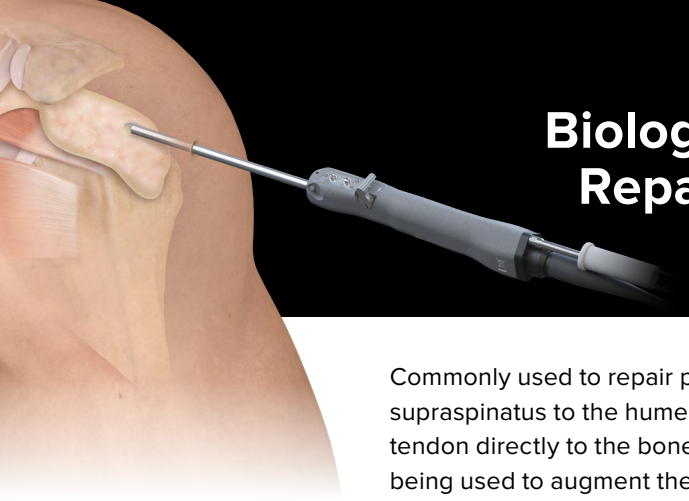

Biological Augmentation of Shoulder Repairs Using the GraftNet™ Device

Scientific Update

Commonly used to repair partial- and full-thickness tears of the tendons that connect the supraspinatus to the humeral head, rotator cuff repair is often performed by fixating the tendon directly to the bone using suture and suture anchors. Newer approaches are now being used to augment the biomechanics of the repair and support the biologic healing response. These have included the use of dermal allografts and, more recently, autologous fluids at the bony insertion of the rotator cuff. Autologous tissue may serve as a reservoir of growth factors and cell secretory factors at the repair site. Located between the acromion process and supraspinatus, the subacromial bursa as an autologous source of tissue, has shown initial promise as part of the rotator cuff repair and augmentation.

Analysis of Subacromial Bursal Cells

Baldino JB, Muench LN, Kia C, Johnson J, Morikawa D, Tamburini L, Landry A, Gordon-Hackshaw L, Bellas N, McCarthy MB, Cote MP, Mazzocca AD

Intraoperative and in vitro classification of subacromial bursal tissue. *Arthroscopy*. 2020;36(8):2057-2068. doi:10.1016/j.arthro.2020.03.039

- Further classified tissue type during surgery and in an in vitro setting after tissue was arthroscopically harvested.
- The section of bursa covering the supraspinatous muscle was mostly fatty and moderately vascularized, while the section covering the tendon was mostly fibrous and contained low vascularity.
- Bursal cells obtained from the tendon showed significantly increased proliferative capability at 3 weeks (approximately twice the amount of cell growth) compared to the muscle bursa.
- >90% of the bursal cells harvested from both locations contained MSC-specific cell surface markers. A minimal number showed cell surface markers for endothelial, hematopoietic, and/or bone-marrow MSCs.

Takeaway

Cellular proliferation differs based on subacromial bursa collection location. However, cells from both locations studied show high rates of MSC-specific cell surface markers.

Dyrna F, Zakko P, Pauzenberger L, McCarthy MB, Mazzocca AD, Dyment NA

Human subacromial bursal cells display superior engraftment versus bone marrow stromal cells in murine tendon repair. *Am J Sports Med*. 2018;46(14):3511-3520. doi: 10.1177/0363546518802842

- Investigated the efficacy of cells derived from the human subacromial bursa compared to bone marrow stromal cells (BMSCs) for tendon repairs in an in vivo, murine patellar tendon defect model.
- Healing tissue and its adjacent tissue contained significantly more bursal cells at 2 and 5 weeks compared to the BMSCs.
- The bursal cells obtained 3D morphology similar to the surrounding native tendon fibroblasts.

Takeaway

Subacromial bursal cells have the ability to proliferate in vivo and obtain a tendon cellular morphology that is superior to that of BMSCs.

Arthrex®

Wellington IJ, Hawthorne BC, Messina JC, LeVasseur MR, McCarthy MB, Cote MP, Mazzocca AD

Efficacy of arthroscopic shavers for the retrieval and processing of connective tissue progenitor cells from subacromial bursal tissue. *J Clin Med*. 2022;11(5):1272. doi:10.3390/jcm11051272

- Sought to determine if arthroscopic shavers can collect and process connective tissue progenitor cells and evaluated proliferative yields between shaver types.
- The Excalibur shaver (Arthrex) contained increased colony-forming units at 14 days, overall cellular outgrowth, and proliferation with a 3-week culture compared to a competitor's comparable shaver.
- Both shavers' cell populations predominantly contained cells with progenitor cell surface markers and minimal hematopoietic cell surface markers.
- The Excalibur shaver showed a significant increase in viability at time zero and at 3 weeks.
- The Excalibur shaver showed a significant increase in production of anti-inflammatory cytokine receptors (IL-1RA) at time zero and vascular endothelial growth factor (VEGF) at time zero and 96 hours. It also showed a significant decrease in degradative genes (MMP-1 and MMP-3) at time zero and 96 hours and a decrease in inflammatory cytokines (IL-1β and IL-6) and degradative genes (MMP-13) at 96 hours.

Takeaway

Arthroscopic shavers have the ability to collect connective tissue progenitor cells from bursal tissue. Compared to other shavers, the tissue collected by the Excalibur shaver shows superior colony-forming units, cellular outgrowth, proliferation, cell viability, and protein production.

Pancholi N, Gregory JM

Biologic augmentation of arthroscopic rotator cuff repair using minced autologous subacromial bursa. *Arthrosc Tech*. 2020;9(10):e1519-e1524. doi:10.1016/j.eats.2020.06.013

- Technique overview for autologous subacromial bursal reimplantation during arthroscopic rotator cuff repair.
- Subacromial bursectomy was performed using a 4.5 mm oscillation shaver. Bursal tissue was collected with the GraftNet™ autologous tissue collector.
- Extracted bursal tissue was placed in a 3 cc syringe while the rotator cuff repair was completed.
- After the repair, the shoulder was evacuated of fluid and the bursal tissue was placed on top of the rotator cuff repair using the lateral portal.

Takeaway

To augment tissue repair, subacromial bursal tissue can be collected with the GraftNet device prior to rotator cuff repair then implanted arthroscopically, in a dry environment, on top of the repair.

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