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To repair or not to repair: The proper management of the subscapularis in Reverse Shoulder Arthroplasty

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Introduction

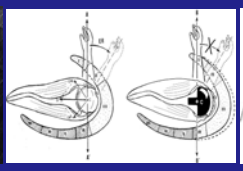
1985 Paul Grammont's RSA

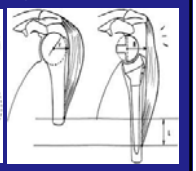
- End stage CRA
- Patients av. age 70 y.
- Altered shoulder biomechanics
  - Fixed, medialized COR
  - Lowered humerus
  - Small lateral offset (absent neck)

Boileau, Pascal, et al JSES 2005

Grammont Design

Medialized COR | Less Post Recruitment | ↑ Deltoid Tension





Introduction

2016 RSA
- Multiple designs
- Many Indications
- Lateralized vs medialized
  - Altered COR
  - Inlay/Onlay








Is subscap function design related?

The question is…

…to repair or not to repair…

SUBSCAPULARIS??

Subscapularis in RSA

- Unrepaired subscap = risk of unstable RSA
- Grammont design (Aequalis Tornier)
- Medialized COR

Edwards, T. Bradley, et al. JSES, 2009

Subscapularis in RSA

Intact subscap

- Joint reactive force 426%
- Deltoid force for elevation 132%
- Posterior cuff force 460%

Deltoid has to work harder

Routman, Howard D. Bulletin of the NYU Hospital for Joint Diseases 2013
Onstot, B., M. Jacofsky, and M. Hansen 58th Annual Meeting of the Orthopaedic Research Society, CA, 2012

Design Options

Grammont Medialized (COR)	Inlay Lateralized (COR)	Onlay Lateralized (Humeral)

Routman, Bulletin of the NYU Hospital for Joint Diseases 2013

Cadaver Studies – Repair (Grammont Medialized COR)

- Loading of the subscap = increased stability with all neck-shaft angles
- Larger glenosphere increases stability
- Loss of subscap decreases stability

Oh, Joo Han, et al. JSES 2014
Pastor, Marc-Frederic, et al Archives of Orthopaedic and Trauma Surgery 2016

Clinical Outcomes – Repair (Grammont Medialized COR)

- Anterosuperior approach decreases instability due to subscap preservation (most surgeons use delto-pect approach)
- Increased risk of dislocation when subscap not repaired
- Relative dislocation risk 1.90 greater in patients without repair

Bradley, et al. JSES, 2009
Boileau, Pascal, et al. JSES, 2006
Edwards, et al. JSES, 2009

Clinical Outcomes – No Repair (Grammont Medialized COR)

- Subscap repair not significantly related to the postop complications ie, dislocations
- Outcomes were not affected by subscap repair
- Lack of repair associated with better active external rotation

Wall, Bryan, et al. JBJS 2007
Boulahia, Aziz, et al. Orthopedics 2002

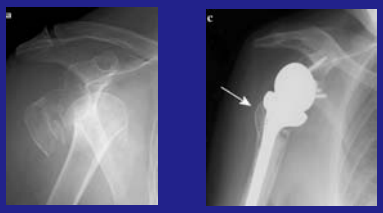
Clinical Outcomes - No Repair

- Equal complication rate repair vs non-repair Lack of repair had no significant effect on dislocation rate (lateralized COR)
- Using increased humeral onlay, lateralized design resulted in an increase in force being needed to dislocate

Clark, Hawkins, et al. JSES, 2012
Clouthier, et al. JSES, 2013

Clinical Outcomes – Fractures

- Proximal humeral fractures in elderly patients
- Subscap repair does not seem a critical factor for preventing implant dislocation



Grassi, F. A. etal Musculoskeletal Surgery 2014

Postop Subscap Integrity

- US following repair: subscap sufficient in only 40% pts; mean FU 30 months (Aequalis Tornier)
- No difference in post-op ROM
- No difference in CMS and OSS

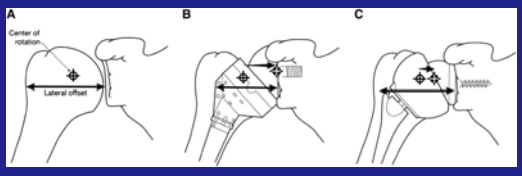
de Boer, F. A. etal Musculoskeletal Surgery 2016

Prosthesis Design

In favor of repair:
Boileau, Edwards – Medialized Grammont type

Repair unnecessary:
Clark – Lateralized design
de Boer – Medialized Grammont type

Opinion



Routman

- The influence of the subscapularis on the RSA may be design specific and correlated with overall construct lateralization.

Clark, Hawkins, et al. JSES 2012
Routman, Bulletin of the NYU Hospital for Joint Diseases 2013

Answer to repair or not…

1. Unnecessary with a lateralized construct
2. It may be necessary with medialized construct (some authors disagree)

Thank You!