Rotator Cuff Injuries

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Disclosures

- Consultant for Arthrex (Naples, FL)
- Owner, Midwest Orthopedic Specialty Hospital
- Owner, OSM Consulting, LLC
- Owner, The Surgery Center at Associated Surgical and Medical Specialists
- No financial remunerations pertaining to this presentation
Objectives

- Shoulder anatomy/functional review
- Physical Examination
- Common pathologic conditions of the rotator cuff
- Review of basic treatments
- Rehabilitation concepts
- Questions
Shoulder Anatomy: Rotator Cuff
Function of the Rotator Cuff

- **Supraspinatus muscle**
  - Initiates shoulder flexion and abduction, most commonly torn tendon.

- **Infraspinatus muscle**
  - External Rotator of the shoulder.

- **Teres Minor muscle**
  - Secondary external rotator of the shoulder.

- **Subscapularis muscle**
  - Internal rotator of the shoulder.
Function of the Rotator Cuff

The primary function of the rotator cuff is to maintain an appropriate relationship between humeral and glenoid articulation, which is lost in massive tears.

“Rotator cuff arthropathy”
Shoulder Physical Examination

- Inspection
- Skin
- Muscle
- Osseous anatomy
  - Scapula
  - AC Joint
- Active range of motion
Shoulder Physical Examination

- Palpation
- Passive range of motion
- Capsular mobility!!!!
- Posterior capsule
- Scapula
- Rotator cuff rent test
- Strength testing
- “Special tests”

Rent Test

Rotator Cuff Pathology

Impingement

External

“Classic”

Internal

“Microinstability”
Rotator Cuff Pathology

Extrinsic Impingement

Non-surgical treatment
- Rest/Activity Modification
- NSAID’s
- Physical Therapy
- Injections- Subacromial
  - Cortisone
  - Orthobiologics

Surgical treatment
Rotator Cuff Pathology

- Intrinsic Impingement
  - Microinstability lesion
  - Posterior capsular contracture
- Non-surgical treatment
  - Rest/Activity Modification
  - NSAID's
  - Physical Therapy
  - Injections- Intra articular
    - Cortisone
    - Ortho biologics
- Surgical treatment
Rotator Cuff Pathology

- Partial Tear of rotator cuff
- Bursal surface
- Articular sided tear

Classification of tear

Grade 1: Partial tear < 3mm deep
Grade 2: Partial tear 3-6 mm deep (depth not exceeding one-half of the tendon thickness)
Grade 3: Partial tear > 6mm deep.
Rotator Cuff Tear Therapy

- **Physical Therapy**
  - Restore dynamics
  - Improve strength and motion
  - Allow for compensatory musculature to increase
  - Posterior capsular stretching

- **Cortisone Injection**
  - Reduces inflammation

**Best indicated for impingement, tendinopathy and partial or small full thickness tears**

**Biologics?**
Partial Thickness Rotator Cuff Tear: Bursal Surface Tear
Partial Thickness Rotator Cuff Tear: Conventional Repair
Partial Thickness Rotator Cuff Tear: “PASTA”:
Partial Articular Supraspinatus Tendon Avulsion

- Most commonly in younger patients
- Associated with “micro-instability”
- Repetitive overhead athletics
- Traction injuries
- Supraspinatus most common tendon
Partial Thickness Rotator Cuff Tear: Transtendon Repair for Articular Sided Tears
Rotator Cuff Repair

- Often performed with a subacromial decompression
- Open techniques
- “Mini Open” techniques
- Arthroscopic methods
  - Single vs. Double Row
- Biologic Augmentation
Arthroscopic Single Row Mason-Allen Equivalent Repair

Sutures prior to tying

Final repair
Arthroscopic Double Row Transosseous Equivalent Repair

Rotator Cuff Repair Recovery

- 6 weeks for tissue healing
- 3-4 months for motion and strengthening

Dependent on repair experience:
- Size
- Tissue Quality
- Strength of repair

Caution:
- Repetitive
- Overhead
- Lifting
Arthroscopic Rotator Cuff Repair
Rotator Cuff Repair Results Single Row v Double Row

Our Experience:

- 154 patients with 12 month follow-up on 132 patients- 3/06 to present
  - 78 single row Mason Allen configuration group
    - Ave. age 54 yr
    - Tear size 2.7 cm
  - 54 double row Double Row Transosseous Equivalent group
    - Ave. age 55 yr
    - Tear size 3.4 cm
    - No significant difference in mean tear size
  - Preop evaluation performed
    - Dynamometric measurements- supra, infra
      - Subs assessed as part of routine, no subs repairs included in study, therefore subs data not analyzed
    - Motion testing- ER, IR, Abd, FE
    - ASES, UCLA, VAS scores
Methods

Surgery
- Lateral decubitus position
- Rotator cuff repaired arthroscopically
  - Single surgeon (WTP)
  - Single row Mason-Allen v double row transosseous equivalent

Post-op protocol same in both groups
- CPM 3 weeks
- 5 wk PROM, 1-3 wk AAROM, then AROM/strengthening
- Re-eval at 3, 6, 12 and 24 months
  - Patients who refused to come in for evaluation as above, were given phone interview for subjective outcomes

Statistical analysis: paired T-test
Results:
Total Patient Population Satisfaction

Patient Satisfaction Rate:
- 95% Single row group
- 92% Double row group
Rotator Cuff: Healing vs. Function

Original research

Previous studies demonstrate that the incidence of persistent rotator cuff defects following arthroscopic rotator cuff repair ranges from 20 – 50%

We specifically evaluated MRI appearance of rotator cuff repairs to correlate to postoperative function


57 patients underwent ARCR followed by MRI evaluation at 12-28 months post-op.
All patients demonstrated statistically significant improvements in all outcome measures (p<0.05).
93% reported satisfaction.
Not all demonstrated radiographic healing:
  - Grade I: n=19
  - Grade II: n=15
  - Grade III: n=7
  - Grade IV: n=11
  - Grade V: n=5
Healing vs. Function

No significant correlation exists
- The 1-5 MRI grade did not linearly increase or decrease with level of functional improvement.

15 of the 16 patients (93%) with a Grade 4 or 5 radiographic appearance of their rotator cuff on MRI (persistent defect) were satisfied with their result and had markedly improved outcome

16 of the 19 patients (84%) with Grade 1 radiographic appearance (normal) were satisfied with their result
Workplace Exposure

1.74% of all current workers have an Occupational Shoulder Disorder (OSD)
30% of missed work days are due to MSK injuries – 6.3% for shoulder alone.
Highest incidence of shoulder injury in transportation and utility services
Median days of missed work per injury = 15 days
Men 75%
Mean age 34
Wisconsin Department of Workforce Development

- 2008 Statistics for Occupational Shoulder Injuries in Wisconsin alone
- Shoulder accounts for 2,664/22,726 injuries
- Average of $3,469.63 per injury
- Total cost $7.5 million in 2008 alone
  - Higher total cost than cervical or lumbar spine

127 patients underwent ARCR followed by clinical evaluation at 12-28 months post-op
- 40 filed for Workers Compensation
- 87 did not file for Workers Compensation
Occupational vs. Non-Occupational Rotator Cuff Repair: Postoperative Analysis

**WC patients scored significantly lower for all subjective outcome categories:**

**Subjective Patient Reported Scores:**
- Satisfaction (97% vs. 72%)
- ASES (89 vs. 78 out of 100)
- UCLA (31 vs. 26 out of 35)
- VAS (0.8 vs. 2 out of 10)

**WC patients actually scored significantly higher for some strength outcomes**

**Functional Outcomes:**
- Infraspinatus (20.5lbs vs. 17.4lbs)
- Subscapularis (26.6lbs vs. 23.4lbs)

**WC patients scored lower in every test that involved patient subjective self-evaluation**
Rotator Cuff Pathology:
Massive Rotator Cuff Tears

- Rotator cuff arthropathy
Rotator Cuff Pathology

- Rotator cuff arthropathy
  - Initially described by Neer in 1983
  - “A massive tear also allows the humeral head to be displaced upward, causing subacromial impingement that in time erodes the anterior portion of the acromion and the acromioclavicular joint. Eventually the soft, atrophic head collapses, producing the complete syndrome of cuff-tear arthropathy.”

Neer, CS, Craig, EV, Fukuda, H.; Cuff-tear arthropathy
Rotator Cuff as a Shoulder Stabilizer
The reverse shoulder prosthesis is a prosthesis that has been in clinical use in Europe since 1985 and was approved for use in the United States in 2004.
Surgical Technique: Approach

- Procedure can be performed through:
  - Deltopectoral
    - Need Subscap precautions postop
  - Superior
    - Deltoid precautions postop
Rotator Cuff Pathology

Rotator cuff arthropathy
Patient Selection

- Patients >70 primarily indicated
- “Reverse Total Shoulder Arthroplasty: Survivorship Analysis of Eighty Replacements Followed for Five to Ten Years”
  - Early glenoid loosening at 3 years
  - Prosthetic/functional decline at 6 years
  - Survival rate with replacement of the prosthesis and glenoid loosening as the end points were 91% and 84%, respectively, at 120 months
Contraindications

1. Active local or systemic infection
2. Poor bone quality and/or inadequate bone stock to appropriately support the prosthesis
3. Severe deformity
4. Muscle, nerve or vascular disease
5. Over activity

TEASER!!!!!: Superior Capsular Reconstruction!
Thank You

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