

Comment to the Article “The Nearest Clinical and Structural Results of Arthroscopic Reconstruction of the Upper Capsule in Patients with Cuff Tear Arthropathy after a Massive Rotator Cuff Tear”

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The need to evaluate treatment outcomes for patients with shoulder arthropathy who underwent restoration of superior shoulder capsule with acellular dermal collagen matrix (ADCM) and iliotibial band (ITB) grafts is unquestionable and explained by absence of a universal and reliable approach to treatment of irreparable rotator cuff tears. High interest from the side of practicing trauma and orthopaedic surgeons and researchers along with ongoing enhancement of organ-preserving surgical procedures for patients with shoulder arthropathy will over time allow to define the roles and indications for

reconstructive procedures on superior shoulder capsule, partial suturing of irreparable rotator cuff injuries, balloon grafting, transfer of latissimus dorsi and trapezius tendons as well as reverse shoulder arthroplasty.

The grafting concept for superior shoulder capsule justified in 2012 by Mihata et al. received successful clinical validation in the studies of mentioned authors and many other researchers including the authors of the publication under discussion [1, 2]. Efficiency of technically challenging method largely depends on graft reliability and strongly correlates to the learning curve of a surgeon. So, Burkhart and Hartzler reported in 2019 a high graft retention rate in the superior shoulder capsule — 30% of partial failures without fully detached grafts which was significantly higher than their own results of 2018 — 55% of partial and fully failed ADCM grafts [3, 4]. Correlation of functional treatment outcomes for patients to arthropathy syndrome, pseudoparalysis of upper extremity and the degree of graft retention, reported by Mihata and Burkhart and by authors of the publication under discussion, indicates

• *Comment on the Article*

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the efficiency of grafting for superior shoulder capsule. Besides, Mihata et al. described better functional outcomes and less failure rate for autografts from fascia lata (4.5%) as compared to ADCM grafts (18.6%) which was explained by authors by better retention properties of autologous tissues [4, 5]. On the contrary, the discussed study reports more failures for ITB autografts. Follow up terms, number of patients and evidence level of studies published so far do not allow making final conclusions regarding late functional outcomes and complications rate, as well as potential ligamentous adaptation of various graft types.

Another key issue is definition of indications for grafting of superior shoulder capsule. Literature doesn't provide reliable data on comparative efficiency of organ-preserving and organ-substituting treatment methods for patients with irreparable rotator cuff tears, so it would be advisable to use fundamental knowledge on shoulder joint biomechanics and mode of action for compared procedures. In particular, currently applied surgical techniques aim at restoration of a stable rotation center of humeral head as the key condition for effective deltoid function. We can distinguish methods to recover static (passive) and dynamic stabilization of the rotation center. Thus, grafting of superior shoulder capsule, balloon grafting and, conditionally, reverse arthroplasty statistically improve the stability of humeral head during movements, while muscle-tendon transfers and rotator cuff repair in addition to static stabilization provide also dynamic effect by mobilizing repaired or transferred muscles [6, 7]. Quantitative evaluation of the overall stabilizing outcome of various procedures is yet to be undertaken.

The mechanism of partial restoration of external rotation of the shoulder joint after muscle-tendon transfer apart from dynamic stabilization of humeral head is also linked to the contractive activity of muscles. Results of some studies confirmed that efficiency of

transposition of latissimus dorsi and teres major muscles is connected not only to static passive tenodesis-like effect but also to contractive activity of transferred muscles [8, 9]. Irlenbusch et al. captured the values of muscular activity of transferred latissimus dorsi by surface electromyography [10]. Henseler et al. confirmed impact of active contraction of transferred latissimus dorsi muscle on the partial restoration of external rotation both for adducted and for abducted joint [9].

While improvement of active external shoulder rotation is related not only to stabilization of rotation center but also to contractive activity of transferred muscle, muscle-tendon transfers can be more advantageous in contrast to grafting of superior shoulder capsule in cases of irreparable posterosuperior tears of rotator cuff with substantial loss of active external rotation (positive ERLS test). Irreparable injury of posterosuperior aspect of rotator cuff with pseudoparalysis of upper extremity implicates substantial or complete loss of function both of supraspinatus and infraspinatus muscles, active external rotation of shoulder joint in the majority of patients with such rotator cuff tears significantly deteriorates and its restoration after surgery has the key importance. For this reason, reverse shoulder joint arthroplasty for patients with positive ERLS test is supplemented by transposition of latissimus dorsi muscle in certain cases.

So, grafting of superior shoulder capsule is an efficient and promising treatment method for patients with irreparable tendon lesions of rotator cuff including pseudoparalysis of upper extremity. We still need to accumulate clinical experience to compare efficiency of replacement for superior shoulder capsule using various grafts, muscle-tendon transpositions, balloon grafting and reverse shoulder arthroplasty, as well as to evaluate the possibility and advisability to combine above methods in treatment of severe functional disorders in patients with

irreparable rotator cuff tears. The study under discussion serves as a good starting point for considering the role of grafting for superior shoulder capsule in challenging treatment of such patients.

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