

Does rotator cuff tear morphology affect clinical outcomes post surgical repair in large to massive tears?

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Disclosure

- The authors have no conflict of interest to declare

Background

- Rotator cuff tear morphology is an **important predictor** of cuff repair outcomes as it affects repair technique
- Previous Cuff tear classification Systems:
 - McLaughlin: Transverse; Vertical; Retracted
 - DeOrio and Cofield: Length of greatest diameter of tear
 - Davidson and Burkhart: Geometric classification (crescent-shaped, U-shaped, L-shaped)
- Few studies investigated tear morphologies specifically in **large to massive tears**, where failure rates and clinical outcome remained suboptimal
- Kim et al: Site and direction of tear affects direction in which the cuff is pulled to bone during surgical repair

Study Aim and Hypothesis

- **Study Aims**
 - To propose an updated classification system for describing tear morphology, along with the corresponding repair techniques
 - To investigate the effect of the tear morphology on clinical outcomes and re-tear rates of large to massive tears
- **Hypothesis**
 - Clinical outcomes would differ between the various tear morphologies, with symmetrical tears patterns having better outcomes post-operatively

Study Design

Inclusion and exclusion criteria

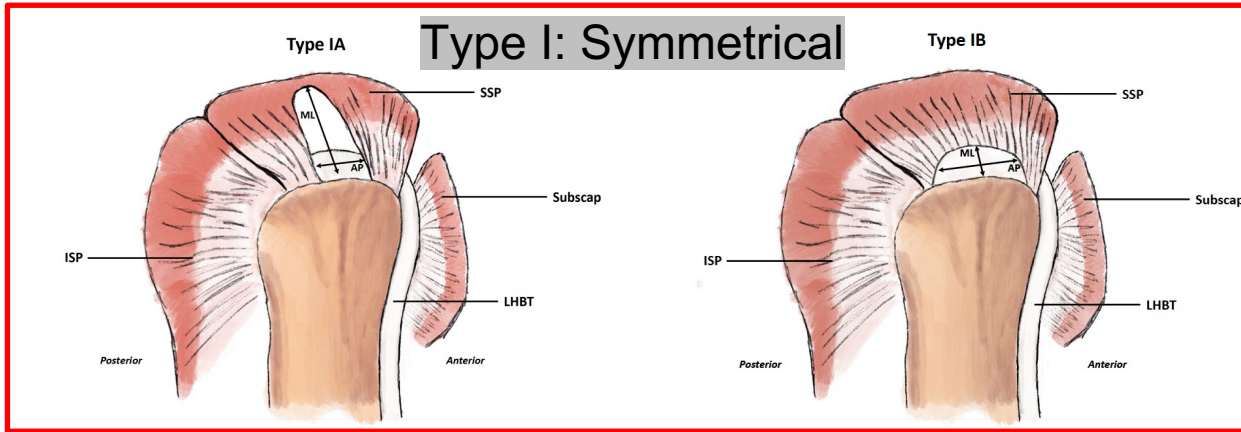
- **Inclusion Criteria**
 - Patients aged ≥ 21 who underwent cuff repair
 - Full thickness, large to massive tears (≥ 3 cm)
- **Exclusion**
 - Small and medium tears
 - Partial thickness tears
 - Isolated subscapularis tears
 - Previous surgery on affected shoulder
 - Other non-rotator cuff issues on affected shoulder

DeOrio and Cofield	
Small	<1cm
Medium	1-3cm
Large	3-5cm
Massive	>5cm

Outcomes measured

- Follow up 3, 6, 12 and 24 months postoperatively
- **Functional outcome scores**
 - Oxford shoulder score (OSS)
 - Constant Shoulder Score (CSS)
 - University of California at Los Angeles Shoulder Score (UCLASS)
 - **Compared both absolute scores as well as pre- to post-operative change**
- **Retear rates**

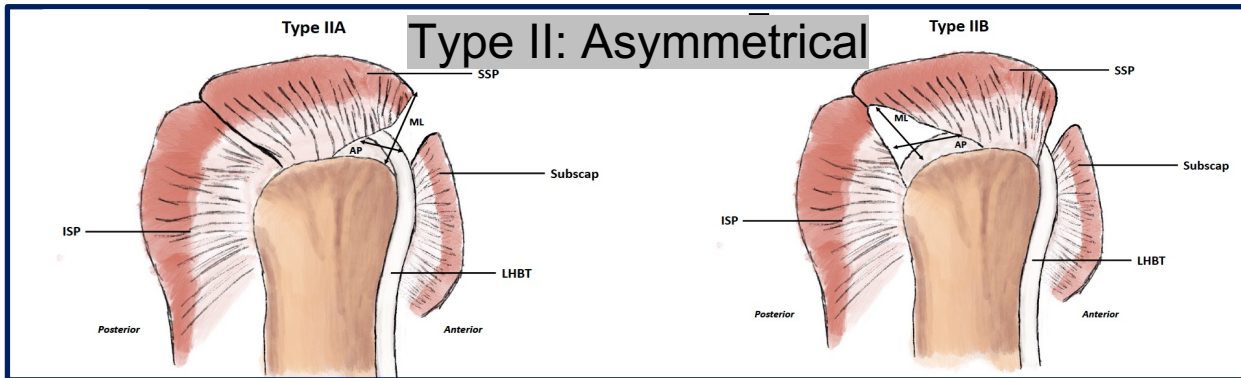
Classification of Rotator Cuff Tear Patterns



Type I: Apex at the center of the base without preferential extension of the tear anterior or posteriorly

Type IA: ML > AP diameter (similar to U-shaped tears)

Type IB: AP > ML diameter (similar to crescent-shaped tears)



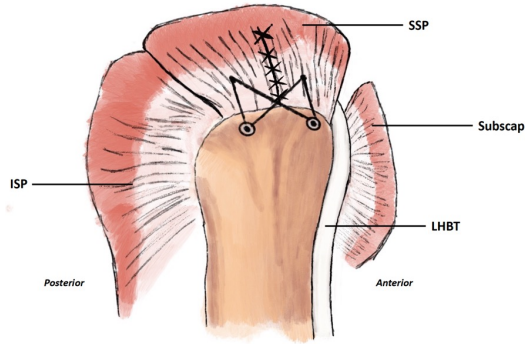
Type II: Tears detach from the greater tuberosity in an asymmetrical manner and extent anterior or posteriorly

Type IIA: Anterior extension towards rotator interval

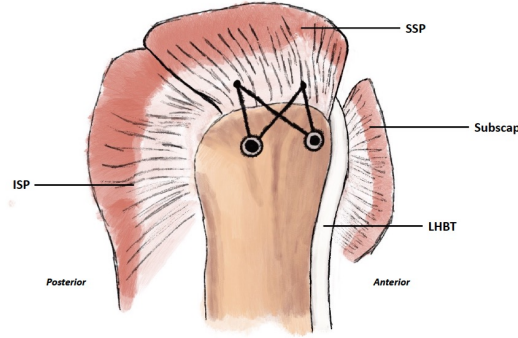
Type IIB: Posterior extension into infraspinatus

Surgical Technique

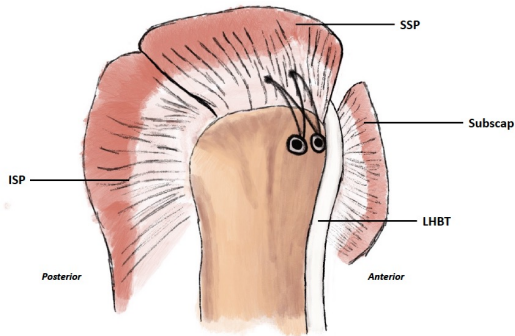
Type IA



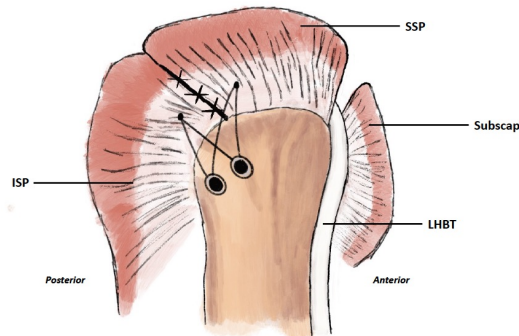
Type IB



Type IIA



Type IIB



All tendon-to-bone repairs were performed via **double-row technique**

Type IA: Margin convergence technique was utilized. The converged margin was then mobilized in the medial-to-lateral direction and repaired to bone.

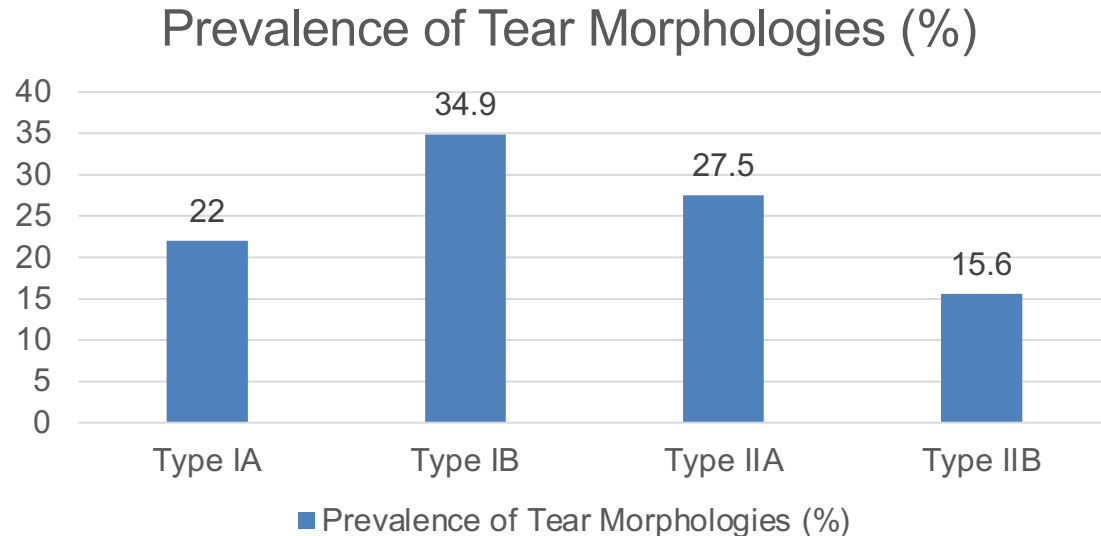
Type IB: Tendon at the medial apex of the tear was mobilized medio-laterally and directly repaired to bone

Type IIA: The posterior leaf was mobilised in the oblique-anterior direction and directly repaired to the anterior bone bed, re-establishing the rotator interval.

Type IIB: Margin convergence with the infraspinatus was performed for tears with excessive longitudinal split. The anterior leaf was then mobilised in the oblique-posterior direction and repaired to the posterior bone bed

Results - Overview

- A total of 109 cases of large to massive tears were included
- No significant difference in baseline demographic and pre-operative outcome scores



Results – Tear Morphology

- All groups showed **statistically significant improvement** from pre-operative scores in all 3 outcome measures at 24-months ($p < 0.001$)
- **No significant differences** in absolute postoperative outcome scores and pre- to postoperative change between the groups at 6, 12, and 24 months
- **No significant difference** in re-tear rates between the various tear morphologies

Implications of Findings

- Identifying the tear morphology and providing the corresponding repair technique can lead to significant clinical improvement at long term follow up
- No difference between the various tear morphologies which is concordant with existing literature:
 - Park et al compared crescent/L-shaped tears with U shape tears and found no difference
 - Watson et al compared outcomes between crescent, U shape, and L-shaped tears and found no difference as well
- Retear rates across of 4 types of tear morphology ranged from 10.5% to 29.4%, which is lower than reported rates for arthroscopically repaired large to massive rotator cuff tears
 - Meshram et al: 39% retear rate
 - Sugaya et al: 40% retear rate

Limitations

- Retrospective in nature
- Substantial heterogeneity within the identification of tear morphology as this can be subjective
- Did not evaluate fatty degeneration pre-operatively on MRI – an important consideration since it affects post-operative repair integrity

Conclusion

- A robust system of classification for rotator cuff is essential as it can **guide surgical management** and serve as a basis for **communication** between orthopedic surgeons/radiologists
- Low incidence of re-tear in the current sample shows the **potentially favorable use** of this classification to guide surgical repair



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