Non-Operative Management of Rotator Cuff Tears: Who Needs Surgery?

CHIGAGO
Sports Medicine Symposium
World Series of Surgery

Julie Bishop, MD
Professor of Orthopaedics, Chief Division of Shoulder Surgery
Team Physician, OSU Department of Athletics
Jameson Crane Sports Medicine Center
The Ohio State University
The Ohio State University Wexner Medical Center

I (and/or my co-authors) have nothing to disclose.

- Thank you to Jed Kuhn for sharing slides with me for this talk!

The Ohio State University Wexner Medical Center

How Many People Have Cuff Tears?

MRI and Cadaveric studies support 10-40% of population >60 yo has full thickness rotator cuff tear (FTRTC)

Table 4 Composite table of results

Group	Total number	Mean age (years)	FTTs prevalence (%)	PTTs prevalence (%)	Total prevalence (%)
Total cadaveric	4629	69.3	12.7	10.4	23.1
Full data cadaveric	2553	70.1	11.8	18.5	30.3
Ultrasound asymptomatic	591		21.7	17.2	38.9
Ultrasound symptomatic	1038	50.4	34.7	6.7	41.4
MRI asymptomatic	271	44.3	10.3	15.9	26.2
MRI symptomatic	490	43.6	40.8	8.6	49.4

Reilly et al. Dead men and radiologists don't lie. A review of cadaveric and radiological studies of rotator cuff tear prevalence. Ann R Coll Surg Engl 2006;88:116-121

The Ohio State University Wexner Medical Center

Prevalence Data

- MRI and Cadaveric studies support 10-40% of population >60 yo has Cuff tear
- US Population 2010=308.4 million
  - **Over Age 60 = 57 million**
- Lets use a Conservative Estimate (10%):
  - 5.7 million cuff tears in USA
- BUT – only 270,000 rotator cuff surgeries are done each year….
- 4.7% of People with Cuff Tears have Surgery…

The Ohio State University Wexner Medical Center

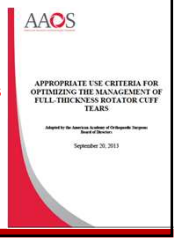
If <95% of People with Rotator Cuff Tears are Having Surgery….
Should I be Operating on Every Rotator Cuff Tear I See?

What are the Indications for Surgery?

The Ohio State University Wexner Medical Center

Surgeons do NOT Agree on Approach to the Same Patient

- AAOS Survey of members, 49% Response Rate
  - Four Hypothetical Rotator Cuff Tear Cases
  - ***Significant Variation in Decision Making***
  - Lack of Clinical Agreement Regarding
  - Role of Surgery vs Nonoperative Care/Tx
  - Dunn WR et al. JBJS 87A(9):1978-84, 2005
- AAOS 2013: Guidelines TX of FTRTC tears
  - 16 experts voted on 100's of scenarios
  - Not much EMB literature to guide decisions
  - ***Most recommendations were consensus***
  - ***LEVEL 5***



Systematic Reviews of the Literature ***Demonstrate Variation in Indications for Surgery***

- 86 Rotator Cuff Repair Manuscripts Reviewed
- Indications were NOT Described in Most Manuscripts
- 31% used Limitations in ADLs
- 52% used Failure of Nonoperative Tx
- 26% used Duration of Nonoperative Tx
- 16% used Night Pain

LEVEL 4

Marx et al. CORR 467(2):450-456, 2009

The Ohio State University Wexner Medical Center

Injections for Rotator Cuff Tears Corticosteroids

- 60 patients with FTRCT enrolled
  - 40mg triamcinolone (N=20)
  - Two injections 40mg triamcinolone 3 wks apart (N=20)
  - No Treatment (N=20)
- Steroid tx induced statistically and clinically significant reduction in activity pain and night pain

However, Level 4,5 evidence suggests detrimental effects of multiple injections in the setting of a full thickness tear….

Level 2 Gialenella et al. Pain Med 2011

The Ohio State University Wexner Medical Center

Timing of Injection Affects Postoperative Infection Risk

- National Medicare Database
- 3 Groups
  - Arthroscopy within 3 months of injection (n=3625)
  - Arthroscopy betwn 3-12 mo of injection (n=7069)
  - Arthroscopy without injection (n=186,678)
- *Incidence of infection significantly higher in those with injection within 3 mo of arthroscopy*
  - OR, 2.2; P<.0001

Level 3 Werner, et al., JSES 2016

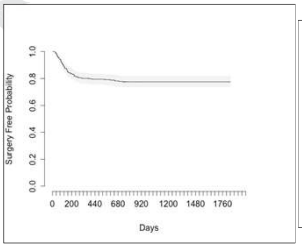
The Ohio State University Wexner Medical Center

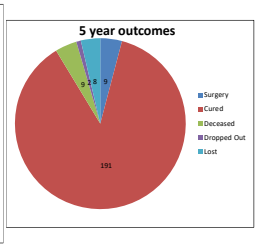
Exercise/PT for Rotator Cuff Tears

- Many Case Reports in Literature
- **MOON Data Largest Series N=452 patients**
  - Symptomatic Atraumatic Full Thickness Rotator Cuff Tears
  - Evidence Based Rehabilitation Program
  - Prospective Cohort Study
- Assess patients at 6, 12 weeks, 1 & 2 years
  - *Are you cured?*
  - *Are you better and want to continue with therapy?*
  - *Are you no better and want to have it repaired?*

The Ohio State University Wexner Medical Center

Effectiveness of Therapy





N=433 (>95% Follow up)
<80% of Patients Had Surgery
Patients Chose to Have Surgery in First 12 Weeks
Take Home: If PT was going to work – Knew w/in 6-12 wks

The Ohio State University Wexner Medical Center

Features NOT Predictors of Surgery

Patient Factors

- Age, sex, BMI
- Handedness
- Education, occupation
- Work-compensation status
- Comorbidities
- ***Pain level***
- ***Duration of symptoms***
- SANE score

Structural Factors:

- ***Number of tendons torn***
- ***Amount of retraction***
- ***Forward elevation***

LEVEL 1

The Ohio State University Wexner Medical Center

What are the Predictors of Failure of Nonoperative Treatment?

- *Anatomic Severity of Tear- NO ASSOCIATION*
- *Symptoms (pain, strength)– NO ASSOCIATION*

- Associations
  - Higher Activity Level (p=0.011)
  - Not Smoking (p=0.023)
  - Younger Age (p=0.042)

LEVEL 1

The Ohio State University Wexner Medical Center

Predictors of Failure of Nonoperative Treatment? ***Strongest Association***

- ***Low Patient Expectations*** Regarding Success with Therapy (p<0.0001)
- If a patient thought PT would not be effective-it generally wasn't
- If a patient thought PT would be effective-It was

LEVEL 1

The Ohio State University Wexner Medical Center

What should be done in PT?

- Pay attention to the scapula!
- Scapular Dyskinesis
  - Non-specific response to painful conditions in the shoulder
  - Visually inspect scapular position at rest/dynamic movement
  - If present – it can be addressed
  - Restore dynamic scapular stability
    - Strengthen scapular stabilizers
    - Kinetic chain-based rehab
  - If it improves – Patients often improve

Non Operative PT Protocol for FTRTC's

- **Stage 1 0-4 weeks**
  - Reduce pain
  - Start Loading joint
  - Isotonics when supported
  - Avoid high tendon compression
- **Stage 2 4-8 weeks**
  - Continue isotonics with increased ROM and less arm support
  - Strengthen surrounding structures
- **Stage 3 8-12 weeks**
  - Start eccentrics to build kinetic energy in muscles
  - Kinetic chain deficits
- **Stage 4 12-16 weeks**
  - Introduce ballistic exercises (kinetic energy releaseing)
  - Consider sport

Should we Repair Rotator Cuff Tears or do Nonoperative Treatment?

Randomized Trials

LEVEL 1 and 2

Comparing surgical repair with conservative treatment for degenerative rotator cuff tears: a randomized controlled trial

- 56 patients with atraumatic cuff tears
  - 25 surgery mini-open repair
  - 31 injection, PT (more large tears in this group)
- 12 Month Results:

  8.2 difference Constant Score; MCID is 18
  1.4 difference VAS; MCID is 2.0
  73.7% of repairs failed (20/25 failed)
  9.6% non-op patients failed and had surgery
  5 pts with intact repair – had best outcomes

LEVEL 2

Heerspink et al JSES 2015

Comparison between surgery and physiotherapy in the treatment of small and medium-sized tears of the rotator cuff

A RANDOMISED CONTROLLED STUDY OF 103 PATIENTS WITH ONE-YEAR FOLLOW-UP

- Randomized Trial of 103 Patients
- 52 pts in PT vs 51 pts with Mini-open/open Surgery
- Cuff Tears <3cm
- Traumatic and Atraumatic Tears on MRI

LEVEL 1

Moosmayer et al., JBJS Br 2010; 92-B(1):83-91.

The Ohio State University Wexner Medical Center

Outcomes @ 1 year

- Primary: Constant Score
  - Constant Score = 10 points higher in surgery group
  - p=0.002; change in score higher in surgery group
  - Continues to improve for 1 yr in surgery group
    - Improvement levels off in PT group
- Secondary:
  - ASES Score
    - ASES Score = 13.4 points higher in surgery group
    - p=0.005; change in score higher in surgery group
  - VAS
    - Difference 1.5 on 10 mm scale (less pain in surgery group)
    - p=0.005

LEVEL 1

Moosmayer et al., JBJS Br 2010; 92-B(1):83-91

The Ohio State University Wexner Medical Center

Success with Surgery

- MRI follow up on 50 of 51
- 76% of Tears Remained Intact
- 24% Failures of Surgery!

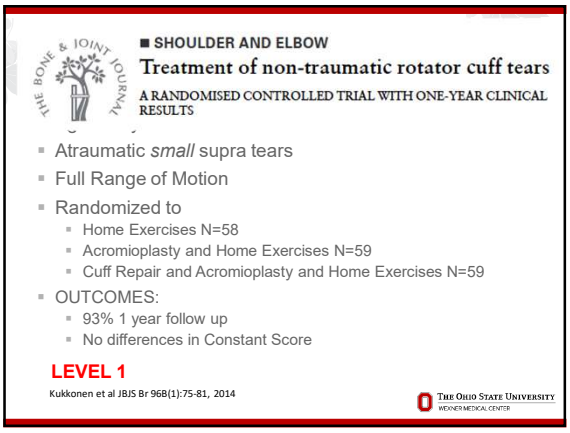
Success with Exercise Program

- Surgery as Failure of Rehabilitation
- 9 of 53 Failed and had Surgery (18%)
  - 3 Before 6 Months; 6 After 6 months
- *If Success is Measured by Avoiding Surgery, Nonoperative Treatment is Successful in >80% of Patients*
- *If Success is Measured by PRO, the VAS and ASES scored did not reach clinically important differences, the Constant Score did, likely related to late gains in strength*

LEVEL 1

Moosmayer et al., JBJS Br 2010; 92-B(1):83-91

The Ohio State University Wexner Medical Center



Systematic Review: Surgery Versus Non-op

- Level 1 and 2
- 1013 articles: 3 qualified
- 269 patients with 1-year FU
- Constant Scores and VAS at 1 yr
  - Favors surgery
  - P=.002
  - BUT: differences were small, despite significant
  - DID NOT meet minimal difference to be clinically significant/important….

Neviaser, et al., JSES 2018

The Ohio State University Wexner Medical Center

So, Who Needs Surgery?

What are the Indications for Rotator Cuff Repair? **Best Evidence in the Literature**

- ***LEVEL 4 EVIDENCE…..***
- ***Acute Tears***-Should Probably Be Repaired Early
  - Especially if acute weakness/loss of function
- ***Weakness or Loss of Function***-Will be Improved if the Rotator Cuff Repair Heals
- ***Patient Expectations***-If they think they need surgery, they probably wont get better until they get surgery….

The Ohio State University Wexner Medical Center

What about the Atraumatic Tear with Pain?

- ***Pain is NOT A GREAT INDICATION***
- The Relationship between Pain and Cuff Tears is NOT Robust
- If Pain is from another source, (e.g. Biceps) then maybe surgery will be required

But, Doctor, will my tear get bigger if we don't fix it?

The Ohio State University Wexner Medical Center

Natural History of Rotator Cuff Tears

- Safran, et al. AJSM 2011
  - 61 FTRTC's followed over 2-3 yrs; <60 yo pts
  - Progression in tear size linked to ⬆ pain
- Eljabu, et al. A Orthop Trauma Surg, 2015
  - Scarcity of data
  - Systematic review – 7 articles, none great
  - Worsening symptoms correlates with tear progression
- Keener, et al, JBJS 2015
  - 224 pts with asymptomatic cuff tear – followed median 5 yrs
  - Tear enlargement occurred in 49% at median 2.8 years
  - Tear enlargement assc with pain and muscle fatty degen
- Khatri, et al. AJSM, 2018
  - Systematic review/meta-analysis of 57 RCT's
  - FTRTC tears: surgery or not – Improve over time
  - Substantial improvement in outcomes regardless

The Ohio State University Wexner Medical Center

Summary: We NEED better data to help us care for patients with rotator cuff tears

- Degenerative Atraumatic Cuff tears
  - Appropriate PT program can work
  - Anatomic/structural factors not important
  - NEED patient buy in
  - If PT will work – know within 6-12 wks
- Cortisone injections
  - Reduce pain
  - Be careful: affect on tendon/risk of infection
- If improved strength is the goal:
  - A *healed* repair likely best option
- Many cuff tears progress
  - Typically accompanied by worsening symptoms
  - However, we really don't understand the long term natural hx
    - *Surgery MAY NOT stop this progression*

The Ohio State University Wexner Medical Center

Thank You Very Much!

- This talk will be up on the Website
- Questions for me?
  - Julie.bishop@osumc.edu
- PT questions?
  - Mitchell.salsbery@osumc.edu