

Return to Play and Prior Performance in Major League Baseball Pitchers After Repair of Superior Labral Anterior-Posterior Tears

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Background: The published return-to-play (RTP) rates for Major League Baseball (MLB) pitchers who have undergone surgical repair of superior labrum anterior-posterior (SLAP) tears vary widely and are generally accepted to be lower in the subset of competitive throwers. The efficacy of surgical treatment for MLB players is largely unknown.

Purpose: To examine the RTP rate and performance of MLB pitchers who have undergone SLAP tear repair between 2003 and 2010.

Study Design: Descriptive epidemiological study.

Methods: A retrospective review of MLB pitchers undergoing SLAP repair was performed using the MLB disabled list. Data collected included the following player statistics: earned run average (ERA), walks plus hits per inning pitched (WHIP), and innings pitched (IP). The mean values for performance variables both before and after surgery were compared. A definition of return to prior performance (RTP) was established as an ERA within 2.00 and WHIP within 0.500 of preoperative values.

Results: Twenty-four MLB players met inclusion criteria, of which 62.5% were able to RTP at the MLB level after SLAP repair surgery. Of those able to RTP, 86.7% were able to RTP. However, the overall rate of RTP, including those unable to RTP, was 54.2%. Mean performance analysis of the RTP group revealed a statistically significant decrease in IP for MLB pitchers throwing a mean 101.8 innings before injury and 65.53 innings after injury ($P = .004$).

Conclusion: Of those pitchers able to RTP, chances of a full recovery were good (86.7%). Our results indicate the need for future research aimed at proper surgical selection of who will return to play, as they will likely achieve full recovery. We believe this information can help surgeons advise high-level overhead-throwing athletes about expected outcomes for surgical treatment of SLAP tears.

Keywords: SLAP; baseball; epidemiology; surgical outcome

Elite overhead-throwing athletes continually strive to improve their abilities through rigorous training routines and year-round competition. Major League Baseball (MLB) pitchers, for example, train to boost throwing velocity, generate spin, and maximize accuracy. The physical stress of

this intense training increases the risk of shoulder injury such as superior labral anterior-posterior (SLAP) tears. Recent data from 2012 indicate that the volume of SLAP repair procedures performed in the United States continues to increase each year.¹⁶ Arthroscopic SLAP repairs have good reported outcomes and a high level of satisfaction among the general population.^{8,13} Although there have been a number of studies in the general population, outcomes remain unclear for elite overhead-throwing athletes such as MLB pitchers.

The existent studies examining SLAP repair outcomes in elite athletes rely largely on subjective scales, such as the American Shoulder and Elbow Surgeons (ASES) score, used to measure outcomes in the general population. These measures focus on activities of daily living and do not account for the intense physical demands that elite athletes place on their shoulders. The limitation of using such a scale to evaluate MLB pitchers is evident based on the current literature. For example, Brockmeier et al³ reported

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that only 74% of the elite athletes were able to return to their preinjury level of play despite their high postinjury ASES scores (mean, 97). Clearly, the ASES score alone may not be the best predictor of return to play (RTP) for these elite athletes, as it focuses on routine activities of daily living. Moreover, an ideal measure for these athletes would include sport-specific outcomes such as RTP and performance parameters.

Clinical outcomes after SLAP lesion repair in elite athletes remains a subject of interest among sports medicine clinicians and researchers. One area of particular interest has been RTP in these elite athletes after undergoing repair of SLAP tears.^{4,9,11-13} Overall, the current literature is limited and presents inconsistent results, mostly for amateur players. Neuman et al¹³ reported 84.1% of overhead-throwing athletes returned to their preinjury level of function, and 93.3% of these athletes were satisfied with their treatment outcome. Morgan et al¹¹ retrospectively reviewed 53 overhead-throwing athletes using both the objective University of California–Los Angeles (UCLA) rating scale and a subjective scoring system to assess player performance. They found that 84% of pitchers returned to their preinjury level of activity; 87% described their recovery as excellent and 13% described their recovery as good.¹¹ In contrast, Cohen et al⁴ used both mean ASES scores and another subjective scoring method adapted from the L'Insa-lata questionnaire in their review of 29 athletes. They found that only 39% of these overhead-throwing athletes were able to RTP, while 69% of the entire cohort reported excellent or good results.⁴ Kim et al⁹ also indicated lower postoperative scores for overhead-throwing athletes compared with the overall group. Thus, while several studies have attempted to evaluate RTP in overhead-throwing athletes, their results are inconclusive and based largely on subjective data for a wide variety of athletes.

There are other aspects of SLAP tear injuries that should be considered and explored in MLB pitchers, such as the time it takes to RTP and the level of RTP compared with preinjury (eg, return to prior performance [RTPP]). There are a few studies that report the time that is needed for RTP, but their focus is on amateur and college-level athletes.^{13,15} Other studies have examined RTPP after surgical SLAP repairs in a small subset of players from a single MLB organization.⁷ Thus, there remains a paucity of literature objectively examining important outcomes in elite overhead-throwing athletes. The objective of this study was to examine the RTP and performance of MLB pitchers from all MLB organizations who have undergone SLAP tear repairs between 2003 and 2010.

METHODS

A retrospective review was performed to collect data on MLB pitchers who underwent shoulder surgery for a SLAP tear from 2003 to 2010. A list of MLB pitchers who were injured and underwent surgery for SLAP tear was compiled from a publicly available site (<http://mlbreports.com/tj-surgery>).² Players with multiple shoulder surgeries or other injuries leading to placement on the disabled list

TABLE 1
Group Demographics of the 24-Pitcher Cohort^a

Age at injury, y	27.8 ± 4.73 (23.1-32.5)
Years in MLB before surgery	4.38 ± 3.68 (0.70-8.06)
RTP for cohort, %	62.5
RTPP for cohort, %	54.2
Total days on disabled list, mean	338

^aData are reported as mean ± SD (range) unless otherwise indicated. MLB, Major League Baseball; RTP, return to play; RTPP, return to prior performance.

(DL) were excluded from our study. Players who did not play in at least 10 MLB games before injury or players who had multiple concomitant injuries at the time of shoulder injury were also excluded from this study.

The player name, position, and length of time on the DL was collected from the MLB public database.¹⁰ We included statistics for earned run average (ERA), walks plus hits per inning pitched (WHIP), and innings pitched (IP). Several recent publications have used these methods to collect and report data on MLB athletes.^{1,5,7}

To help minimize anomalies when calculating an individual player's statistics, we first calculated mean values for his ERA, WHIP, and IP. The mean values for performance before injury included all full season's played before the injury; likewise, mean values for performance after the player's recovery included all full seasons played after treatment and rehabilitation.

We defined a successful RTP as ability to pitch for at least 1 entire season at the MLB level after the repair. Players who did not RTP for at least 1 complete season after surgery or returned to play at the minor league level were considered a failure of return to play (FRTP). A definition of RTPP was established as an ERA within 2.00 and WHIP within 0.500, as previously described by the Erickson et al⁶ and Fedoriw et al⁷ in separate evaluations of MLB pitchers.

Mean age, level of experience, and days spent on the DL were calculated for the entire data set. The RTP status was determined for each player. Each pitcher's overall change in performance from before injury and after treatment was analyzed using a paired-samples *t* tests. All statistics were performed using Excel (Microsoft Corp) or SPSS software (IBM Corp), with a significance level of .05.

RESULTS

We identified 24 MLB players with SLAP tears meeting our inclusion criteria from 2003 to 2010. The mean age at the time of injury (± SD) was 27.8 ± 4.73 years, and players had a mean 4.38 ± 3.68 years of playing experience in the MLB before surgery (Table 1). The overall RTP for our sample was 62.5% (15/24) (Table 1), and the mean remaining career length on RTP was 3.67 ± 1.91 years (Table 2).

Performance analysis of all pitchers showed that after successful RTP there was a statistically significant decrease in the innings pitched ($P = .004$); however, there were no significant changes in ERA or WHIP ($P = .450$ and

TABLE 2

Group Demographics of the Pitchers Who Returned to Play^a

Age at injury, y	28.3 ± 5.57 (22.7-33.9)
Years in MLB before surgery	4.87 ± 4.31 (0.56-9.18)
Years in MLB on RTP	3.67 ± 1.91 (1.76-5.58)
RTPP for cohort, %	86.7
RTP days on disabled list, mean	315

^aData are reported as mean ± SD (range) unless otherwise indicated. MLB, Major League Baseball; RTP, return to play; RTPP, return to prior performance.

TABLE 3

Mean Pre- and Postinjury Performances of All Injured Pitchers Returning to Play^a

Pitching Statistic	Preinjury	Postinjury	P Value
ERA	4.86	4.80	.450
WHIP	1.34	1.44	.109
IP	101.08	65.53	.004

^aThe only statically significant measure of performance was IP ($P = .011$). ERA, earned run average; IP, innings pitched; WHIP, walks plus hits per inning pitched.

.109, respectively) (Table 3). Overall, 54.2% (13/24) of pitchers in our sample achieved RTPP (Table 1). Examining only those 15 pitchers who achieved RTP, 86.7% (13/15) were able to RTPP (Table 2). The mean time spent on the disabled list for these 15 players was 315 days (Table 2).

DISCUSSION

Surgical treatment of SLAP lesions has a high level of satisfaction in the general population, with excellent outcomes based on validated outcome tools.⁸ These outcome tools such as the ASES score focus on activities of daily living in the general population. These scales, however, do not account for the intense physical demands that elite athletes place on their shoulders. Using a scale skewed toward relatively low levels of performance to evaluate an elite athlete's recovery has obvious drawbacks. It was therefore our aim to conduct a retrospective analysis on surgical treatment of SLAP lesions in MLB pitchers based on objective data on performance.

MLB pitchers were selected, and performance statistics before and after surgical treatment were used to determine the rate of RTP, the mean time interval needed to RTP, and ability to RTPP. We hypothesized that performance after surgical treatment of SLAP lesions for elite MLB pitchers would be significantly decreased compared with preinjury performance.

The results of this study help further the growing body of literature examining recovery in MLB pitchers undergoing shoulder surgery. The results demonstrated a 62.1% RTP for MLB pitchers who undergo surgical repair of SLAP lesions. The mean time interval needed for RTP was 315 days, which is similar to the value reported by Neuman

et al,¹³ who reported a mean RTP of 10.7 months for Olympic, professional, collegiate, and recreational pitchers. There is a significant chance that these pitchers will throw fewer innings after surgery. We found that if a player is able to RTP, they are likely to achieve RTPP. In this sample, 86.7% of players who were able to RTP achieved RTPP. However, of all players who had surgery, including those who were unable to RTP, only 54.2% were able to RTPP. Thus, overall, there were slightly more players able to RTPP in the MLB after a SLAP repair.

Interestingly, these results for RTPP for elite athletes differed only slightly compared with the 2 other published studies. While 54.2% of our sample achieved RTPP, a systematic review by Sayde et al¹⁴ reported a 63% return to preinjury level of play for overhead-throwing athletes, and Neri et al¹² reported a 57% RTPP. These differences may be due in part to the different methods of determining RTPP for the 3 studies. The systematic review examined articles that relied heavily on subjective measures such as the previously mentioned ASES score and the L'Insalata score. Similarly, the study by Neri et al¹² relied on the Kerlan Jobe Orthopaedic Clinic score as well as the ASES score. Neither of these studies incorporated sport-specific statistics, which may explain the differences in the RTPP values in this study.

The limitations of this study are related most directly to its retrospective nature, data collection methods, and sample size. The database did not include specific details about the surgical treatment of each injury such as the procedure performed, any attempted nonoperative treatments before surgery, or types of rehabilitation therapy undertaken. Despite these limitations, this study contributes meaningfully to a growing body of literature examining surgical repair of SLAP lesions in elite athletes.

Overall, this study highlights the importance of patient selection for surgical treatment of SLAP tears in elite MLB pitchers. We noted a high RTPP rate among athletes who did RTP (86.7%), which suggests a good prognosis for players who achieve RTP. This indicates the need for future research aimed at proper surgical selection of those who are most likely to RTP, as they have a strong chance of achieving RTPP. A study with a larger sample size would control for some of our confounding variables and perhaps allow better prediction of the best surgical candidates. The information provided by such a study would help surgeons better advise elite pitchers when discussing surgical treatment of SLAP tears. In the future, predicting who will be able to successfully RTP will greatly improve the outcomes of surgery in elite overhead-throwing athletes. We must continue to study this common pathology to identify characteristics of good surgical candidates. In doing so, we will not only limit unnecessary and unsuccessful surgeries, but we will also increase patient satisfaction and surgical outcomes in MLB pitchers.

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