Adhesive Capsulitis: From Bench to Bedside

Does Pathophysiology Guide Clinical Treatment?

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J. Neviaser (1945) “Adhesive Capsulitis”

- reported changes in capsular volume at arthrography
- capsular volume loss resulted from intra-articular adhesions
- described scar formation in synovium and subsynovium

• location of pathology
  - intra-articular
  - subacromial
  - adhesions vs contracture

• pathophysiology
  - inflammation
  - fibrosis

• risk factors
  - female
  - age > 40
  - thyroid disease
  - stroke, MI
  - trauma

Stages of Adhesive Capsulitis
(Neviser, 1987)

• Stage 1:
  - no true loss of motion
  - ROM limited by pain
  - night and rest pain

• Stage 2:
  - “freezing phase”
  - ROM limited by pain and stiffness
  - Night and rest pain

• Stage 3:
  - “frozen phase”
  - ROM limited by stiffness
  - no night or rest pain
  - pain at end ROM

• Stage 4:
  - “thawing phase”
  - slow and steady recovery of ROM

“treatment must be based on pathogenesis and natural history”
(Neviser, 1987)

- benign neglect
- PT
- intraarticular steroid
- subacromial steroid
- NSAID
- capsular distention
- manipulation
- surgery

PATHOLOGY?

- idiopathic adhesive capsulitis
- 92 pathology specimens
- clinical history
- ROM (active and passive), EUA
- arthroscopic findings
- clinical stage determined
- pathologic stage determined
- correlations between pathologic and clinical stage were made
**History**

- location and type of pain
- night and rest pain
- onset of pain precedes loss of motion
- description of pain or stiffness is heavily dependent on the stage of the disease
- medical history
- PT may describe “irritable shoulder”
- “does exercise increase the pain and stiffness?”

**Physical Exam and Radiographic Exam**

- cervical spine exam
- always examine R/L shoulders
- active/passive ROM
  - glenohumeral
  - scapulothoracic
- supine passive GH motion:
  - documentation of capsular flexibility
  - monitor clinical response to treatment
- x-rays: normal or osteopenia
- MRI
  - capsular thickening
  - loss of axillary pouch

**Treatment**

- “Benign Neglect”
  - level 3-4 studies
  - demonstrate good outcome at 2-10 years
  - subjective outcomes better than objective ROM
  - stage of disease at time of diagnosis is not considered

- Intra-articular injection
  - several level 1-2 studies
  - many level 4 studies
  - demonstrate early improvement in ROM as compared with PT, ice, benign neglect
  - no difference in outcome at 2 years
  - randomized to intra-articular prednisolone, PT, ice, no treatment
  - steroid injection resulted in best response at 6 wk
  - no difference at 6 months
  - single injection of triamcinolone vs placebo vs PT
  - additive effect of steroid and PT
  - 1-3 injections of triamcinolone vs PT
  - average 2.2 injections resulted in 77% treatment success vs 46% with PT alone
  - efficacy of injection correlated with duration of symptoms
Cochrane Review (2009)

- wide variation in type and dose of steroid
- most did not verify accuracy of injection
- variation in comparison groups
- stage of disease poorly documented
- summary
  - little evidence to guide treatment secondary to variable methodology
  - intra-articular steroid may have short term benefit

Surgical Treatment

- reserved for patients with minimum of 6 months conservative treatment
- current literature supports use of capsular release and MUA
- results are reproducible and long lasting
- anterior and posterior release most widely reported, need for inferior release not well documented

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Interventions</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Janda et al</td>
<td>1993</td>
<td>MUA</td>
<td>Poor result w/ diabetes</td>
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<tr>
<td>Pollock et al</td>
<td>1994</td>
<td>MUA, then arthroscopy</td>
<td>83% Satisfactory results (64% if diabetic)</td>
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<tr>
<td>Segmüller et al</td>
<td>1995</td>
<td>Arthroscopic release</td>
<td>88% Very satisfied 87% E/G Constant Score</td>
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<tr>
<td>Ogilvie-Harris</td>
<td>1995</td>
<td>MUA vs. arthroscopic release</td>
<td>Scope better long term results, including DM</td>
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<tr>
<td>Warner et al</td>
<td>1996</td>
<td>Arthroscopic release and MUA</td>
<td>Reliable improvement in motion, low mortality</td>
</tr>
<tr>
<td>Harryman et al</td>
<td>1997</td>
<td>Arthroscopic release and MUA</td>
<td>30 cases, 13/30 DM, both groups 88% E/G</td>
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<tr>
<td>Andersen et al</td>
<td>1998</td>
<td>MUA, then arthroscopy</td>
<td>Safe &amp; effective Rx assoc, pathology</td>
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<tr>
<td>Lievre and Murrell</td>
<td>2012</td>
<td>Arthroscopic release: anterior-posterior-inferior followed by MUA</td>
<td>Sustainable excellent results when comparing 1 and 7 year follow-up Safe and effective</td>
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Stage 1

- duration of symptoms 0-3 months
- rest and night pain
- pain with AROM, PROM
- limitation of FF, ABD, IR, ER
- exam under anesthesia = full ROM
- arthroscopic findings
- pathology

inflammatory, hypervascular synovitis

normal capsule
Treatment: Stage 1

- intra-articular corticosteroid / anesthetic
  - 80 mg depomedrol / lidocaine / marcaine
- examine 15 minutes following injection
  - pain
  - range of motion (0, 45, 90 degree GH)
- examine in 2 weeks to determine efficacy
- second injection (if first not image guided)
- home PT program
- examine in one month

Stage 2

- duration of symptoms 3-9 months
- rest and night pain
- pain with AROM and PROM
- significant loss of FF, ABD, IR, ER
- EUA: range of motion = awake exam
- arthroscopic findings
- pathology

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**Stage 1: Internal Rotation**

- IR
  - initial
  - inject
  - 2 wks
  - 4 wks
  - 6 wks
  - 3 mo
  - 6 mo

**Stage 1**

- FF
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

- ABD
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

- ER
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

**Stage 2**

- FF
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

- ABD
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

- ER
  - 0
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70

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Pathology images:

- synovial and subsynovial scar
- dense capsular scar

TGF-beta staining in capsule and synovium

Rodes et al. JOR 1997
Treatment: Stage 2

- treatment of intra-articular synovitis and capsular contracture
- intraarticular injection to decrease pain and synovial hyperplasia
- examine in 15 minutes to assess pain and degree of capsular contracture
- home based or supervised PT
- examine in two wks to determine efficacy

Treatment: Stage 2

- water based therapy may be helpful
- examine Q 6 weeks to monitor recovery of ROM
- consider arthroscopic intervention if patient does not respond to intra-articular injection or fails to progress with recovery of ROM
- synovectomy, +/- capsular release, manipulation under anesthesia

Stage 3

- duration of symptoms > 9 months
- no rest or night pain
- pain at end ROM
- significant loss of motion
- EUA: ROM unchanged
- arthroscopic findings
- pathology

Treatment: Stage 3

- treatment of contracture
- no indication for corticosteroid
- home or supervised PT
  - recover glenohumeral ROM
  - restore strength of rotator cuff and periscapular musculature
- arthroscopic intervention
- capsular release and manipulation
**Adhesive Capsulitis**

- can be confused with impingement in early stages
- understanding the pathophysiology should guide treatment decisions
- female >> male
- early diagnosis is critical

**Understand pathology and stage of disease**

Pathology determines treatment

Treatment and stage determine time to recovery

**THANK YOU**

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