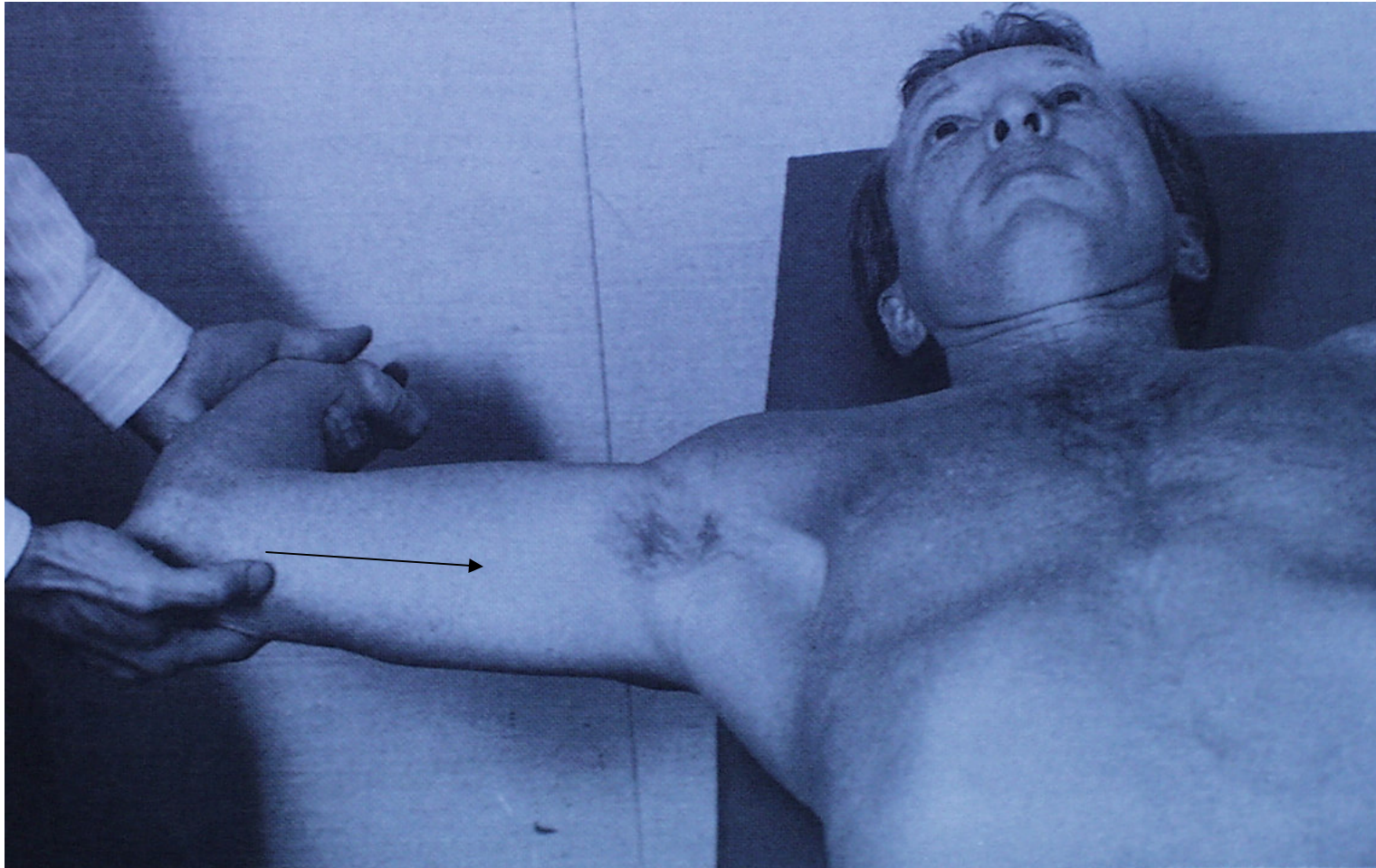


- Relocation Test





# Crank Test





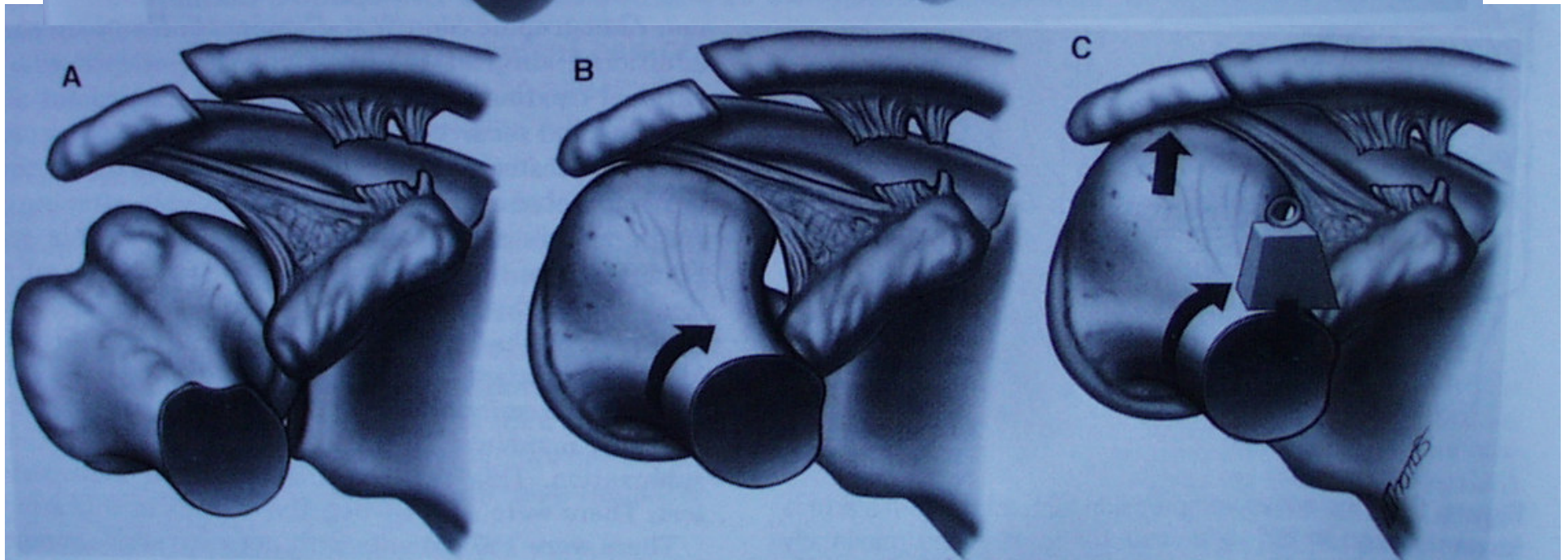
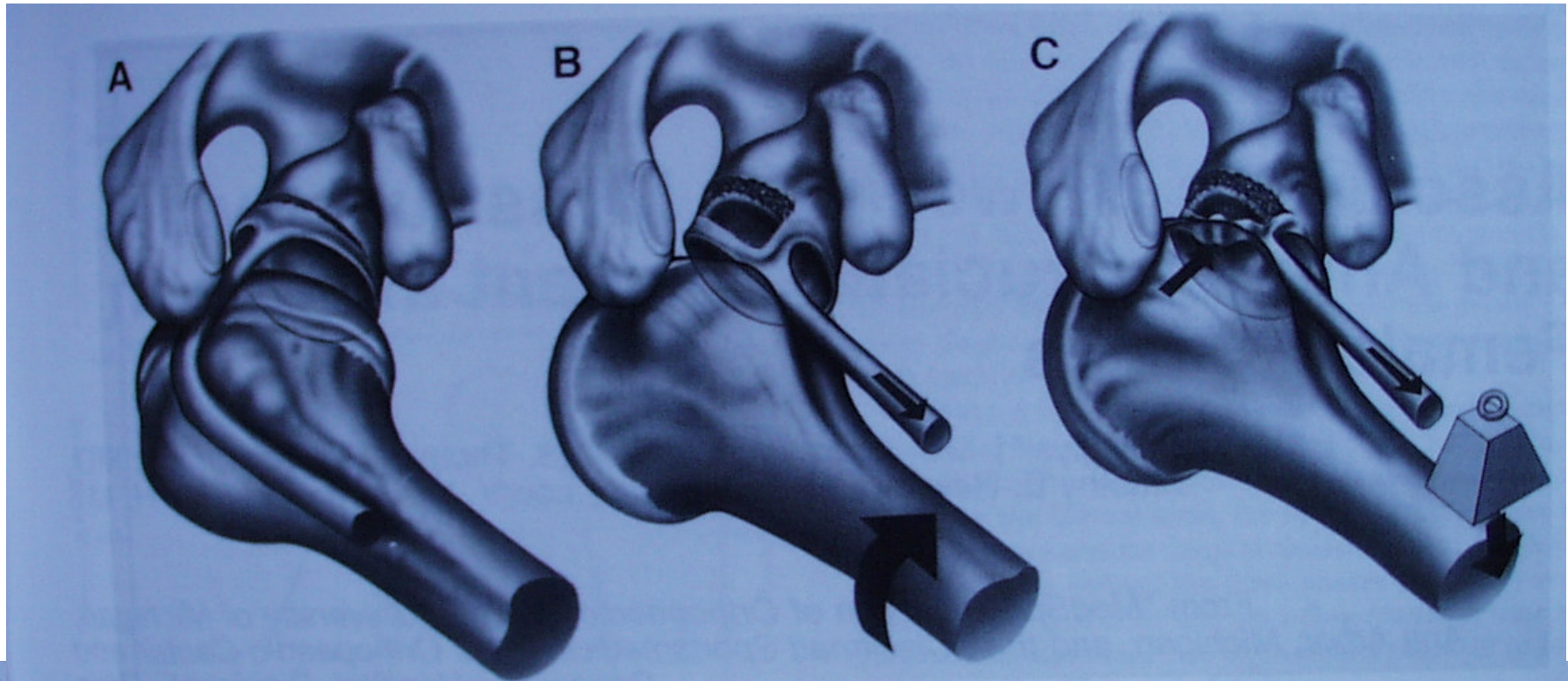
# Slide Test



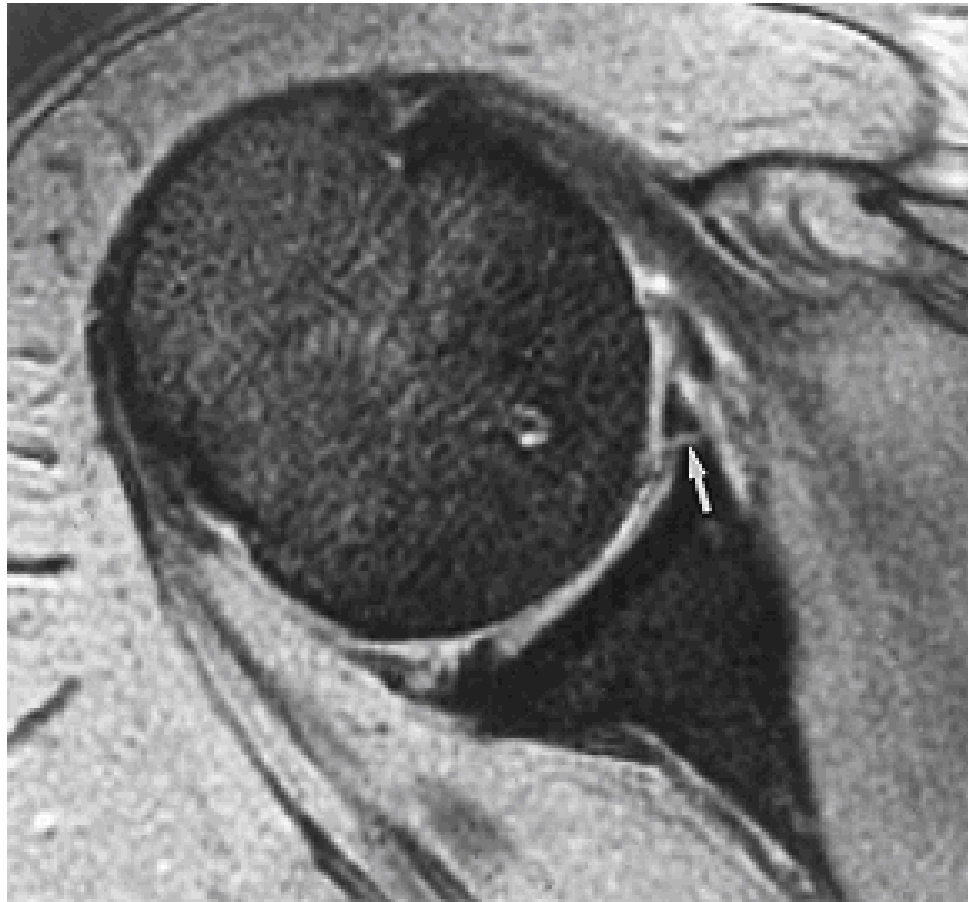
# O'Brien Sign











# Shoulder

## Clinical Assessment of SLAP Lesions

- 3 tests studied: Anterior Slide (AS), Active Compression (AC), and Compression Rotation (CR)
- Sensitivity, specificity, positive and negative predictive values were determined using arthroscopic comparison
- Not good at localizing or producing a click
- Overlap of positives for impingement

- Most sensitive – AC = 47%
- Most specific – AS = 84%
- Highest positive predictive value – AC = 10%
- Highest overall accuracy – AS = 77%
- Lowest accuracy – AC = 54%

# Shoulder

## Diagnosis of Labrum Tears

- Comparison of diagnostic value of the Crank Test, O'Brien Test, and MRI
- Crank Test – positive predictive value (PPV) of 41%, negative predictive value (NPV) of 61%, 56% specific, 46% sensitive
- O'Brien Test – PPV = 34%, NPV = 50%, 31% specific, 54% sensitive,

Stetson WB, et al. Am J Sports Med: 30(6),806-809, 2002

- MRI – PPV = 63%, NPV = 83%, 92% specific, 42% sensitive
- MRI + O'Brien – PPV = 71%, 82% specific, 50% sensitive
- MRI + Crank – PPV = 60%, 67% specific, 43% sensitive

# Common Mistakes (Continued)

- Neurological pain is always evident through dermatome and myotome testing
- Sources of referred pain is limited to organs, facets, and trigger points