Collagen Bridging of Massive Rotator Cuff Tears Using Fascia Lata Autograft Could Provide a Lasting Solution

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Editorial Commentary: Collagen Bridging of Massive Rotator Cuff Tears Using Fascia Lata Autograft Could Provide a Lasting Solution

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Abstract: Shoulder rotator cuff tears are ideally primarily repaired, but large and massive, chronic, and/or retracted tears result in challenges. In response, innovative solutions include superior capsular reconstruction, tendon transfer, subacromial balloon spacer placement, tuberoplasty, partial repair, and marginal convergence. A recent innovation is to use collagen tissue to bridge repair of compromised tendon. Recent research using fascia lata autograft for supraspinatus tendon reconstruction in a rat model has shown positive outcomes with structural similarity to the normal muscle-tendon interface, decreased fatty infiltration, and increased type I and III collagen, suggesting enhanced mechanical strength. In human subjects, the advantages of autograft outweigh harvest-site morbidity, noting that Dacron, Teflon, and xenograft show poor results. Ideally, a graft might be composed of a degradable scaffold, possess mechanical strength, and amalgamate stem cells, growth factors, and matrix proteins to facilitate host-tissue integration.

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In the ongoing pursuit of enhanced healing in rotator cuff repair, there is a constant drive for improvement. Given the imperative for effective treatment options for addressing challenging rotator cuff tears, a multitude of innovative solutions are under exploration. These include superior capsular reconstruction, tendon transfer, subacromial balloon spacer placement, tuberoplasty, partial repair, and marginal convergence.[1] One of these approaches, using collagen tissue to interpose the cuff and bridge the remnant tendon from medial to lateral, connecting it to the humerus, shows promise in replacing the missing cuff and reinstating normal shoulder biomechanics.

Despite the challenges and controversies surrounding these procedures, many surgeons are resolute in their quest to discover practical solutions for patients with complex rotator cuff tears. Rigorous studies have been undertaken to unearth the most compelling evidence in support of these efforts. An animal study by Liao, Zhou, Wang, Li, and Zhou,[2] titled "Fascia Lata Autografts Achieve Interface Healing With the Supraspinatus Muscle Histologically and Mechanically in a Rat Supraspinatus Tendon Reconstruction Model for Massive Irreparable Rotator Cuff Tears," presents a hopeful outlook on the potential use of fascia lata autograft in supraspinatus tendon reconstruction for cases of massive irreparable rotator cuff tear in a rat model. The histologic healing process and mechanical characteristics unequivocally showed positive outcomes, suggesting a gradual regeneration of structural similarities to the normal muscle-tendon unit interface at 16 weeks postoperatively, which is indicative of healing. Additionally, there was a notable reduction in fatty infiltration in the supraspinatus muscle and an increase in type I and III collagen, underscoring enhanced mechanical strength. This unequivocally illustrates the potential of the autograft to offer sufficient mechanical support and functionality in the reconstructed tendon, serving as a promising development in rotator cuff tear management.

Who among us, as surgeons performing rotator cuff repairs on massive tears, has not wished for this pleasant outcome? We commend the authors on their commendable efforts in conducting a meticulously planned and executed study from the laboratory bench. Additionally, we have some pertinent published studies to share from the clinical front. For instance, a retrospective study conducted by Ranebo et al.[3] explored the

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use of a synthetic interposition graft made of Dacron (DuPont, Wilmington, DE) in 13 patients. The study revealed concerning results, indicating that the graft failed to maintain its integrity in a significant majority of cases, specifically 70%. Furthermore, it only succeeded in preventing rotator cuff arthropathy in a mere 30% of patients. Additionally, a systematic review by Haque and Modi[4] examined the efficacy of various interposition grafts for treating large or massive irreparable rotator cuff tears. However, the review did not uncover any published long-term results for the use of any graft types.

In another meta-analysis, Ono et al.[5] sought to identify the optimal graft for rotator cuff repair. However, similar to previous studies, this study also fell short of offering a definitive conclusion. Hence, researchers persist in their quest for the ideal graft—one that can furnish a degradable scaffold, possess mechanical strength, and be amalgamated with stem cells, growth factors, and matrix proteins to facilitate host tissue integration.

The latest clinical investigation, spearheaded by Ribeiro et al.,[6] involved a single-blind randomized controlled trial comparing a mini-open fascia lata interposition graft (20 patients) with arthroscopic partial repair (22 patients) for irreparable rotator cuff tears. Remarkably, at the 2-year follow-up, the fascia lata interposition graft group exhibited superior functional outcomes.

We do not intend to convey negativity, but we feel it is important to share insights from the clinical perspective. When we discuss with patients the need to harvest tissue from their thighs to address a shoulder injury, we often detect a sense of doubt or uncertainty from them. Particularly in cases of massive irreparable rotator cuff tear, the remaining tendon is frequently of subpar quality, heightening the risk of failure between the patch graft and the remnant. Additionally, achieving the optimal tension during the procedure can pose considerable challenges.

Nevertheless, it is essential to underscore some advantages of using fascia lata for intercalary reconstruction of the supraspinatus tendon. Personally, as patients, we would prefer to use our own tissue to repair our shoulders, thus avoiding potential allergic reactions associated with foreign tissues. It is widely acknowledged that we have witnessed failures with porcine xenografts and Teflon (C.R. Bard, Murray Hill, NJ) (polytetrafluoroethylene) in previous cases.[7,8] Indeed, using one's own tissue could present a superior option. An additional advantage of this procedure lies in the dynamic restoration it offers to the supraspinatus muscle. Surgeons must continuously adapt the procedure to suit each patient's specific needs. This is analogous to using a hammer—you don't perceive every nail as the same problem. Furthermore, it is crucial to note that the procedure may not be feasible if there is not enough remaining supraspinatus tissue.

Although the study by Liao et al.[2] offers valuable insights into the histologic and mechanical aspects of the autograft interface, it is imperative to conduct further research to validate these findings in larger animal models and, ultimately, in clinical settings. Nevertheless, these initial results present a promising pathway for future research and potential clinical applications in managing rotator cuff tears. With ongoing research and innovation, there is optimism for the development of improved treatment options that can enhance the quality of life of patients.

Disclosures

All authors (I-H.J., E.K.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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