Editorial Commentary: Rotator Cuff Tear: Know When Not to Operate So You Don’t Make It Worse

Frederik O. Lambers Heerspink, M.D., Ph.D., and Oscar Dorrestijn, M.D., Ph.D.

Abstract: Shoulder rotator cuff repair results in significantly improved outcomes compared with conservative treatment, but some repairs result in retear and, worst of all, enlarged retears (i.e., tears larger after surgery than primarily). Elevated serum total cholesterol and low-density lipoprotein levels and fatty infiltration of the infraspinatus are significantly related to symptomatic failed rotator cuff repair. Hypertension could also be a risk factor. In such cases, nonoperative treatment, reverse shoulder prosthesis (in older patients), or alternative joint-preserving procedures (superior capsular reconstruction, subacromial balloon spacer, multiple-tendon interposition autografts, augmentation of the long head of the biceps, or tendon transfers such as latissimus dorsi transfer and lower trapezius transfer) could be considered or are worthy of future investigation.

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The history of rotator cuff repair is full of refinements and improvements in its surgical technique. In 2019, the term “rotator cuff repair” resulted in 564 PubMed hits, compared with 109 hits in 2005. Side-to-side repair was abandoned for tendon-to-bone healing. Arthroscopic techniques were developed with suture anchors in different configurations (single row, suture bridge, double layer). Over time, these refinements and improvements led to a rise in publications on the topic of rotator cuff repair. In a systematic review, the reported healing rate and functional outcome after rotator cuff repair did not significantly improve during this same period. In recent years, outcomes of conservative treatment have been compared with rotator cuff repair. Surgical repair results in significantly improved outcomes compared with conservative treatment. However, the gain of surgical repair over conservative treatment is small. This gain is probably best explained by improved strength in patients with an intact repair compared with patients with retears. No differences were found in pain experienced and function.

Rotator cuff repair is a common procedure that generally results in predictable improvement in patient function and decreasing pain, even in patients with retears. Nowadays, the complication rate is low because rotator cuff repair is performed using an arthroscopic technique. The worst thing that can happen is a deterioration in outcome after cuff repair. Therefore, every high-quality study on prognostic factors and patient selection is a great asset.

We applaud the well-performed study by Lee, Park, Lee, and Shin in this issue of Arthroscopy, “Factors Related to Symptomatic Failed Rotator Cuff Repair Leading to Revision Surgeries After Primary Arthroscopic Surgery.” They found preoperative serum total cholesterol level, low-density lipoprotein level, and fatty infiltration of the infraspinatus to be significantly related to symptomatic failed rotator cuff repair. In this study, postoperative magnetic resonance imaging follow-up was performed in 719 of 1,061 patients who underwent arthroscopic rotator cuff repair. In 141 patients (19.6%), a retear was present during follow-up. Of the patients in this study, 43 were excluded for different reasons, leaving 98 to be included. The patients in this group had large preoperative rotator cuff tears including at least 2 tendons, measuring on average...
28 mm in anteroposterior size and 29 mm in mediodi-lateral size. Unfortunately, the authors did not mention whether, during their surgical procedures, the tendons could be repaired back to the footprint or whether they just performed a partial repair. In the group that needed revision surgery (group 1), the tear size enlarged by 18%, whereas the tear size was reduced by approximately 34% in the group of patients who did not need revision surgery (group 2). In our opinion, this second group, in which the tear size was reduced after surgery, can be considered as having partial rotator cuff repair. The functional outcome of this group measured with the Constant-Murley score was 85 points; these results are comparable to previously reported results on partial rotator cuff repair.6,7

However, the question is how these partial repairs persevere in the long term. Do they behave different from conservatively treated full-thickness rotator cuff tears on natural history, which progress (and become symptomatic) conservatively treated full-thickness rotator cuff tears on natural history, which progress (and become symptomatic) over time?8-10 Or are these more sustainable? In a systematic review (N = 643) presented by Malahias et al.,11 all mean postoperative clinical and functional subjective scores, as well as the muscle strength of patients treated with arthroscopic partial repair, were significantly improved compared with the mean preoperative values. However, the follow-up varied widely among studies, from 2 to 8 years, and no studies reported long-term follow-up. Considering that this is an operative procedure with only short- to mid-term results documented, new studies investigating the long-term outcome of arthroscopic partial repair are required to confirm the therapeutic value of this technique.

The first group of patients in the study by Lee et al.5 ended up with larger tears than they started with. These were the patients with poor outcomes. In clinical practice, it is important to identify these patients before surgery to prevent these unwanted outcomes. In a univariate regression analysis, the authors found that fatty infiltration of the infraspinatus was a risk factor for an enlarged retear, especially when fatty infiltration exceeded 50%. However, fatty infiltration greater than 50% was diagnosed in only 9 of 45 patients in this study. This emphasizes that more factors are playing a role and we should not decide whether to perform surgery solely based on a single parameter.

Another important risk factor for an enlarged retear is increased levels of total cholesterol and low-density lipoprotein. It would be very interesting to have data for the intact repair group as well. Hypertension is also described as a risk factor for rotator cuff tear development. Hyperlipidemia and hypertension probably influence the intrinsic pathway in rotator cuff tear development. These factors should be of further interest to better understand which patients should undergo surgery. A detailed examination of our patients prior to surgery remains important.

The study by Lee et al.5 helps to identify patients in whom we should not perform rotator cuff repair because the chance of success is low. In future research, we should attempt to increase inclusions in these studies (big data) to further select patients with a good chance of success after our surgical interventions. Unfortunately, data on the preoperative tear size of the healed rotator cuffs were not presented in this study and not included in an analysis to identify prognostic factors for successful rotator cuff repair. The best treatment option for relatively large rotator cuff tears remains a challenge for the treating shoulder surgeon, especially in young patients. And the question is whether large cuff tears, as presented in the study by Lee et al.5 with infraspinatus fatty infiltration exceeding 50%, should be considered massive irreparable posterosuperior rotator cuff tears. Reverse shoulder prosthesis is probably the most reliable option for elderly patients with such tears but is not an attractive option for young patients because the shoulder joint is sacrificed. Today, many alternative joint-preserving treatments for large irreparable rotator cuff tears, or tears prone to failure, exist. Arthroscopic superior capsule reconstruction, introduced by Mihata et al.,12 using fascia lata, later commonly replaced by dermal patches, is probably the fastest growing solution for this indication.13 Other less popular or newer options are subacromial balloon spacer implantation, multiple-tendon interposition autografts, and augmentation of the long head of the biceps.14-17 In addition, tendon transfers such as latissimus dorsi and lower trapezius transfer have been popularized for this indication.18,19 However, the variety in options suggests that there is no superior treatment. Studies comparing these different treatment options are scarce or have methodologic weaknesses such as a small study group or a nonrandomized study group allocation.20 Furthermore, not all shoulder surgeons are familiar with all these techniques, and long-term results of newer methods are absent.

Another possible cause of failure in rotator cuff repair is low-grade shoulder infection, most often *C. Acnes.* As a result of the low virulence of this pathogen, wound problems are mostly absent. Because of the lack of cultures obtained during revision surgery, the incidence is very likely underestimated.21 Unfortunately, these data were not presented for group 1 in the study by Lee et al.5 In our experience, low-grade shoulder infection can be a reason for failure and poor outcomes after cuff repair.

The choice of the right treatment for patients with large rotator cuff tears is not always evident. In the study presented by Lee et al.,5 the patients in the failed cuff repair group underwent the second operation on average 15 months after the primary cuff repair. Even if they do well after revision surgery,
time will be around 2 to 2.5 years. However, repeated cuff repair is probably associated with an increased rate of complications such as infection, stiffness, and failure. Patient satisfaction can be expected to be diminished. Therefore, we think it is crucial to choose the best 1-time surgical option for your patient. Just don’t make it worse.

References