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Bio-Ravioli: A Novel Surgical Technique for Biologic Augmentation of Rotator Cuff Repair

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Faculty Disclosure Information

- Nothing to disclose

Background

•Despite being a common procedure, **rotator cuff repair (RCR)** still shows **high failure rates**, often associated with poor postoperative outcomes[1].

•The limited healing potential of tendons has led to the development of several **biologic augmentation strategies**[2].

•**Cell-based approaches** are promising, although the **optimal cell source** remains under investigation.

•**Bursa-derived stromal cells (BDSCs)** have recently emerged as a promising candidate: multipotent MSCs, abundant in the **subacromial bursa**, capable of chondrogenic, osteogenic, and adipogenic differentiation[3].

•A key technical challenge remains: ensuring **effective delivery and retention** of these cells at the tendon-bone interface.

Purpose

- Introduce the **Bio-Ravioli technique**, a novel biologic augmentation method for arthroscopic rotator cuff repair, involving the implantation of microfragmented autologous subacromial bursal tissue (MASBT) enveloped in a compressed autologous long head (LHBT) of the biceps tendon patch at the bone–tendon interface.

Indication and Patient selection

•**Patient assessment:** history, clinical exam, and imaging (X-rays, MRI, DEXA)

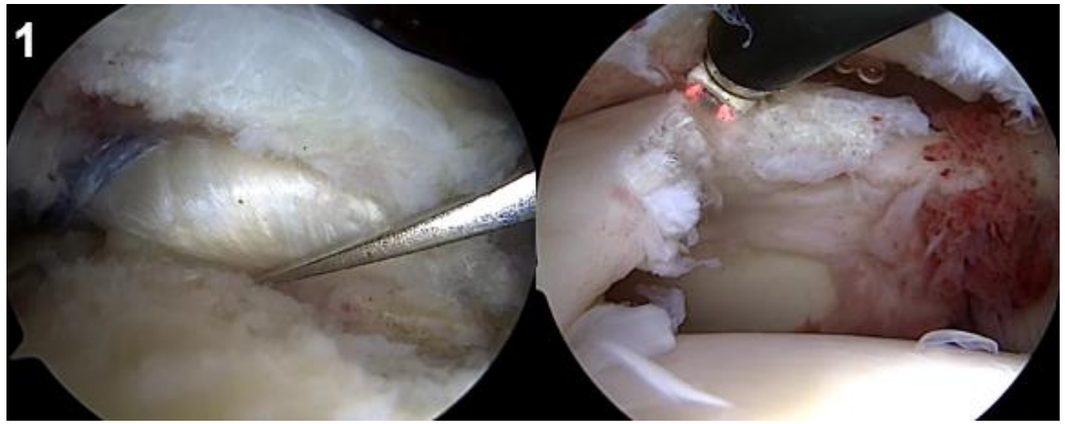
- **Inclusion criteria:**
  - ✓ Repairable full-thickness posterosuperior cuff tear
  - ✓ Moderate-to-high risk of healing failure (RoHI > 5)

- **Exclusion criteria:**
  - ✓ Degeneration (> 50%) or rupture of LHBT
  - ✓ Irreparable subscapularis tears
  - ✓ Previous bursectomy or severe glenohumeral arthropathy

Procedure

Biceps Patch Graft Preparation

1. Intraarticular LHBT portion (~3 cm) was harvested arthroscopically
    - Tenodesis performed in <65 y/o patients using knotless anchor; tenotomy in older patients
2. Tendon trimmed (~25 mm) and compressed in dedicated plate/press for 4 minutes
3. Resulting patch: ~27 × 22 mm biologic scaffold



MASBT Harvest & Graft Assembly

1. Subacromial bursal tissue harvested using GraftNet during bursectomy (preferably lateral bursa above tendons)

2. MASBT placed over LHBT patch and rolled into an envelope, closed with 2-0 permanent sutures

    - Two traction sutures placed for graft shuttling

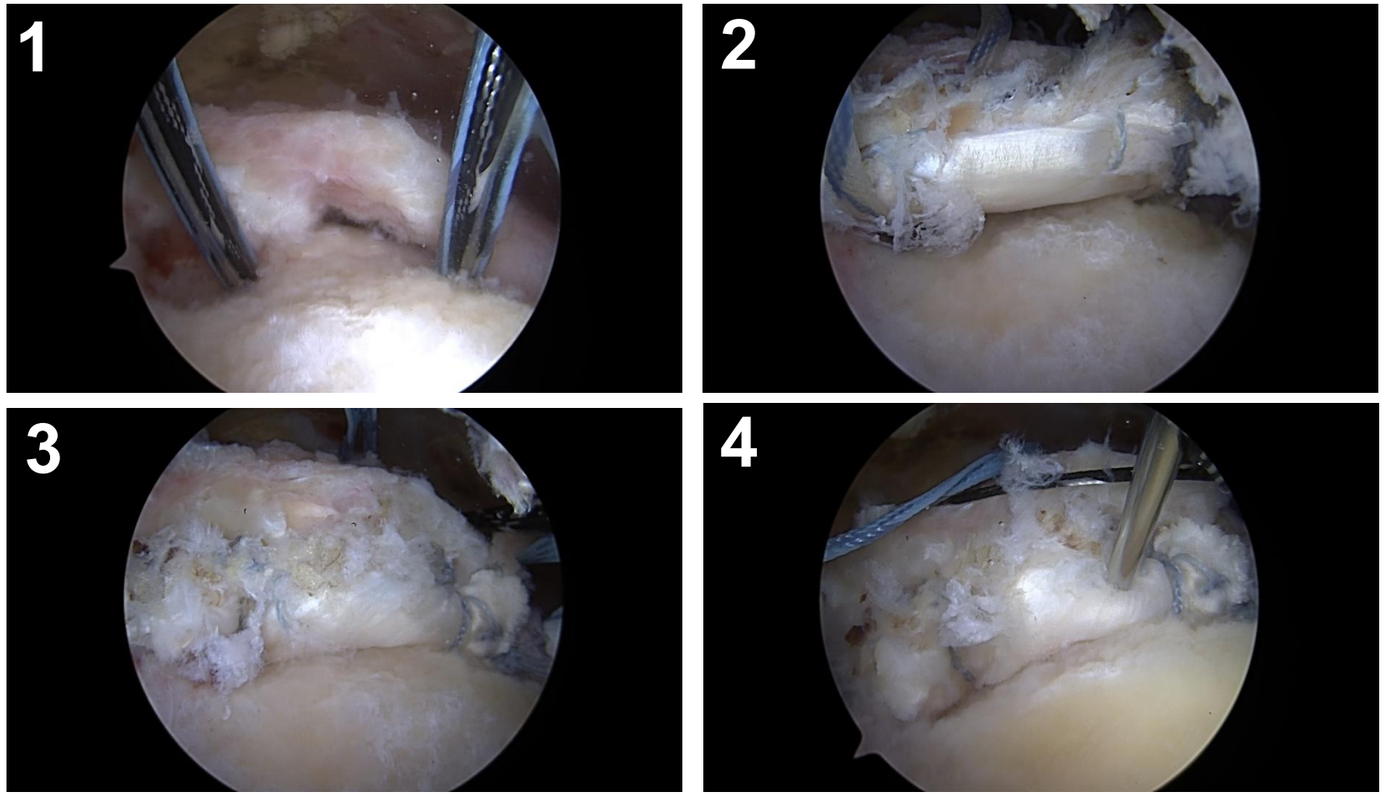
Graft Fixation

1. Two soft anchors (triple-loaded) placed medially at footprint.

2. Graft introduced via anterior-superior portal, positioned over greater tuberosity.

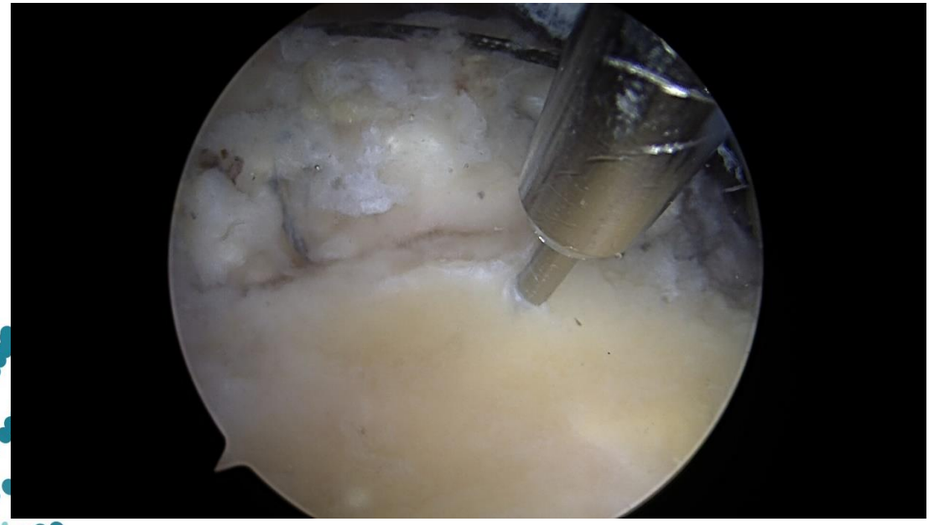
3. One of the three suture tapes was passed through and utilized to secure the graft at the medial edge of the tendon footprint

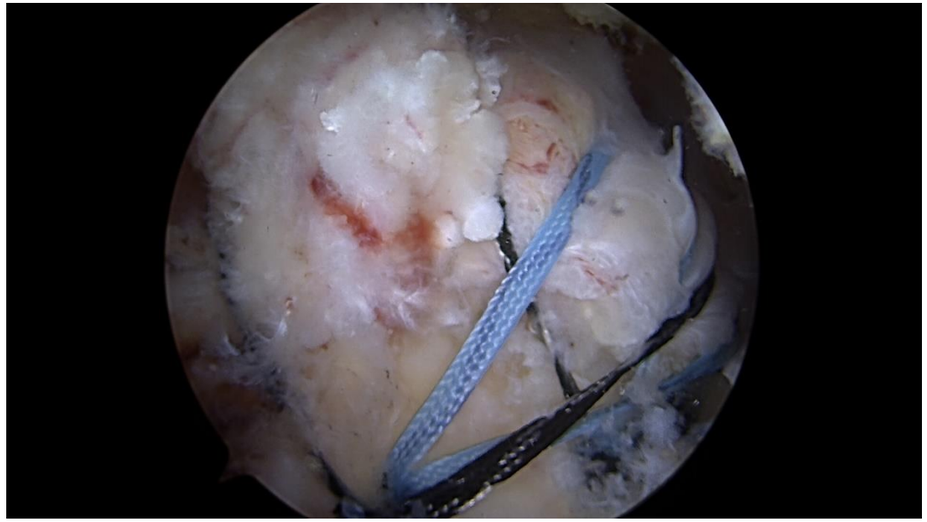
4. Needle vents created in the graft to allow MSC migration and retain MASBT.



Rotator Cuff Repair

- Tear pattern assessed (L, U, V), converted to crescent via margin convergence if needed
- Remaining sutures passed ~15 mm medial to tear edge
- Bone venting with microfracture system performed to enhance biologic environment
- Speed-Bridge configuration used for double-row repair





Conclusions

Bio-Ravioli represents an innovative, promising and cost-effective surgical approach for augmenting the healing potential of arthroscopic RCR. This technique utilizes autologous mesenchymal stem cells (MSCs) from two distinct sources, the subacromial bursa and long head of the biceps tendon, within a stable graft construct, potentially improving clinical outcomes in patients with rotator cuff injuries.

References

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