Superior Capsular Reconstruction: Applications and Early Results

William T. Pennington, MD
The Orthopedic Institute of Wisconsin
Midwest Orthopedic Specialty Hospital
Disclosures

- Consultant with Arthrex
- Physician owner Midwest Orthopedic Specialty Hospital
- Physician owner The Surgery Center at Associated Surgical and Medical Specialists
- Owner OSM Consulting, LLC
Objectives

- Present our experience with superior capsular reconstruction for the treatment of massive tears of the rotator cuff in the younger, more active patient
  - Arthroscopic superior capsular reconstruction with acellular dermal graft
  - “Functional rotator cuff augmentation” in repair
  - “Bioplasty”- SCR in conjunction with TSA in active patients with irreparable rotator cuff tear and glenohumeral arthritis
Treatment Options in Patient’s with Massive Irreparable Rotator Cuff Tears

- Debridement +/- Biceps tenotomy
- Partial repair
- Interval slide
- Muscle transfer
- Reverse total shoulder arthroplasty
- Superior capsular reconstruction
Superior Capsular Reconstruction

- Procedure pioneered by Dr. Teruhisa Mihata
- Utilized fascia lata to perform reconstruction of the superior capsule of the shoulder in patients with massive irreparable rotator cuff tears
- Theoretically restores glenohumeral mechanics through re-establishment of superior stability lost in massive RCT*

Goals:
- Function restoration
- Pain relief

Arthroscopic Superior Capsular Reconstruction for Irreparable Rotator Cuff Tears

- Original case series reported by Dr. Mihata in Arthroscopy, 2013
- 24 shoulders treated in 23 patients
- ASCR utilizing fascia lata
- Functional improvement:
  - Active elevation: 84 to 148
  - External rotation 26 to 40
- Increased Acromial humeral distance: 4.6 to 8.7mm
- 83% no graft tear

Arthroscopic Superior Capsular Reconstruction for Irreparable Rotator Cuff Tears
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Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Matrix: Our Experience

- 80 shoulders in 78 patients
- Younger active patients deemed inappropriate for rTSA
- Minimum follow up 7 months
- All with irreparable rotator cuff tears and unsuitable loss of function, pain

Arthroscopic SCR performed with acellular dermal allograft
  - Fixed medially with 2.9 mm push-in anchors and suture tape
  - Lateral fixation with transosseous equivalent double row repair with four suture anchors and two suture tapes
  - Side to side closure with #2 suture to graft and remaining anterior and posterior structures
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Joint Preparation
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Graft Preparation
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Glenoid Fixation
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Graft Fixation
Arthroscopic SCR Early Results:

- n=80
- 43 male, 37 female
- avg age: 58 years old
- 5 failures
  - Two secondary to falls
  - All from humeral side
  - Revisions: One to rTSA, one repeat SCR
- ROM results:
  - ABD/FF preop       ABD/FF 6mos       ABD/FF 12mos
  - 84/86               142/165          160/165
- Strength results:
  - ABD/FF Preop       ABD/FF 6mos       ABD/FF 12mos
  - 5/5.5               6.5/7            8/11
Arthroscopic SCR Outcome Analysis: VAS Scores (n=63 of 80)
Arthroscopic SCR Outcome Analysis: Simple Shoulder Test (n=63 of 80)
Arthroscopic SCR Outcome Analysis: ASES Index Scores (n=63 of 80)
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Radiographic Results

Preop
AHD Preop 4.4mm
Postop
AHD 6mos 9.4mm
AHD 12mos 10.6mm
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Clinical Results
Arthroscopic Superior Capsular Reconstruction with Acellular Dermal Allograft: Failures

All Failures at greater tuberosity attachment
Role for additional biologics?
Hernigou, et al SICOT, 2015:
Number of stem cells at the greater tuberosity decreased with:
  - Lag time from tear onset
  - Tear size
  - Number of tears
  - Stage of fatty infiltration
PRP increases proliferation and migration of stem cells
Superior Capsular Reconstruction to Augment Rotator Cuff Repair

- Numerous studies evaluate augmentation and interposition of rotator cuff repair to improve outcomes in repair of massive rotator cuff tears
  - Augmentation techniques
  - Interposition techniques
- Does loss of superior capsular integrity lead to higher re-tear rate in repair of massive rotator cuff tears?
- Technique developed to reconstruct superior capsular layer beneath repair of massive rotator cuff tear employed
  - Theoretical benefits:
    - Superior capsular reconstruction provides re-centering of humeral head lost massive RCT
    - Dermal allograft provides soft tissue augmentation of atrophic, poor quality tendon at site of footprint providing biologic scaffold to enhance healing response
    - “Functional Biologic Augmentation” = Biologic scaffold + restoration of proper kinematics
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ARCR+SCR: Early Results

- n=41
- All grade 3 atrophy or more
- 27 with at least one prior procedure
- 43 male, 37 female
- avg age: 56 years old
- 2 failures
  - Both from humeral side
  - Neither revised
- ROM results:
  - ABD/FF preop  ABD/FF 6mos
    - 100/100  120/125
- Strength results:
  - ABD/FF Preop  ABD/FF 6mos
    - 5/4  7/6
ARCR+SCR Outcome Analysis: VAS Score
ARCR+SCR Outcome Analysis: SST

![Graph showing outcome analysis over time](image-url)
ARCR+SCR Outcome Analysis: Early Results
Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty: “Bioplasty"

- Younger more active patients present challenges when presenting with severe cartilaginous with concomitant irreparable rotator cuff pathology
- Physiologic age consideration most important factor in rTSA
- We have ten patients that have been treated with SCR/conventional shoulder arthroplasty in young active patients presenting with degenerative arthritis and irreparable rotator cuff repair
- Indications:
  - Irreparable RCT in association with glenohumeral arthritis
  - Revision total shoulder arthroplasty
  - Massive rotator cuff tear in previously placed TSA
Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty: Technique
Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty: Suture Anchor Technique
Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty: Transosseous Technique
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Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty:
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Superior Capsular Reconstruction with Concomitant Total Shoulder Arthroplasty: Clinical Results
“Bioplasty” TSA+SCR: Early Results

- n=10
- 6 primary joint procedure, 4 revision TSA
- 4 male, 6 female
- avg age: 60 years old
- 2 failures
  - Both from humeral side
  - One revised to rTSA, one repair of SCR failure secondary to fall
- ROM results:
  - ABD/FF preop       ABD/FF 6mos
  - 25/30                      100/120
- Strength results:
  - ABD/FF Preop       ABD/FF 6mos
  - 1/1                             3/5
Simple Shoulder Test, TSA/SCR

Pre-Surgery

6 Months
Superior Capsular Reconstruction: Summary

- Useful procedure for patients with irreparable rotator cuff tears that are too young or active for reverse total shoulder arthroplasty
- Results demonstrate decreased pain, increased function, increased acromial humeral distance
- May be used in conjunction with TSA in patients with arthritis/irreparable rotator cuff that aren't candidates for rTSA
- Useful augmentation technique
- Provides superior constraint and possibly restores force couples
- Burns no bridges
Thank You!

William T. Pennington, M.D.
The Orthopedic Institute of Wisconsin
Midwest Orthopedic Specialty Hospital
wpennington@theorthoinstitute.com