Degenerative Conditions in the Shoulder

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My Profile

• Dr John Trantalis
• MBBS UNSW 1996
• Gained Fellowship in Orthopaedic Surgery 2007 with:
  – Royal Australasian College of Surgeons
  – Australian Orthopaedic Association

• Shoulder & Elbow Fellowship in Canada and Sydney 2007/08.
Treatment of Localized Disease: Location Location Location!!

Patient History

1. Pain profile: SOCRATES
   - Location
   - Mechanical Pain? e.g. shoulder pain worse with overhead activities.

2. Functional Profile
   - How does the problem effect the patient’s functional activities

3. Joint Profile
   - Mechanical Joint Symptoms: Clicking, Locking, Instability, Swelling
Treatment of Localized Disease: Examination

1. Look
   - Wasting, Scars, Posture, etc

2. Feel
   - Tenderness: Location!!!!!!!
     - Especially in shoulder

3. Move
   - Active motion
   - Passive Motion

4. Special tests
Key to Shoulder Examination:
Passive vs Active Motion

• **ACTIVE MOTION**
  – Patient moves the joint on their own

• **PASSIVE MOTION**
  – The examiner moves the joint for the patient

• If the joint is stiff:
  ➢ Both active and passive motion will be restricted

• If all the tendons are torn off…
  ➢ Only active motion is affected…. Passive preserved.
PASSIVE vs ACTIVE motion

- Loss of active Motion
- Preserved Passive Motion
  - Massive Cuff Tear

- Loss of Active *and* Passive Motion
  - Shoulder Arthritis or Frozen Shoulder
Online Video Tutorial: How to Examine Shoulders

These Video Tutorials can be viewed Online:

Shoulder: shoulderandelbow.com.au
# Information for Medical Students

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The Shoulder Joint

- Great ROM
- Very Shallow Socket
- Most frequently dislocated joint
- Rotator Cuff
Conditions Affecting the Adult Shoulder

• Age >40 y
  • 85% “Rotator Cuff Syndrome”
    – Rotator Cuff Tendonosis and Tears
    – Impingement
    – Long Head of Biceps Tendon Pathology
    – Acromioclavicular Joint Pathology
  
  – 10% Frozen Shoulder (aka Adhesive Capsulitis)
  – 4% Osteoarthritis
  – 1% other
Conditions Affecting the Adult Shoulder

- Age < 30 y
  - 85% Instability of Glenohumeral Joint
    - Labral Tears
  - 15% Other
Function of the Shoulder Joint in Human: Position the Arm in Space
RECENT EVOLUTIONARY CHANGES EXPLAIN THE PATTERN OF DEGENERATIVE SHOULDER CONDITIONS
From 4 legs to 2: The Evolution of the Shoulder Joint

- Hitchcock
- JBJS 1948

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<th>Mode of progression</th>
<th>Opossum</th>
<th>Gibbon</th>
<th>Gorilla</th>
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<td>Quadriped</td>
<td>Active tree swinger</td>
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<td>Thorax</td>
<td><img src="image1" alt="Thorax Opossum" /></td>
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<td>Position of scapula</td>
<td><img src="image5" alt="Position Opossum" /></td>
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<td>Effect of free arm length with humerus at side and hand at midline</td>
<td><img src="image9" alt="Effect Opossum" /></td>
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<td>Detail of course of biceps tendon thru shoulder</td>
<td><img src="image13" alt="Detail Opossum" /></td>
<td><img src="image14" alt="Detail Gibbon" /></td>
<td><img src="image15" alt="Detail Gorilla" /></td>
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NOW LET’S FOCUS ON THE ACTUAL CLINICAL CONDITIONS......
TENDONOSIS: WEAR AND TEAR OF TENDONS OVER TIME
Tendinosis: Life Expectancy over the Ages
The Shoulder: Tendonosis
Stress Fatigue Failure
How does body Combat Stress Fatigue: Regeneration / Healing
Regenerative Capacity and Vascularity of an Organ

Muscle
Bone
Tendon
Tendon: Poor Healing Potential
Tendonosis increases with age
Does Tendonosis lead to Tendon tears
The Function of the Rotator Cuff

“Effect of Massive Rotator Cuff Tears”
Rotator Cuff

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis
- Integrated Unit
Rotator Cuff Function

- Humeral head *depressor / compressor*

- RC always co-contracts with the deltoid.

- Deltoid cannot function without the RC
Deltoid contracting alone
Cantilever EFFECT: Co-Contraction of Deltoid and Rotator Cuff
Unbalanced CUFF TEARS: Massive Rotator Cuff Tears

Normal

Massive tear: Proximal Humeral Migration
Consequences of a Massive Unbalanced Cuff Tear → Cuff Tear Arthropathy
ROTATOR CUFF TENDONOSIS, TEARS AND SUBACROMIAL IMPINGEMENT
RC Tendonosis and Impingement
Anatomical Changes Contributing to Subacromial Impingement

Acromial Spurs

RC Tendonosis / Thickened Tendon
Impingement Signs

Neers

Hawkins
Rotator Cuff Tears: Anatomy

- Supraspinatus 70%
- Infraspinatus 30%
- Subscapularis 20%
- Teres Minor 5%
Rotator Cuff Tears: Clinical Presentation

- **Pain**
  - Lateral / Anterior
  - Wakes up patient at night
  - Worse with overhead activities

- **Examination**
  - Loss of active motion
  - Preserved Passive motion
Rotator Cuff Tears: Pain with Resisted testing of muscles

• Supraspinatus
  – Forward Elevation

• Infraspinatus / Teres Minor
  – External Rotation

• Subscapularis
  – Internal Rotation
Rotator Cuff Tears: Pain with Resisted Testing of Power
Rotator Cuff Tears: XRAY / US / MRI
Rotator Cuff Tears: Non-op Treatment

- Analgesics
- Modification of Activities
- Corticosteroid Injections
- Physiotherapy
RCT’s: Surgical Treatment

• Repair of Rotator Cuff
  – Open
  – Arthroscopic

• Long recovery (6 months) but good results
When should a patient with a Rotator Cuff Tear be offered Surgery Semi-Urgently?

MASSIVE CUFF TEARS

– Middle Aged Patient After a Shoulder Dislocation

– Shoulder Injury Leading to Loss of Ability to Lift Arm Above Head
Acute Massive Rotator Cuff Tears

Patient can’t actively lift arm above shoulder level (but passive motion maintained)
Why is this surgery so “urgent”? Why not trial non-operative management then surgery if this fails?
What happens to the tendon and muscle after a cuff tear

- Tendon - contracts and shortens
- Muscle belly - Turns into fat
- These changes
  - Are IRREVERSIBLE
  - Occur rapidly within 12 weeks
Tendon Retraction with Large Cuff Tears
Muscle Wasting and Fatty Infiltration
Significance of these Irreversible Cuff Changes

- Lower the chance of a successful outcome with surgery.
- Early repair of the rotator cuff → stops the progression of the changes
Massive Cuff Tears → Cuff Tear Arthropathy
Clinical Case: 63yo Sign Writer 2 weeks after shoulder dislocation
Massive Tears fixed early have a much better outcome than chronic massive tears

- **Acute Massive Tear**
  - Easy to repair with Low Tension

- **Chronic Massive Tear**
  - Too tight / shrunken to allow a repair
Clinical Case: 63yo Sign Writer
2 weeks after shoulder dislocation
Double Row Repair
6 months post-op
OSTEOARTHRITIS OF THE GLENOHUMERAL JOINT
Glenohumeral Osteoarthritis

• Uncommon
  – Not a weight bearing joint

• Usually older Population
Glenohumeral Osteoarthritis

• Pain
  – Anterior
  – Chronic
  – Worse with movement

• Examination
  – Loss of active AND passive motion
Glenohumeral Osteoarthritis: Imaging

- **XRAY**
  - Loss of Glenohumeral joint space
  - Osteophytes
    - “Beard Osteophyte”
Glenohumeral Osteoarthritis: Treatment

• Non-operative
  – Analgesics
  – Modification of Activities
  – Corticosteroid Injections

• Operative
  – Shoulder Replacement
    • Half
    • Total
Cuff Tear Arthropathy of the Shoulder
Unbalanced CUFF TEARS: Massive Rotator Cuff Tears
Consequences of a Massive Unbalanced Cuff Tear $\rightarrow$ Cuff Tear Arthropathy
Cuff Tear Arthropathy: Clinical Features

• Chronic Shoulder pain
  – Anterior / lateral
  – Worse with activity

• Examination
  – Reduced Active Motion
  – Variable passive motion

• XRAY is diagnostic
XRAY Clues for Cuff Tear Arthropathy:

“Proximal Migration of Humeral Head

- Acromiohumeral distance
- Humeroscapular curve
XRAY Clues for Cuff Tear Arthropathy: “Shoulder becomes a Hip Joint”

Femoralisation of Humeral Head
Acetabularisation of Acromion / Glenoid
Cuff Tear Arthropathy: Non-Operative Management

- Analgesics
- Modification of Activities
- Corticosteroid Injections

- Physiotherapy:
  - Anterior Deltoid Strengthening Exercises
Cuff Tear Arthropathy: Surgical Management

• Reverse Total Shoulder Replacement

• Good for improving pain AND active motion
What is a REVERSE Shoulder Replacement? Ball and Socket Reversed.

- **Normal Shoulder**
- **Standard Shoulder Replacement**
- **Reverse Shoulder Replacement**
Can’t do “Standard” Shoulder Replacement: Glenoid loosens
Reverse TSR: Works by Lever Mechanism
Acromioclavicular Joint: Anatomy

- Small Fibrocartilaginous Joint
- Stabilized mainly by Coracoclavicular Ligaments
Acromioclavicular Joint: Degenerative Arthritis

- Present on Xrays in almost all individuals >50 years
  BUT
- Usually not symptomatic
Acromioclavicular Joint: Degenerative Arthritis

- **Pain**
  - Superior, directly over AC joint
  - Worse with activity

- **Examination**
  - Tenderness directly over AC joint
Acromioclavicular Joint OA: Exam
Acromioclavicular Joint OA: Imaging

- **Xray**
  - Narrowing of AC Joint
  - Osteophytes from AC joint

- **MRI**
  - AC jt degeneration
  - Oedema in lateral end of clavicle
Acromioclavicular Joint Osteoarthritis: Treatment

• Non-operative
  – Analgesics,
  – Corticosteroid injections
  – Modification of Activities

• Operative
  – Excisions of lateral end of clavicle
    • Open
    • Arthroscopic
Long Head of Biceps: Anatomy
Evolutionary Anatomy

• Quadrupeds (e.g. horse)
  – Biceps only has one head proximally
  – Important for elevating limb after stance, and locking limb in stance phase

  – *the biceps tendon fits over the humeral head and locks the forelimb forming the passive stay apparatus in stance.*
From 4 legs to 2: The \textit{IN}volution of the Long Head of Biceps

Anatomical Changes indicate that the role of the biceps tendon in the shoulder is lessening.
Long Head of Biceps Tendon

- Tendinitis
- Instability
- Longitudinal Tears / Splits
- Tendinopathy
- Rupture (Popeye)
Biceps Tendon Problems: History

• Pain
  – Anterior
  – Radiates down the front of the arm
  – Worse with activity

• Clicking
  – With biceps instability
Biceps Tendon Problems: Examination

- Tenderness
  - Over Biceps Tendon anteriorly

- Pain with resisted forward elevation
Biceps Tendon Problems: Investigation

- XRAY (screening test)
- MRI
- Ultrasound: dynamic
Biceps Tendon Problems: Treatment

- **Non-operative**
  - Analgesics,
  - Corticosteroid injections
  - Modification of Activities

- **Operative**
  - Tenotomy
    - Just cut it and let it drop
  - Tenodesis
    - Attach it to the humerus
Key Points

• Increase in life expectancy is coincident with the mechanical failure of the rotator cuff.

• Tendonosis and Cuff Tears are mostly a wear and tear phenomenon of the shoulder.
Thank You

Lake Louise, Alberta, Canada