

Editorial Commentary: Personalized Medicine for Shoulder Instability May Result in Best Outcomes With the Lowest Complication Rates



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Abstract: Personalization is a type of medical care in which the treatment is customized for an individual patient. When treating shoulder instability, we need to consider not only soft-tissue damage but also the bony lesion and patient characteristics. Of particular importance is the consideration of whether there is anterior glenoid bone loss, together with the presence of a Hill–Sachs lesion, on or off-track, as well as whether the patient is hyperlax and/or is an athlete, in which case in what type of sport. In hyperlax, nonoverhead sport athletes with recurrent anterior instability and glenoid bone loss <15%, Bankart repair with subscapularis augmentation is an effective procedure with a lower risk of complications and arthritis than a bony procedure. This is a perfect example of personalized medicine indicating a particular treatment to the benefit of patients.

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Shoulder instability surgery has gone through a progression driven by a continuous increase in knowledge but even more following the personalization of medicine. Personalization is a type of medical care in which treatment is customized for an individual patient. Perhaps Hippocrates already stated about this idea with the famous sentence “It is more important to know what sort of person has a disease than to know what sort of disease a person has.”

The stratification of patients into groups to guide treatment decisions is not a new concept; every time we attempt to diagnose the underlying cause of joint pain as either tendinous or cartilaginous in the hope of prescribing the intervention most likely to tackle the cause, we are effectively practicing stratified medicine. However, in recent years, our understanding of both patients and their underlying conditions has

significantly increased.¹ The same happened to shoulder instability surgery.

Historically, several papers regarding instability in the first era, far from the concept of the personalization of our practice, just compared different surgical techniques without a deeper analysis of patient populations or precise anatomical (bony) damages. These kinds of papers^{2,3} advocated a shoulder surgery concept for the surgeon (low recurrence despite the risk of complications or long-term glenohumeral arthritis) rather than a surgery concept for the patient (most effective surgery with less risk of complications and minimal invasiveness).

In the second era of shoulder instability surgery, a few years ago, a paper changed dramatically our decision-making,⁴ focusing on both the patient and the joint damage, allowing us to work in the direction of personalized medicine. The Instability Severity Index drew our attention because not only soft-tissue damage but also bony lesion and patient characteristics were included to customize precisely the operation.

This concept came together with the studies of Burkhart et al.,⁵ Itoi et al.,⁶⁻⁸ and Di Giacomo et al.⁹ on bony anatomy damage that allowed us to develop an algorithm where the anterior glenoid bone loss, together with the presence of Hill–Sachs lesion on or off-track, helps surgeons in their indications and operative planning.

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We are living in the third era of shoulder instability surgery, where we are driven not only by the risk factors for recurrence¹⁰ and bone damage concepts but also by personalization of the surgery related to the type of population treated in term of sports together with the soft-tissue quality. In this frame, the paper “Bankart Repair With Subscapularis Augmentation in Athletes With Shoulder Hyperlaxity” by Maiotti, Russo, Zanini, Castricini, Castellarin, Schröter, Massoni, and Savoie, all recognized and expert surgeons, is a perfect example of personalized medicine applied to shoulder surgery.¹¹

The study includes a group of 397 patients treated with arthroscopic Bankart plus the arthroscopic subscapularis augmentation (ASA) technique¹² with evidence of shoulder hyperlaxity (positive sulcus sign in the external rotation [ER]1 position and Coudane–Walch test $>85^\circ$) performing non-overhead collision and contact sports activities, recurrent anterior instability, and glenoid bone loss $<15\%$. They excluded athletes suffering voluntary instability, multidirectional instability, or with pre-existing osteoarthritis and throwing athletes. Thus, the group is very well stratified and a precise population can be identified. Furthermore, all patients were studied with pre-operative computed tomography scans and magnetic resonance imaging.

With such a precisely selected population, the Bankart repair augmented with subscapularis tenodesis can assure a low recurrence (3.8%) with a Rowe score of 92.7 ± 2.5 ($P = .037$) and an American Shoulder and Elbow Surgeons Shoulder Score of 97.4 ± 2 ($P = .041$). A final reduction of external rotation is reported, 15° in ER1 and 10° in ER2. No limitations in sports activity were reported in 87%, mild in 8.3%, and moderate in 4.7% of patients. None of the patients reported a severe limitation in any sports activity.

These results are promising and interesting, especially in the particular situation of subcritical glenoid bone loss ($<20\%$), where we all know that bony procedures can assure satisfactory results with the price of greater rate of complications and greater risk of glenohumeral arthritis in the long term.¹³ In conclusion, I think that the ASA technique can be an appropriate augmentation in cases of anterior shoulder instability and hyperlaxity, especially in overhead athletes.

References

1. National Research Council (US). *Committee on a Framework for Developing a New Taxonomy of Disease*. Toward precision medicine: Building a knowledge network for biomedical research and a new taxonomy of disease. Washington (DC): National Academies Press, 2011.
2. Hovelius L, 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;20:1095-1101.
3. Zimmermann S, 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;23:1954-1961.
4. Balg F, Boileau P. The instability severity index score. A simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. *J Bone Joint Surg Br* 2007;89:1470-1477.
5. Burkhart SS, Debeer JF. Traumatic glenohumeral bone defects and their relationship to failure of arthroscopic Bankart repairs: Significance of the inverted-pear glenoid and the humeral engaging Hill–Sachs lesion. *Arthroscopy* 2000;16:677-694.
6. Itoi E, Lee SB, Berglund LJ, Berge LL, An KN. The effect of a glenoid defect on anteroinferior stability of the shoulder after Bankart repair: A cadaveric study. *J Bone Joint Surg Am* 2000;82:35-46.
7. Omori Y, Yamamoto N, Koishi H, et al. Measurement of the glenoid track in vivo as investigated by 3-dimensional motion analysis using open MRI. *Am J Sports Med* 2014;42:1290-1295.
8. Yamamoto N, Shinagawa K, Hatta T, Itoi E. Peripheral track and central-track Hill-Sachs lesions: A new concept of assessing an on-track lesion. *Am J Sports Med* 2020;48:33-38.
9. Di Giacomo G, Itoi E, Burkhart SS. Evolving concept of bipolar bone loss and the Hill–Sachs lesion: from “engaging/non-engaging” lesion to “on-track/off-track” lesion. *Arthroscopy* 2014;30:90-98.
10. Randelli P, Ragone V, Carminati S, Cabitza P. Risk factors for recurrence after Bankart repair: A systematic review. *Knee Surg Sports Traumatol Arthrosc* 2012;20:2129-2138.
11. Maiotti M, Russo R, Zanini A, et al. Bankart repair with subscapularis augmentation in athletes with shoulder hyperlaxity. *Arthroscopy* 2021;37:2055-2062.
12. Maiotti M, Massoni C. Arthroscopic augmentation with subscapularis tendon in anterior shoulder instability with capsulolabral deficiency. *Arthrosc Tech* 2013;2:e303-e310.
13. Gilat R, Lavoie-Gagne O, Haunschild ED, et al. Outcomes of the Latarjet procedure with minimum 5- and 10-year follow-up: A systematic review. *Shoulder Elbow* 2020;12:315-329.