

Treatment options for massive irreparable RCT: Débridement or tendon transfer

Jon J.P. Warner, MD
Chief, Harvard Shoulder Service
Associate Professor
Ariane Gerber, MD
Shoulder Fellow
Partners Dept. Of Orthopaedics
Harvard Medical School
Massachusetts General and Brigham and Women's Hospitals

Definitions

- Massive
 - >5 cm (Cofield)
 - >2 tendon involvement after debridement (Gerber)
- Irreparable
 - A defect that cannot be repaired primarily , after debridement of avascular tissue, by reattachment of the tendons to the region of the greater tuberosity unless the upper extremity is immobilized in abduction (Rockwood)
 - Static subluxation of the humeral head (acromiohumeral distance < 5mm)
 - Fatty degeneration stage III to IV (Goutallier) and/or severe atrophy on parasagittal MR imaging scans (Zanetti, Gerber)
- Irreparable does not mean massive, massive does not mean irreparable!
 - Repairable (symptomatic) ruptures should be repaired, excepted in elderly, low demand patient with biomechanically compensated massive RCT and poor candidate for morbidity of formal open repair
 - Interpretation of results difficult because of poor differentiation between those categories especially in arthroscopic studies!
- Configuration of tendon tear
 - Posterior-superior (Supraspinatus + Infraspinatus)
 - Anterior-superior (Subscapularis + Supraspinatus)

Epidemiology

- Small percentage of all RCT
 - Neer 1992: 145 of 340 RCT over 13 yrs
 - Bigliani 1992: 61 cases over 6 years
 - Ellman 1986: 9 of 50 RCT over 12 years
 - Harryman 1991: 28 of 100 RCT over 5 years
 - Hawkins 1985: 27 of 100 RCT over 5 years

- Warner 2000: 92 of 470 over 6 years
- Anterior-superior tears less common than posterior-superior tears

Therapeutic options for massive irreparable tears

- Débridement: see below
- Partial repair: Repair of the posterior and anterior reparable parts of the tear without transposition and with a residual defect of 1-3 cm² can lead to good function (Burkhart). See also clinical outcome after structural failure of RCR (Jost, Gerber)
- Rotator cuff allografts: no reproducible results
- Synthetic materials: no reproducible results
- Local tendon transfer or muscle slide: destruction of the coronal plane force couple and danger of nerve injury
- Tendon transfer: see below
- Hemiarthroplasty: no improvement of function
- Fusion: salvage procedure

Pathomechanical considerations

- Balanced force couple concept :
 - Coronal force couple: superior-inferior balance: Deltoid – Inferior parts of the cuff
 - Transverse force couple: antero-posterior balance: Subscapularis-Infraspinatus/Teres minor
 - In order to have a stable fulcrum of glenohumeral motion, the force couples in both the coronal and transverse planes must be intact. This is compatible with a RCT
- Role of coracacromial arch: stabilizer against unchecked anterosuperior movement of the humeral head in tears involving the supraspinatus and at least one other tendon.

Tendon Transfer for irreparable cuff tears

- Which tendon?
 - Supraspinatus: Trapezius, Deltoid
 - Infraspinatus/Teres minor: Teres major, Latissimus dorsi
 - Subscapularis: Pectoralis minor, Pectoralis major
- State of the art
 - Latissimus dorsi transfer for irreparable posterior-superior cuff tears
 - Pectoralis major transfer for irreparable anterior-superior cuff tears
- Clinical experience:
 - Latissimus
 - Gerber(1992): good to excellent results in 80 % of patients stable over 10 years
 - Miniaci (1999): satisfactory results in 80 % of patients after failed RCR

- Warner (2000): significant poorer results in transfer after RCR and 30% of transfer rupture
- Pectoralis major
 - Wirth, Rockwood (1997): satisfactory results in 10/13 patients
 - Resch (2000): good and excellent results in 9/12 patients
 - Warner (2000): 10 complex cases after failed surgery with less predictable results
- Technical considerations: see literature
- Indications for tendon transfer
 - Painful irreparable RCT with poor function in high demand patient
 - Compliant patient and physiotherapist (long and difficult rehabilitation)

Débridement of irreparable cuff tears:

- Clinical experience
 - Apoil, Augereau 1990 poor long-term results after open subacromial débridement and resection of the coracoacromial ligament
 - Rockwood, Williams, Burkhead 1995: decrease of pain and improvement of function and strength in 83% patients after open acromioplasty, subacromial decompression, tear débridement without deterioration with time
 - Gartsman, 1997: decrease of pain, improve of function but decrease of strength after open débridement and subacromial decompression, overall results inferior than Rockwood's results
 - Esch et al. 1988: 3 from 6 failures after arthroscopic decompression in case of cranial migration of the humeral head
 - Burkart, 1991: good and stable results in biomechanical compensated irreparable tears after arthroscopic acromioplasty
 - Ellman, Kay, Wirth 1993 : significant reduction of pain but no improvement in function and strength after arthroscopic débridement
 - Zvijac, Lévy, Lemak, 1994: Deterioration of function and strength over time especially in massive tears after arthroscopic débridement and subacromial decompression
 - Kempf et al , 1999: long rehabilitation and non significant improvement in overall Constant score in patients with massive tears after arthroscopic débridement.
- Technical considerations
 - Open versus arthroscopic: for massive irreparable tears no difference, but arthroscopic procedure less invasive for patient
 - Biceps: controversy about preservation (Rockwood) or tenotomy(Kempf, Walch)
 - Débridement of the tear seems not to be essential as far as acromioplasty is performed (Kempf)
 - Loss of the coracoacromial arch means loss of the shoulder
- Indication

- The best patient for débridement is an elderly low demanding patient with a painful compensated massive (rep or irrep) cuff tear
- In case of poor preoperative function this procedure cannot guarantee durable pain relief or recovery of function. Consider alternatives like partial repair of the tear if possible, hemiarthroplasty or the implantation a Delta III reversed prosthesis
- Osteoarthritis and previous operations like acromioplasty or cuff repair are negative factors

Recommendations: Transfer versus Débridement

- Overall disability of patient (pain > functional deficit) usually (young patient excepted) establishes indication for surgery
- Individualized treatment depending on:
 - Work/Sport requirements
 - Patient expectations, compliance
 - Preexisting medical conditions
 - Bilateral or dominant site involvement

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