

# Return to Play after Arthroscopic Bankart Repair Combined with Open Subpectoral Biceps Tenodesis



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**Purpose:** To evaluate the clinical outcomes and rate of return to play (RTP) in patients who underwent arthroscopic Bankart repair and open subpectoral biceps tenodesis. **Methods:** A retrospective review of patients who underwent combined arthroscopic Bankart repair and open subpectoral biceps tenodesis by a single surgeon between 2012 and 2016 was performed. RTP, the level of return, and the timing of return were assessed. Visual analog scale for pain, Rowe score, Shoulder Instability-Return to Sport after Injury score, and Subjective Shoulder Value were evaluated. **Results:** The study included 14 patients, with a mean follow-up of  $34.2 \pm 12.1$  months. Of the 14 patients, 13 (92.9%) returned to sport at a mean of  $4.8 \pm 1.2$  months and 9 (64.3%) returned to the same or higher level of sport. At final follow-up, the mean Rowe was  $80.0 \pm 16.3$ , the mean Subjective Shoulder Value was  $81.0 \pm 15.1$ , the mean Shoulder Instability-Return to Sport after Injury was  $57.3 \pm 25.6$ , and the mean visual analog scale score was  $2.6 \pm 1.5$ . One patient had a recurrent dislocation, whereas no patients underwent a further operation on the ipsilateral shoulder. **Conclusion:** Patients undergoing arthroscopic Bankart repair combined with open subpectoral biceps tenodesis had a high rate of RTP with a low rate of recurrent instability. **Level of Evidence:** IV, Therapeutic Case Series.

Anterior shoulder instability is a common problem in athletes, with collision athletes at particularly high risk.<sup>1,2</sup> The arthroscopic Bankart repair is the most commonly performed procedure for shoulder instability globally, in the setting of soft-tissue injury absent of glenoid bone loss.<sup>3-5</sup> Outcomes following arthroscopic Bankart repair are generally considered excellent with high rates of return to play in athletes.<sup>6</sup> However, associated pathologies, especially lesions of the long head of the biceps brachii tendon (LHBT) in athletes, might complicate return to play.<sup>7-10</sup>

LHBT lesions are a rare pathology alongside anterior shoulder instability, but can be a significant source of pain in the shoulder because of the large number of free nerve endings around the shoulders.<sup>11-13</sup> There are 3 main subtypes of LHBT lesions: (1) LHBT degeneration, (2) LHBT anchor disorders, and (3) LHBT instability (14). Biceps tenodesis is commonly used in the management of LHBT lesions or superior-labrum anterior-posterior (SLAP) tears in younger active patients. It is advantageous over tenotomy alone because it allows for the preservation of the anatomy for improved cosmetic appearance and functional outcomes, as the biceps is the chief supinator and secondary flexor of the elbow.<sup>14,15</sup>

There is scant literature on the outcomes of biceps tenodesis combined with arthroscopic Bankart repair, with no studies to our knowledge reporting on the rate of return to play (RTP) in these patients. Therefore, the purpose of this study was to evaluate the clinical outcomes and rate of RTP in patients who underwent arthroscopic Bankart repair and open subpectoral biceps tenodesis. Our hypothesis was that arthroscopic Bankart repair and biceps tenodesis would result in high rates of RTP.

## Methods

A retrospective analysis of patient reported outcomes and prospectively collected operative findings was

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carried out. The operation notes from all of the arthroscopic Bankart repairs performed by a single fellowship trained shoulder surgeon (H.M.) from 2012 to 2016 were analyzed. The inclusion criteria for the study were: (1) anterior shoulder instability; (2) traumatic LHBT injuries with instability and/or partial or complete ruptures of the LHBT; (3) arthroscopic Bankart repair; (4) open subpectoral biceps tenodesis; and (5) minimum 24-month follow-up. The exclusion criteria were significant glenohumeral arthritis at the time of the procedure and patients who had received a previous surgery on the ipsilateral shoulder.

Operative findings were recorded by the performing surgeon following surgery. These findings were retrospectively reviewed and analyzed, by a surgical trainee (E.T.H.) not involved in the case. Patients were followed by telephone contact and, upon receiving permission, were sent an e-mail with a follow-up survey to be completed. Once completed, results were recorded, analyzed, and collated. Details recorded included demographic information, return to sport information (including level returned at and reasons for not returning where applicable), Rowe score, the Shoulder Instability-Return to Sport after injury score, the visual analog scale score, and the Subjective Shoulder Value score, recurrence of dislocations or subluxations, revision surgeries, and complications.

### **Surgical Technique**

All surgeries were performed in beach chair position under general anesthesia. An examination under anesthesia was performed on both shoulders to evaluate instability, range of motion, and joint laxity. A diagnostic arthroscopy through a standard posterior portal was performed including dynamic examination to confirm the diagnosis. The capsuloligamentous structures were evaluated, whereas the glenoid and humerus were examined for osteochondral or osseous defects. The intraarticular part of the LHBT was evaluated in its entirety including dynamic testing for instability. The dynamic arthroscopic examination routinely includes moving the glenohumeral joint through the whole range of motion and test for luxation tendencies. This includes final evaluation of all potential bipolar osseous lesions to determine their relevance. Furthermore, the LHBT and its origin is evaluated closely during this dynamic examination to identify any instabilities and get a better idea of the degree of injury to the superior labrum. A probe was used to examine the biceps anchor and mobilize the LHBT out of its groove. Indications for biceps tenodesis included: (1) observation of extension of the glenoid lesion into the LHBT itself; (2) partial rupture of the LHBT; (3) accompanying damage to the rotator cuff insertions indicative of chronic or acute LHBT instability (pulley-lesion); and (4) clear instability of the LHBT. If the decision was made to perform a LHBT

tenodesis, the tendon was cut near its origin. To address anterior capsulolabral lesions, the labrum was mobilized and the glenoid bone freshened. The capsular tissues and labrum were then fixed to the glenoid rim with suture anchors as needed, with the primary goal of our repair being the restoration of the inferior glenohumeral ligament and the hammock effect of the glenohumeral ligaments. The number of anchors was determined by the size of the glenoid because our routine technique includes placing a minimum of 3 anchors from the 6 o'clock position up to approximately the 11 o'clock position. After finishing the arthroscopic repair, all portals were closed and an oblique skin incision was made at the inferior border of the pectoralis major muscle over the humerus. The LHBT was then mobilized and sutured. A guide pin was positioned centrally in the humerus and overdrilled unicortically with a cannulated reamer. The LHBT was fixed with an interference screw in an intramedullary fashion.

### **Rehabilitation and Return to Play**

Postoperatively the shoulder was placed in a sling for 3 weeks. Nonresisted activities of daily living of the elbow and shoulder without excessive elevation and external rotation were allowed. Patients immediately began physiotherapy, which continuously increased in intensity over the next weeks. Return to contact activities while avoiding collision drills was allowed after 12 weeks. Return to full contact and competition usually would follow within the next 3 months, depending on progress of physiotherapy.

### **Statistical Analysis**

Descriptive statistics were gathered using SPSS, version 22 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.).

## **Results**

### **Patient Demographics**

A total of 17 patients fitting the inclusion criteria could be identified, of which 14 (82.4%) were available for a follow-up at a mean  $34.2 \pm 12.1$  months. There were 13 (93%) males and 1 (7%) female, and a mean body mass index of  $29.2 \pm 4.2$ . The mean patient age was  $35.5 \pm 10.2$  years. The mean follow-up time was  $34.2 \pm 12.1$  months. There were 5 (36%) professional athletes, all rugby players, and 3 other competitive athletes. Eight (57%) patients were involved in contact sports and 6 (43%) were involved in noncontact sport.

### **Return to Sport**

At follow-up, 13 (93%) of patients had returned to sport (Table 1). Of these patients, 9 (64.3%) returned to the same/higher level of sport. Of those who returned at a lower level, 3 (75%) were due to residual shoulder

**Table 1.** Return to Sport

	Overall	Collision	Competitive/Professional
N	14	8	8
Total RTP	13 (93%)	7 (87.5%)	8 (100%)
Same/higher level	9 (64.3%)	7 (87.5%)	6 (75%)
Lower level	4 (31%)	0 (0%)	2 (25%)
Time to RTP (mo.)	4.8 (3-9)	4.5 (3-6)	4.9 (3-9)

RTP, return to play.

symptoms postoperatively (e.g., recurrent instability, recurring pain) and 1 (25%) was due to social/family factors. The mean time of return to sport was  $4.8 \pm 1.2$  months. Of the 8 collision athletes, 7 (86%) returned to sport and all returned at the same or higher level. All of these returned between 3 and 6 months. In the competitive/professional athlete group, all 8 (100%) athletes returned. Six (75%) returned at the same or higher level of sport and 2 (25%) returned at a lower level. All of the 5 professional rugby players returned to sport at the same level.

### Patient-reported Outcomes

Of 14 patients, the mean Rowe score was  $80 \pm 16.3$  (Table 2). The mean Shoulder Instability-Return to Sport after Injury score was  $57.3 \pm 25.6$ . The mean visual analog scale score was  $2.6 \pm 1.5$ . The mean Subjective Shoulder Value was  $80 \pm 15.1$ .

### Complications

Overall, 1 patient (7%) suffered a redislocation; this was a competitive cricket player who redislocated 3 years later from a collision with a bat. No other patient had either redislocation, subluxation, or revision surgery. Additionally, no patients complained of Popeye deformity.

## Discussion

The most important finding from this study was that patients who underwent arthroscopic Bankart repair combined with subpectoral biceps tenodesis, showed an overall high rate of return to sport with a low rate of recurrent instability.

Maffet et al.<sup>16</sup> classified SLAP tears involving the LHBT alongside a Bankart lesion of the glenoid labrum as type V SLAP tears, with previous literature reporting the incidence of type V SLAP tears in patients with anterior shoulder instability as approximately 30%. The majority of the literature on outcomes following biceps tenodesis are from LHBT lesions in the setting of rotator cuff tears. However, biceps tenodesis has been gaining popularity as a primary surgical option for type II SLAP tears, rising from less than 2% of procedures in 2002 to close to 20% in 2011.<sup>17</sup> Hurley et al.<sup>18</sup> found in a systematic review of the literature that biceps tenodesis resulted in higher rates of RTP over SLAP repairs, higher rates of patient satisfaction, and trends toward

lower reoperations and stiffness. In the group of younger athletes, biceps tenodesis is advantageous over tenotomy alone because it allows for the preservation of the anatomy for improved cosmetic appearance and functional outcomes, as the biceps is the chief supinator and secondary flexor of the elbow.<sup>15</sup> Several studies found a higher peak torque power with tenodesis and similar endurance between tenodesis and tenotomy.<sup>19-21</sup> However, there is scant literature in the treatment of symptomatic LHBT lesions occurring alongside anterior shoulder instability.

Biceps tenodesis is most widely performed in an open sub- or suprapectoral technique or an arthroscopic approach, whereas there is currently no evidence clearly favoring either option.<sup>22</sup> Nonetheless, for the active patients in this study group, an open subpectoral approach was chosen for the purpose of the potentially strongest fixation in the subpectoral region. This reasoning would be in accordance with Jeong et al.,<sup>23</sup> who showed that subpectoral fixation had a lower rate of failure and a lower rate of bicipital groove pain than with a more proximal arthroscopic fixation.

RTP is a primary concern for athletes undergoing shoulder stabilization and has been shown to be the most important outcomes for these patients, over recurrent instability.<sup>24</sup> Our study found a high rate of return, with only 1 athlete unable to return. Additionally, all of the collision athletes, including 5 professional rugby union players, were able to RTP. These results are encouraging because they are comparable to the findings in the literature on arthroscopic Bankart alone despite the additional need for biceps tenodesis. Memon et al.<sup>6</sup> found in a systematic review that 81% of athletes undergoing arthroscopic Bankart repair could RTP, with 82% of competitive athletes returning. Similarly, studies have found high rates of RTP following biceps tenodesis with rates between 70% and

**Table 2.** Patient-reported Outcomes

Outcome	Mean Score
Rowe score	$80 \pm 16.3$
SIRSI score	$57.3 \pm 25.6$
VAS score	$2.6 \pm 1.5$
SSV	$80 \pm 15.1$

SIRSI, Shoulder Instability-Return to Sport after Injury; SSV, Subjective Shoulder Value; VAS, visual analog scale.

100% reported.<sup>7-10</sup> The overall timing of RTP was approximately 5 months, which is not different to what has been reported for athletes undergoing Bankart repair alone.<sup>6</sup> This suggests that patients may not need prolonged rehabilitation because of the additional biceps tenodesis.

Despite the overall high rate of RTP, almost one-third were unable to return to the same level of play because of residual shoulder issues. This is an often overlooked but very important point when counselling patients for realistic patient expectations, which have been shown to correlate with improved patient satisfaction. Especially in high-demand populations, such as the collision or overhead athletes, where up to 30% of patients are expected to not return to their sport at the same level, regardless of the surgical treatment for anterior shoulder instability despite their overall long-term success.<sup>6,25-28</sup> Although the causes for the relatively high rate of patients not being able to return to the same level of sports in the current study are likely to be multifactorial, it might be a reflection of the more extensive capsuloligamentous and LHBT injury than a labrum lesion alone.<sup>29</sup>

### Limitations

The current study is subject to all inherent disadvantages of a retrospective study. The group evaluated in the current study was small, which reflects the relative rarity of injuries calling for open subpectoral biceps tenodesis in highly selected patients. There was a mix of collision/noncollision athletes, which could have affected the outcomes. There was no control group included in this study for comparative analysis of outcomes. Finally, we did not clinically examine patients in person at the last follow-up, and this limits the accuracy of the data.

### Conclusions

Patients undergoing arthroscopic Bankart repair combined with open subpectoral biceps tenodesis had a high rate of RTP with a low rate of recurrent instability.

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