

# Subscapularis Tenotomy: Optimal Approach to Shoulder Arthroplasty

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## Introduction

- **Subscapularis**

–Strong repair is imperative for stability, motion, and strength following shoulder arthroplasty



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## Introduction

- **Subscapularis Insufficiency**

–Little attention was directed at subscapularis integrity in the past

–Recently, reports have highlighted abnormal subscapularis function following shoulder arthroplasty

Flatow et al. JSES 2003

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## Introduction

- **Subscapularis Compromise**
  - Poor quality tissue
  - Excessive tension secondary to oversizing
  - Nerve injury during mobilization

Flatow et al. JSES 2003

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## Introduction

- **Lesser Tuberosity Osteotomy**
  - Effort to minimize subscapularis repair failure
  - Bone to bone healing
  - Thought by some authors to be superior than bone to tendon healing

Gerber et al. 2006

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## Technique

- **Challenges of lesser tuberosity osteotomy**
  - Complex
  - Crush metaphyseal bone during procedure
  - Fragmentation
  - Non-union

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## Technique

- **Benefits of Tenotomy**
  - Simple
  - Reproducible
  - Time efficient method to provide a secure repair of the subscapularis

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## Biomechanics

- **Compare Tenotomy vs. Osteotomy**
  - 24 pairs of cadaveric shoulders
  - Digital motion analysis
  - Cyclic loading

Romeo et al. JSES 2010

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## Biomechanics

- **Compare Tenotomy vs. Osteotomy**
  - No difference in maximum load to failure
  - Stiffness
  - Elongation amplitude
  - Cyclic elongation

Romeo et al. JSES 2010

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## Biomechanics

- **Compare Tenotomy vs. Osteotomy**
  - 9 paired cadaveric shoulders
  - Randomly assigned to each group
  - Test for displacement and load to failure

Cil et al. ASES 2009

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## Biomechanics

- **Compare Tenotomy vs. Osteotomy**
  - Tenotomy
    - Cyclic displacement 0.82 mm
    - Maximum load 481 N
  - Osteotomy
    - Cyclic displacement 1.76 mm
    - Maximum load 466 N

Cil et al. ASES 2009

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## Literature

- **Prospective Double-Blind Randomized Trial**
  - LTO vs. subscapularis tenotomy
  - 43 LTO group
  - 44 Subscapularis tenotomy

Athwal et al. AAOS 2012

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## Literature

- **Prospective Randomized Trial**
  - Strength, WOOS, and ASES Scores evaluated at minimum 2 year f/u

Athwal et al. AAOS 2012

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## Literature

- **Prospective Randomized Trial**
  - No significant difference in strength ( $p=0.23$ )
    - LTO (4.5 kg, SD 2.9)
    - Tenotomy (5.3 kg, SD 2.7)
  - No significant difference in WOOS and ASES Scores

Athwal et al. AAOS 2012

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## Literature

- **Prospective Randomized Trial**
  - No significant differences in outcome
  - No clear advantage of one subscapularis management technique over the other

Athwal et al. AAOS 2012

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## Literature

- **Clinical Outcome of Tenotomy**
  - 45 patients with a TSA
  - Underwent tenotomy and repair
  - Protected post-operative motion

Nevaizer et al. JSES 2008

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## Literature

- **Clinical Outcome of Tenotomy**
  - 41/45 patients had a negative lift-off test
  - 45/45 negative belly-press test

Nevaizer et al. JSES 2008

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## Literature

- **Clinical Outcome of Tenotomy**
  - Authors note that the issue with tearing is related to the post-op rehabilitation
  - “Inordinate stress on the repair before sufficient healing of the tendon”
  - Role of early post-op rehabilitation is critical to allow healing

Nevaizer et al. JSES 2008

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## Literature

- **Osteotomy: Fatty Infiltration**
  - Concerning rates of fatty infiltration of the subscapularis associated with osteotomy
  - Gerber reported a 44% rate of progressive fatty infiltration
  - No defined cause

Gerber et al. JBJS 2005

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## Conclusion

- Complexity of osteotomy together with concerns:
  - Non-union
  - Fragmentation
  - Fatty infiltration
  - Lack of strong evidence of superiority
- Do not warrant changing from tenotomy

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## Conclusion

- **Tenotomy is preferred**
  - Safe
  - Reliable
  - Simple approach
  - Biomechanically and clinically sound

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