

Editorial Commentary: For Shoulder Hill-Sachs Lesion Remplissage, Medial Anchor Position Must Be Optimized to Achieve Stability Yet Minimize External Rotation Loss



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Abstract: An off-track Hill-Sachs lesion (HSL) is a significant risk factor for recurrent shoulder instability after arthroscopic Bankart repair. Bankart repair combined with remplissage can better restore shoulder stability versus isolated Bankart repair when treating a combined Bankart lesion and off-track HSL. However, remplissage may be nonanatomic and associated with limitation of shoulder external rotation (ER), especially when the arm is in a 90° shoulder abduction position. Excessive medial placement of remplissage anchors is associated with postoperative ER loss and increased glenohumeral cartilage degeneration. The use of 2 medial anchors results in lower articular forces. Thus, in patients with shoulder instability, we recommend using 2 remplissage anchors in those with a Bankart lesion plus an off-track HSL. The anchors should be placed medially to achieve stability—but not so medial as to result in postoperative stiffness and significant ER loss.

See related article on page 2972

In their study “Bankart Repair With Remplissage Restores Better Shoulder Stability Than Bankart Repair Alone, and Medial or Two Remplissage Anchors Increase Stability but Decrease Range of Motion: A Finite Element Analysis,” Feng, Li, Chen, Chen, Ji, and Chen¹ performed a finite element analysis to investigate the effects of the number and location of anchors for the remplissage procedure on postoperative glenohumeral biomechanics. Seven models were established

and compared: a normal model, a model of a Bankart lesion combined with a Hill-Sachs lesion (HSL), a model of Bankart repair alone, and 4 models of combined Bankart repair and remplissage (differing in number and location of anchors). The study recruited 1 healthy male individual and performed computed tomography and magnetic resonance imaging to completely reconstruct the glenohumeral joint 3-dimensionally. After imaging was obtained, Bankart lesions were created within the anteroinferior labrum (between 6- to 9-o'clock position, left shoulder). An off-track HSL was created at the posterosuperior portion of the humeral head; the definition of on-track versus off-track lesions was based on a standard well-referenced technique.^{2,3}

However, the off-track HSL model used by Feng et al.¹ did not incorporate glenoid bone loss (GBL). An HSL rarely occurs in isolation and is commonly associated with a Bankart lesion.⁴ However, GBL is typically associated with HSLs in patients with recurrent shoulder instability.⁴⁻⁶ In addition, an advanced 3-dimensional analysis of computed tomography scans by Peebles et al.⁷ showed that patients with a lower percentage of GBL (5%-10%) had significantly narrower and deeper HSLs than those with a higher

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percentage of GBL (wider and shallower). There was a direct association between the characteristics of HSLs and the degree of GBL.⁷ Thus, GBL should optimally be included in the off-track HSL model to represent the more common pathology in recurrent shoulder instability.

Overall, Feng et al.¹ are to be congratulated for using a finite element analysis model to study both bony and soft-tissue structures in terms of glenohumeral stability. Their study showed that Bankart repair with remplissage can better restore shoulder stability than isolated Bankart repair when treating a Bankart lesion combined with an off-track HSL. A biomechanical study by Elkinson et al.⁸ similarly showed better restoration of shoulder stiffness after remplissage in shoulders with 15% and 30% HSLs compared with isolated Bankart repair. A recent systematic review of treatment using the remplissage procedure showed a low recurrence rate of instability (0%-20%) and reduced odds of recurrent instability compared with isolated Bankart repair alone (0.88) in the treatment of subcritical GBL.⁹ In addition, a meta-analysis conducted by Camus et al.¹⁰ showed the superiority of combined Bankart repair plus remplissage over isolated Bankart repair in terms of decreasing the risk of recurrence and redislocation. Thus, Bankart repair along with remplissage is superior to isolated Bankart repair for the treatment of shoulder instability with an off-track HSL.⁸⁻¹⁰

Various numbers and/or locations of anchors for the remplissage procedure have been described in the literature.⁹ Feng et al.¹ overall concluded that the model using 2 medial anchors showed the lowest stress on the joint capsule and anterior labrum of all the models. When anchors are more medially positioned and a greater number of anchors are used, shoulder stability will increase; however, postoperative range of motion will decrease. Three-dimensional imaging studies of HSL characterization in patients with shoulder instability showed a mean HSL length of 24.3 mm and 28% of the humeral diameter and a mean width of 16 mm and 14.8% of the humeral diameter.^{11,12} On the basis of this knowledge, we believe that 2 anchors are more suitable to fill the HSL defect (especially because they are about 16 mm long) than 1 anchor to cover the whole length of the HSL.

The remplissage procedure is also a nonanatomic procedure and has been associated with limitation of external rotation (ER) motion postoperatively, especially for the arm positioned at 90° of shoulder abduction.^{9,13-17} More medial placement in the remplissage procedure was associated with postoperative ER loss and increasing glenohumeral cartilage degeneration.^{13,16} Feng et al.¹ also point out that the remplissage procedure increased the maximum stress on the articular cartilage compared with isolated Bankart repair, and stress on the articular cartilage was lowest when 2

medial anchors were used. Future studies are needed to determine the long-term adverse effects of the remplissage procedure, such as osteoarthritis.

Thus, the number and location of the remplissage anchors influence stability, glenohumeral cartilage quality, and postoperative range of motion. In our experience, we choose to add 2 remplissage anchors when performing Bankart repair for the treatment of shoulder instability in the setting of an off-track HSL. These anchors should be appropriately placed (and not be too medial) to achieve optimal stability and to decrease the risk of postoperative stiffness, especially regarding ER motion.

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