Zakariya Ali
Leo Pauzenberger, MD
Hannan Mullett, MCh, FRCSI (Tr&Orth)
Dublin, Ireland

Address correspondence to Eoghan T. Hurley (email: eoghanhurley@rcsi.ie).

The authors declared that they have no conflicts of interest in the authorship and publication of this contribution. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

REFERENCES

1. Abdul-Rassoul H, Galvin JW, Curry EJ, Simon J, Li X. Return to sport after surgical treatment for anterior shoulder instability: a systematic review [published online June 1, 2018]. *Am J Sports Med*. doi: 10.1177/0363546518780934
2. Beranger JS, Klouche S, Bauer T, Demoures T, Hardy P. Anterior shoulder stabilization by Bristow-Latarjet procedure in athletes: return-to-sport and functional outcomes at minimum 2-year follow-up. *Eur J Orthop Surg Traumatol*. 2016;26(3):277-282.
3. Bessière C, Trojani C, Carles M, Mehta SS, Boileau P. The open Latarjet procedure is more reliable in terms of shoulder stability than arthroscopic Bankart repair. *Clin Orthop Relat Res*. 2014; 472(8):2345-2351.
4. Blonna D, Bellato E, Caranzano F, Assom M, Rossi R, Castoldi F. Arthroscopic Bankart repair versus open Bristow-Latarjet for shoulder instability: a matched-pair multicenter study focused on return to sport. *Am J Sports Med*. 2016;44(12):3198-3205.
5. Bohu Y, Klouche S, Gerometta A, Herman S, Lefevre N. Outpatient Latarjet surgery for gleno-humeral instability: prospective comparative assessment of feasibility and safety. *Orthop Traumatol Surg Res*. 2016;102(4):507-512.
6. Bottoni CR, Smith EL, Berkowitz MJ, Towle RB, Moore JH. Arthroscopic versus open shoulder stabilization for recurrent anterior instability: a prospective randomized clinical trial. *Am J Sports Med*. 2006;34(11):1730-1737.
7. Cho NS, Yoo JH, Rhee YG. Management of an engaging Hill-Sachs lesion: arthroscopic emplissage with Bankart repair versus Latarjet procedure. *Knee Surg Sports Traumatol Arthrosc*. 2016;24(12):3793-3800.
8. Cole BJ, L'Insalata J, Irrgang J, Warner JJ. Comparison of arthroscopic and open anterior shoulder stabilization: a two to six-year follow-up study. *J Bone Joint Surg Am*. 2000;82(8):1108-1114.
9. Hovelius LK, Sandström BC, Rösmark DL, et al. Long-term results with the Bankart and Bristow-Latarjet procedures: recurrent shoulder instability and arthropathy. *J Shoulder Elbow Surg*. 2001;10(5):445-452.
10. Hovelius LK, Vikerfors O, Olofsson A, Svensson O, Rahme H. Bristow-Latarjet and Bankart: a comparative study of shoulder stabilization in 185 shoulders during a seventeen-year follow-up. *J Shoulder Elbow Surg*. 2011;20(7):1095-1101.
11. Hurley ET, Lim Fat D, Farrington SK, Mullett H. Open versus arthroscopic Latarjet procedure for anterior shoulder instability: a systematic review and meta-analysis [published online March 1, 2018]. *Am J Sports Med*. doi:10.1177/0363546518759540
12. Hurley ET, Montgomery C, Jamal MS, et al. Return to play following the Latarjet procedure for anterior shoulder instability: a systematic review. *Am J Sports Med*. In press.
13. Jeon YS, Jeong HY, Lee DK, Rhee YG. Borderline glenoid bone defect in anterior shoulder instability: Latarjet procedure versus Bankart repair. *Am J Sports Med*. 2018;48(9):2170-2176.
14. Memon M, Kay J, Cadet ER, Shahsavar S, Simunovic N, Ayeni OR. Return to sport following arthroscopic Bankart repair: a systematic review. *J Shoulder Elbow Surg*. 2018;27(7):1342-1347.
15. Rhee YG, Ha JH, Cho NS. Anterior shoulder stabilization in collision athletes: arthroscopic versus open Bankart repair. *Am J Sports Med*. 2006;34(6):979-985.
16. Russo R, Rotonda GD, Cautiero F, et al. Arthroscopic Bankart repair associated with subscapularis augmentation (ASA) versus open Latarjet to treat recurrent anterior shoulder instability with moderate glenoid bone loss: clinical comparison of two series. *Musculoskelet Surg*. 2017;101(1):75-83.
17. Warth RJ, Briggs KK, Dornan GJ, Horan MP, Millett PJ. Patient expectations before arthroscopic shoulder surgery: correlation with patients' reasons for seeking treatment. *J Shoulder Elbow Surg*. 2013;22(12):1676-1681.
18. Zaffagnini S, Marcheggiani Muccioli GM, Giordano G, et al. Long-term outcomes after repair of recurrent post-traumatic anterior shoulder instability: comparison of arthroscopic transglenoid suture and open Bankart reconstruction. *Knee Surg Sports Traumatol Arthrosc*. 2012;20(5):816-821.
19. Zimmermann SF, Scheyerer MJ, Farshad M, Catanzaro S, Rahm S, and Gerber C. Long-term restoration of anterior shoulder stability: a retrospective analysis of arthroscopic Bankart repair versus open Latarjet procedure. *J Bone Joint Surg Am*. 2016;98(23):1954-1961.

Return to Sport After Surgical Treatment for Anterior Shoulder Instability: A Systematic Review: Response

DOI: 10.1177/0363546519825642

Authors' Response:

We thank Dr Hurley and coauthors for their letter and comments regarding our recent article "Return to Sport After Surgical Treatment for Anterior Shoulder Instability: A Systematic Review."[1] The authors raised the concern that our pooled data reported a higher rate of return to sport (RTS) than what was previously reported after anterior shoulder stabilization procedures and that our findings are not fully representative of the results in the literature, which could result in inappropriately high patient expectations. Although we appreciate their comments, it does not change our conclusions, which clearly stated a high RTS rate after anterior shoulder stabilization procedures among studies that reported both rate of RTS and time to RTS.

The Eligibility Criteria section of our systematic review clearly stated that "studies were evaluated only if they included both the RTS rates *and* the time to RTS, centering on a specific surgical procedure." We structured the methodology in this fashion in an attempt to determine not only the rate but also the time to RTS after anterior shoulder stabilization procedures. It is our opinion that these 2 criteria (RTS rate and time to RTS) depend on each other, and it is important to report one with the other in a pooled patient population after anterior shoulder stabilization procedures. As noted in Figure 1 of our article,

which details our PRISMA flowchart, we excluded a number of articles (n = 29) because they did not include both RTS rate and time to RTS. This accounts for the difference in the number of articles included (n = 16) as compared with other studies. The utility of this approach is stated in the Discussion section: "The value of the current systematic review is that only studies with information available for RTS and time to RTS were included for analysis. This allows for a more accurate interpretation of the current literature, with a homogeneous group on both the RTS rates and the time to RTS after anterior shoulder stabilization surgery." As we also discussed in our article, this highlights shortfalls in the current literature on RTS following anterior shoulder stabilization, as few studies reported both the rate of and the time to RTS.

When we pooled the data, the overall rate of RTS after arthroscopic Bankart was 97.5%; however, for the patients who returned to preinjury sport level, the rate was 90%. While it does appear that our RTS rate is higher than what is reported by Memon et al[20] in their systematic review of RTS following arthroscopic Bankart repair, we have concerns about how the data were compiled and presented in their study. In their pooled analysis, Memon et al reported rates of return to any level of sport as the number of athletes returning to sport divided by the total number of patients in each study. Although this method may seem appropriate, when we examined some of their included studies, we found that the RTS data were available for only a subset of the total patient population. They included patients without reported RTS data in the denominator, which would give artificially depressed RTS rates. In our analysis, we used the total number of athletes with available RTS data for both the rate of and the time to RTS. For example, Memon et al reported the RTS rate at any level as 95 of 143 (66%) from Aboalata et al.[2] While the study had 143 total patients, Aboalata et al stated, "We were able to evaluate 119 patients regarding sport participation." Therefore, it would be more representative to state the RTS rate at any level as 95 of 119 (80%).

Similarly, in the study by Godinho et al,[15] the RTS rate was presented as 167 of 252 (66%), yet the original article reported RTS data on only 196 athletes; therefore, the RTS should be 167 of 196 (85%). Another example is the Yamamoto et al[29] study, in which Memon et al reported RTS after "arthroscopic Bankart repair" to any level as 37 of 100 (37%), but the study included only 49 patients who underwent arthroscopic repair, with 37 returning to any level of sport (37 of 49, 76%). The remaining 51 patients had open Bankart repair, which should have been excluded from the systematic review. This analysis method was used to produce many of Memon and colleagues' reported RTS rates,[20] especially studies that were reported to have significantly low RTS rates (<70%) and large sample sizes. Furthermore, in the Castagna et al[9] study, 42 patients were included in the Memon et al systematic review; however, RTS information was collected on only 31 patients. Within the article itself, Castagna et al reported that 22 of 31 patients (71%) "were able to return to their preoperative sports activity," which is significantly higher than the 22 of 42 (52.3%) reported and used by Memon et al for their analysis.

We believe that the aforementioned examples significantly depress the RTS rate that was reported, which may explain some of the difference between our reported rates and those of Memon et al.[20] In fact, when we compile the RTS rates from the studies of Castagna et al,[9] Aboalata et al,[2] Godinho et al,[15] and Yamamoto et al,[29] the RTS rate to any level was 321 of 395 (81%), but Memon et al reported this as 321 of 537 (59.8%) in their review. Without reanalyzing the remainder of their included studies, this alone changes their overall RTS rate after arthroscopic Bankart repair from 81% to 88%. Furthermore, multiple studies in our study and that by Memon et al showed RTS rates $\geq$90% after arthroscopic Bankart repair.* Additionally, our data agree with a recent prospective multicenter study that found that 26 of 29 (90%) collegiate contact athletes were able to RTS the following season after arthroscopic Bankart repair without recurrence.[10]

Thank you for citing the studies regarding no difference in outcome between arthroscopic Bankart and open Latarjet in terms of rate of RTS.[5,6,18,30] Depending on how the data are interpreted, our study does not disagree with these results. We showed that of the athletes who were able to RTS, 91.5% of those receiving arthroscopic Bankart and 90% of those receiving open Latarjet returned to preinjury levels (Table 6), which is not significantly different. Moreover, our study simply reported the overall rate of RTS based on pooled patient data according to our inclusion criteria, and we make no conclusion that one procedure is superior to the other in terms of enabling patients to RTS or reducing time to return to competition. We did not perform a meta-analysis of our pooled data to make this comparison simply because the indications are different among the arthroscopic Bankart, open Bankart, and Latarjet, based on a number of factors—including number of dislocation events, age, presence of hyperlaxity, amount of glenoid bone loss, type of sport, size of the Hill-Sachs lesion, and on- versus off-track Hill Sachs lesions. We emphasized this point in our Discussion section: "Although these pooled data provide valuable information for the physician and athlete on time and rate of RTS after anterior shoulder stabilization surgery, the studies are limited by selection bias and varying severity of soft tissue and glenoid/humeral bone loss within the patient populations, which would have dictated the type of surgical intervention."

It is difficult to compare 2 different populations of patients and make a conclusion concerning which procedure is better for RTS, as it is difficult to standardize the surgical indications with a systematic review. Furthermore, in the Discussion section, we stated that the purpose of our study "was not to determine which type of surgery was the most successful or the most durable for RTS, but to report the time to and rate of RTS for the various anterior shoulder stabilization procedures as a pooled cohort." Last, we concluded that, given the limitations, "to expand from this review, future large prospective studies may be able to use it as a foundation to create a stronger

*References 6, 12-14, 16, 17, 19, 21, 22, 24-28.

framework to more accurately determine the rate and time to RTS for individual athletes after anterior shoulder stabilization surgery."

We appreciate the authors' comment on the term "minimally invasive" versus "arthroscopic" Latarjet from the 2 studies of Beranger et al[4] and Bohu et al.[8] Both authors described their technique as a "minimally invasive" Latarjet procedure, which was grouped and analyzed according to our categorization criteria. The term "minimally invasive" is used in Tables 4 and 6 and throughout the article, which is the correct term and should also be used in the abstract. We thank the authors for highlighting this point.

We would also like to take this opportunity to address the term "return to sport" in the literature, as there is no clear definition or consensus of what it means for an athlete to "return to sport." RTS after shoulder instability surgery differs significantly among overhead athletes (ie, volleyball), noncollision athletes (ie, soccer), and collision athletes (ie, American football), and studies often have a heterogeneous group of athletes, which likely affects the RTS rate. Furthermore, RTS at the preinjury level is not well defined in the literature. This can mean return to the team, practice, any competition, full competition for 1 game, or entire season. Moreover, patients who RTS and continue to have recurrent shoulder apprehension or instability but continue to play can be labeled as successfully returning to sport, even without successful surgical stabilization. The risk of recurrence of either apprehension or instability after arthroscopic Bankart repair is between 7% and 22.9%,[2,6,9,15,17,18] and Zimmerman et al[30] reported that if patients were followed for >6 years, the risk of failure as defined by any type of subjective instability (apprehension, subluxation, and/or dislocation) is 41.7% after arthroscopic repair. It is important to consider the risk of recurrence and failure with longer-term follow-up, to have a true sense of successful and sustained RTS rates after shoulder stabilization surgery. In setting expectations with patients regarding postoperative outcome, all factors—including risk of failure, recurrence of instability, and perioperative complications—must be considered and discussed, in addition to the expected rate and time to return to their preinjury sports and levels of competition.

Additionally, in future studies, it may be more useful to report on both the time to and the rate of RTS for individual sports. This will provide more information to patients on the process of recovery, which, as Porter[23] described, is a critical component of providing value-based health care. For example, Erickson et al[11] reported baseball pitchers' performance outcomes, such as number of innings pitched, after Tommy John surgery. We also think that it would be useful if future RTS studies more widely utilized and reported RTS data with categorization systems, such as that by Allain et al,[3] with patients grouped by sport type (overhead, contact, and noncontact) in addition to sports level (competitive, recreational, and healthy) and amount of participation. Furthermore, using a self-assessment score system to measure the ability of athletes to return to their preinjury sporting levels will add value to better assess the outcome and the true RTS rates. For example, the Subjective Patient Outcome for Return to Sports is "a patient-completed measure built around three separate concepts: 1) the ability to resume a sport at the preinjury level of effort and training, 2) the ability to reach the same level of performance, and 3) the ability to achieve 1) and 2) without or despite pain."[7] It is a simple 10-point scale that assesses the patients' effort, performance, and pain with regard to the original sport, and it was shown to be both reliable and valid in the assessment of athletes returning to sport after shoulder instability surgery.[7] The concept of "return to sport" after shoulder stabilization surgery is extremely valuable to both the patient and the surgeon, and we believe that it is essential for future outcome studies to report both the rate of and the time to RTS and to group the RTS data according to the sporting type (noncontact, contact, and overhead). Additionally, the level of competition and the amount of participation, with subjective (self-assessment score) and objective measurements, should be included in the final RTS outcome measures. Again, we thank Dr Hurley and his coauthors for their comments and for highlighting this important topic of RTS after surgical treatment for anterior shoulder instability.

Hussein Abdul-Rassoul, BS
Joseph W. Galvin, DO
Emily J. Curry, BA
Boston, Massachusetts, USA
Jason Simon, MD
Burlington, Massachusetts, USA
Xinning Li, MD
Boston, Massachusetts, USA

Address correspondence to Xinning Li, MD (email: xinning.li@gmail.com).

One or more of the authors has declared the following potential conflict of interest or source of funding: J.S. has received consulting fees from Arthrex Inc and Kairos Surgical Inc. X.L. has received consulting fees from Tornier Inc, Depuy Orthopedics Inc, Encore Medical, and Stryker Corporation. AOSSM checks author disclosures against the Open Payments Database (OPD). AOSSM has not conducted an independent investigation on the OPD and disclaims any liability or responsibility relating thereto.

REFERENCES

1. Abdul-Rassoul H, Galvin JW, Curry EJ, Simon J, Li X. Return to sport after surgical treatment for anterior shoulder instability: a systematic review [published online June 27, 2018]. *Am J Sports Med*. doi:10.1177/0363546518780934
2. Aboalata M, Plath JE, Seppel G, Juretzko J, Vogt S, Imhoff AB. Results of arthroscopic Bankart repair for anterior-inferior shoulder instability at 13-year follow-up. *Am J Sports Med*. 2017;45:782-787.
3. Allain J, Goutallier D, Glorion C. Long-term results of the Latarjet procedure for the treatment of anterior instability of the shoulder. *J Bone Joint Surg Am*. 1998;80:841-852.
4. Beranger JS, Klouche S, Bauer T, Demoures T, Hardy P. Anterior shoulder stabilization by Bristow-Latarjet procedure in athletes: return-to-sport and functional outcomes at minimum 2-year follow-up. *Eur J Orthop Surg Traumatol*. 2016;26:277-282.
5. Bessiere C, Trojani C, Carles M, Mehta SS, Boileau P. The open Latarjet procedure is more reliable in terms of shoulder stability than arthroscopic bankart repair. *Clin Orthop Relat Res*. 2014;472:2345-2351.
6. Blonna D, Bellato E, Caranzano F, Assom M, Rossi R, Castoldi F. Arthroscopic Bankart repair versus open Bristow-Latarjet for

shoulder instability: a matched-pair multicenter study focused on return to sport. *Am J Sports Med*. 2016;44:3198-3205.
7. Blonna D, Bellato E, Caranzano F, et al. Validity and reliability of the SPORTS score for shoulder instability. *Joints*. 2014;2:59-65.
8. Bohu Y, Klouche S, Gerometta A, Herman S, Lefevre N. Outpatient Latarjet surgery for gleno-humeral instability: prospective comparative assessment of feasibility and safety. *Orthop Traumatol Surg Res*. 2016;102:507-512.
9. Castagna A, Markopoulos N, Conti M, Delle Rose G, Papadakou E, Garofalo R. Arthroscopic bankart suture-anchor repair: radiological and clinical outcome at minimum 10 years of follow-up. *Am J Sports Med*. 2010;38:2012-2016.
10. Dickens JF, Rue JP, Cameron KL, et al. Successful return to sport after arthroscopic shoulder stabilization versus nonoperative management in contact athletes with anterior shoulder instability: a prospective multicenter study. *Am J Sports Med*. 2017;45:2540-2546.
11. Erickson BJ, Gupta AK, Harris JD, et al. Rate of return to pitching and performance after Tommy John surgery in Major League Baseball pitchers. *Am J Sports Med*. 2014;42:536-543.
12. Franceschi F, Papalia R, Del Buono A, Vasta S, Maffulli N, Denaro V. Glenohumeral osteoarthritis after arthroscopic Bankart repair for anterior instability. *Am J Sports Med*. 2011;39:1653-1659.
13. Gerometta A, Rosso C, Klouche S, Hardy P. Arthroscopic Bankart shoulder stabilization in athletes: return to sports and functional outcomes. *Knee Surg Sports Traumatol Arthrosc*. 2016;24:1877-1883.
14. Gibson J, Kerss J, Morgan C, Brownson P. Accelerated rehabilitation after arthroscopic Bankart repair in professional footballers. *Shoulder Elbow*. 2016;8:279-286.
15. Godinho GG, Freitas JM, Franca Fde O, de Lago ESFM, Aragao AA, Barros MK. Bankart arthroscopic procedure: comparative study on use of double or single-thread anchors after a 2-year follow-up. *Rev Bras Ortop*. 2015;50:94-99.
16. Green MR, Christensen KP. Arthroscopic Bankart procedure: two- to five-year followup with clinical correlation to severity of glenoid labral lesion. *Am J Sports Med*. 1995;23:276-281.
17. Ide J, Maeda S, Takagi K. Arthroscopic Bankart repair using suture anchors in athletes: patient selection and postoperative sports activity. *Am J Sports Med*. 2004;32:1899-1905.
18. Jeon YS, Jeong HY, Lee DK, Rhee YG. Borderline glenoid bone defect in anterior shoulder instability: Latarjet procedure versus Bankart repair. *Am J Sports Med*. 2018;46:2170-2176.
19. Levy O, Matthews T, Even T. The ''purse-string'' technique: an arthroscopic technique for stabilization of anteroinferior instability of the shoulder with early and medium-term results. *Arthroscopy*. 2007;23:57-64.
20. Memon M, Kay J, Cadet ER, Shahsavar S, Simunovic N, Ayeni OR. Return to sport following arthroscopic Bankart repair: a systematic review. *J Shoulder Elbow Surg*. 2018;27:1342-1347.
21. Plath JE, Feucht MJ, Bangoj R, et al. Arthroscopic suture anchor fixation of bony Bankart lesions: clinical outcome, magnetic resonance imaging results, and return to sports. *Arthroscopy*. 2015;31:1472-1481.
22. Plath JE, Feucht MJ, Saier T, et al. Sporting activity after arthroscopic Bankart repair for chronic glenohumeral instability. *Arthroscopy*. 2015;31:1996-2003.
23. Porter ME. What is value in health care? *N Engl J Med*. 2010;363:2477-2481.
24. Rangavajjula A, Hyatt A, Raneses E, McCrossin J, Cohen S, DeLuca P. Return to play after treatment of shoulder labral tears in professional hockey players. *Phys Sportsmed*. 2016;44:119-125.
25. Stein T, Linke RD, Buckup J, et al. Shoulder sport-specific impairments after arthroscopic Bankart repair: a prospective longitudinal assessment. *Am J Sports Med*. 2011;39:2404-2414.
26. Tambe A, Badge R, Funk L. Arthroscopic rotator cuff repair in elite rugby players. *Int J Shoulder Surg*. 2009;3:8-12.
27. Uhring J, Rey PB, Rochet S, Obert L. Interest of emergency arthroscopic stabilization in primary shoulder dislocation in young athletes. *Orthop Traumatol Surg Res*. 2014;100:S401-S408.
28. Uribe JW, Hechtman KS. Arthroscopically assisted repair of acute Bankart lesion. *Orthopedics*. 1993;16:1019-1023.
29. Yamamoto N, Kijima H, Nagamoto H, et al. Outcome of Bankart repair in contact versus non-contact athletes. *Orthop Traumatol Surg Res*. 2015;101:415-419.
30. Zimmermann SM, Scheyerer MJ, Farshad M, Catanzaro S, Rahm S, Gerber C. Long-term restoration of anterior shoulder stability: a retrospective analysis of arthroscopic Bankart repair versus open latarjet procedure. *J Bone Joint Surg Am*. 2016;98:1954-1961.