General Surgical Principles of Open Rotator cuff repair and Application of Acellular Dermal Matrix for Massive Rotator cuff Tears and Failed Arthroscopic Repairs

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Wright Medical Consulting Agreement for reverse revision Consultant Royalty.
Arthrex speakers bureau Fellowship support
Fx Shoulder Consultant

Financing My Medicare Hobby with my musical career

Dr. Buz

That's One Bone I Don't Fix.
Dr. Buz and the Medications

There's a Doctor down in Austin Dr. Richard Chopp
Dick Chopp????
Don't let his name frighten you if your's has gone soft

He might give you Viagra
Or do some surgery

Three-Piece Inflatable Prosthesis

He'll put leak back in your bend.
Just you wait and see

Youtub
Warning this Presentation contains Graphic scenes of Blood and Gore and Dead Peoples Body Parts from the Red Neck Institute of Shoulderology Knowledge
Redneck Institute Mottos

- If you are weak nervous or Dizzy it could be your shoulder
- If you have good insurance it must be your shoulder
- You can’t get into Heaven with a torn Rotator cuff
- We are not Smart enough to be Dogmatic
The Irreparable Tear is like the unchuggable beer ie Massive Cuff Tear does not equal Irreparable Cuff tear 2 or more Tendons > 5cm Irreparable tear is one in which the size of the tear, retraction, poor tissue quality prevent direct complete tendon to bone repair. doesn’t have to be a massive tear some partial tears are irreparable due to tissue compliance

• Tears classified by pattern
  • Anterosuperior
    • Supraspinatus with subscapularis extension
  • Posterosuperior
    • Supraspinatus with infraspinatus extension
Surgical repair of large-to-massive rotator cuff tear seems to be a better option than patch augmentation or débridement and biceps tenotomy: a prospective comparative study.

Maillot C¹, Harly E², Demezon H², Le Huec JC².

- This prospective study compared the outcomes after 3 different treatments for large and massive rotator cuff tears.
- Patients were allocated in 3 groups: (1) arthroscopic complete repair (repair group), (2) open repair and xenograft patch augmentation (patch group), and (3) arthroscopic débridement and tenotomy of the long head of the biceps (débridement group).
- N 32. No differences were found between the repair and patch groups, but the difference became significant between the débridement group and the patch group (P < .001) and also between the débridement group and the repair group (P < .002). 5 complications occurred in 11 patients in the patch group.

- The use of porcine dermis patches to augment repairs of massive and irreparable rotator cuff tears is not recommended.
Options for Irreparable RC Tears

**Traditional**
- Debridement (± Biceps Tenotomy)
- Partial Repair
- Bridging or Augmented Graft
- Tendon Transfer
- Reverse TSA
- Combination of these
- Fusion

**Biologic**
- Superior Capsular Reconstruction

Each of these procedures requires different lengths and times of immobilization protection and nuanced rehabilitation.
Palliative procedures for pain
Debridement and subacromial decompression

• Rockwood et al reported significant pain relief and restoration of shoulder function after open acromioplasty and debridement

• Several reports of arthroscopic SAD/debridement demonstrate pain relief, functional recovery
  • Unable to restore strength
  • Questionable long term durability of results
SHOULDER FUNCTION FOLLOWING DECOMPRESSION FOR IRREPARABLE CUFF LESIONS

UTHSCSA © 1983
Palliative procedures for pain
Biceps Tenotomy

- Easiest Procedure for this group
- First question I ask my Fellows. is the biceps present?
- Hard for patients to understand the concept
Biceps Tenotomy

Local with Sedation
Immediate ROM
Redding England
Exercise Program if pseudo paralyzed
Rehab for Palliative Procedures
Phase I

- No sling or for comfort only EMS to Deltoid*
- Full passive and active assisted ROM
- If Pseudo paralyzed Use Redding England program
High Tech REDNECK
Operations that work good

BEFORE SURGERY AT RISK

AFTER SURGERY AT RISK

Before - How does this poor girl know whether people really like her, or just want to "use" her?

After - Suffer no more! Go forth and multiply, for thou art healed!

Arthroscopic Cuff repairs of small and medium sized cuff tear Single Row
Open Rotator Cuff Surgery
Low Tech REDNECK
Operations that work good

What do they say about open cuff repair?

- Painful, Deltoid destroying, Anterior superior escape producing, Permanent Stiffness Creating Massacre
“We Did the Best We Could Try To live with it.” “It looks ok on your Latest ultrasound !” I am not quite sure why you can’t lift your arm.

Minimally invasive Axillary Nerve laceration

No matter how much you medialize Tendons don’t heal to metal
Complete Deltoid Healing
Two months Post Op
My Early Influences

Lippmann Kessel

Charles A. Rockwood Jr.
My Preferred Deltotrapezial Flap Takedown

- Deltotrapezial Flap this thickest within 1 cm of either side of the AC joint
- Plane of Maximum Elevation is 20 degrees anterior to the spine of the scapula.
My Preferred Deltotrapezial Flap Takedown

• The incision courses obliquely across the acromioclavicular joint to take advantage of the thick flap created by subperiosteal exposure preserving the AC joint capsule

• Use cautery for the initial incision and then a slow sweeping motion with the knife
Ligament extends underneath the acromion for 1.5 cm

Do Not Amputate  C-A ligament
CA Ligament

- In massive tears retain the acromial fragment and attached ligament until the end of the procedure.
Cuff Mobilization
Cuff Mobilization
Cuff Mobilization

The suprascapular nerve is 1 cm. from the superior edge and 2 cm. from posterior edge.
Understand the Personality of the Tear
Abduction will facilitate the reduction of the massive avulsion
End to End or Side to Side??
Determine by the amount of Tuberosity Exposed

Boutonniere Deformity
Reduce with Downward Traction and side to side repair

Massive avulsion is Reduced by abducting the arm
Base ball stitch with 1mm Braided Polyester Downward Traction will facilitate this reduction
Bony Trough

- A very shallow but broad bony trough should be created from the sulcus to the tuberosity
- Bevel the articular cartilage to make a smooth transition and allow anatomic recreation of the footprint
Comparison of 3 different Methods of Rotator Cuff Repair

• Improved load-to-failure with TOAK compared to single-row anchors or tunnels

FIGURE 7. Bar graph demonstrating final load to failure for each group tested. TOAK technique demonstrated substantially greater load to failure.
TOAKK TECHNIQUE

• The Toakk technique accurately reflects the dead man theory
Augmentation
Duct Tape For The Rotator Cuff
Rotator Cuff Augmentation

DePuy
Stryker
Pegasus Biologics
Arthrex
Arthrotek
lex HD
Zimmer
Integra
SportMesh
Ascension Orthopedics
Primate Rotator Cuff Study – 4 Weeks

- Tendon
- Graft
- Humerus

- Fibrotic Scar
- Encapsulation
A prospective, randomized evaluation of **acellular human dermal matrix** augmentation for arthroscopic rotator cuff repair.


Large tears >3cm 2 tendon tears
85% healing rate augmented
60% unaugmented
Remove the C-A ligament from the undersurface of The Acromion sharply.
The C-A Ligament is repaired back to the residual Acromion through drill holes with permanent Suture material.
CA ligament
Deltoid Repair

• If, despite your best efforts, the deltoid is thin, place a running suture 1 cm. from the edge and place anchoring sutures behind these.

• Especially helpful with deltoid dehiscence.
Post operative Immobilization
Codman's Abduction Splint

• When Properly Adjusted it is perfectly comfortable

Codman, E.A. Boston Medical journal 1908
Post Op Immobilization
Red Neck Institute Sling

• 3 weeks in Abduction Pillow Without motion. Followed by 3 weeks of passive mobilization above pillow in elevation and external rotation
Post Op Immobilization Must Be individualized

- L shape tear and Subscapularis Tears
  - Internal Rotation
- Reverse L
  - External Rotation
- Massive Avulsion
  - Abduction Pillow
- Side to side
  - Loose fitting sling weight of the arm to pull down
Post op Rehab

• 6 weeks  active assisted and active exercise encouraged begin internal rotation up the back and external rotation at the side
• Theraband exercise short arc qod 12 -14 weeks weights 16-20 weeks
Graft Jacket Augmentation of Massive Rotator Cuff Tears

• 46 patients (2004-2007)
  • 9 women, 37 men
  • Average age 58.8 (range 30-76)
  • Dominant extremity 24 patients (52.2%)
  • Average duration of symptoms: 13.5 months
    • Range 0-72 months
  • Previous failed cuff repair: 17 patients
    • 6 patients with >2 previous failed surgeries
    4 with pseudoparalysis
Materials and Methods

• 2 or 3 tendon tears

Exclusion Criteria

• Current Infection
• GH DJD
  • Outerbridge III-IV
• inability to mobilize tendon to bone*

FDA Approved Use
Patient Satisfaction

• 45/46 satisfied with surgery and would have it again. 97.8%
UCLA

- Pre-op: mean 8.4
  - Range 2-16
- Post-op: mean 29.3
  - Range 11-35
- Average improvement: 20.8
  - Range 12-27

H Ellman, G Hanker and M Bayer
Simple Shoulder Test

Simple Shoulder Test: All Patients
N=41

- Comfortable at Rest
- Sleep Comfortably
- Reach Back
- Hand Behind Head
- Coin on Shelf
- Lift 1 Lb.
- Lift 8 Lbs.
- Carry 20 Lbs.
- Toss Underhand
- Toss Overhand 20 yds.
- Wash Opp. Shoulder
- Work Regular Job

Pre-op vs. Post-op
Pre-op 2006

Post-op 2009
Known MRI Failures
n=10/43
15 of 43 healed as a bridge in some areas

- Average age: 59.9 yrs
- 8 males, 2 females
- Previous repair: 5/10 patients
  - Average 1.6 prior surgeries
- Smokers: 5/10
- Duration of symptoms: 8 months
- Elevation <90 pre-op: 5/10
- Causes:
  - Infection (2), trauma (2), floroquinolone? (1), pseudoparalysis (3) other (2)
6mo post op Graft jacket with sudden deterioration after Fluoroquinilone treatment
1 yr Post-op MRI
RTC Repair with Acellular human Dermal allograft
15 months post Bridging Technique*

Biopsy site

Not FDA Approved Use
Trichrome
37 y/o dominant arm involved in Motorcycle MVA Presents after 3 surgeries elsewhere with flail shoulder. ER -30 elevation 20

- In the rabbit model Histologically, the cuff tendons with the ADM showed characteristically mature tendons as time passed.

- Clinical ASES score improved from 50 to 83,

- UCLA 17 to 30,

- Simple Shoulder Test 4 to 8,

- No further fatty deteriorations or muscle atrophy were observed on follow-up magnetic resonance imaging. A retear 5 of 24 patients (21%).

- Bridging repair with ADM in the rabbit model showed cellular infiltration into the graft and some evidence of neotendon formation. Clinically, ADM repair was a safe alternative that did not show any further fatty deterioration nor muscle atrophy in large to massive rotator cuff tears.
PE

- Elevation 150 active ER to 45 degrees int rotation to L2 spinous process
If its on a T shirt it has to be true
Conclusions

• Open Rotator Cuff Surgery can be successful in treating Massive Rotator cuff tears.

• The same attention to detail from preoperative selection intraoperative technique and postoperative management is required for success regardless of the technique and Many of the historic complications can be avoided.

• The results can be enhanced in some patients with “Irreparable Tears” with the application of Acellular Dermal Matrix.
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