[Orthopaedic Surgery]

The Use of an Orthopaedic Rating System in Major League Baseball

Patrick J. McGahan, MD,*† Jan Fronek, MD,† Heinz R. Hoenecke, Jr, MD,† and Daniel Keefe, MD†

Background: Although the majority of Major League Baseball teams use an orthopaedic rating system to evaluate draft picks, little has been published on the topic.

Hypothesis: Our goal was to assess the attitudes among Major League Baseball physicians regarding 3 common diagnoses in pitching prospects, through the use of an orthopaedic rating system. Our hypothesis was that the assigned orthopaedic grades would vary among physicians, diagnoses, and operative-versus-nonoperative and recent-versus-past treatment.

Study Design: Survey.

Level of Evidence: Level 4.

Methods: A survey in the form of 12 clinical vignettes was used to query Major League Baseball physicians regarding ulnar collateral ligament (UCL) injuries, type II superior labrum anterior posterior (SLAP) tears, and internal impingement. Respondents graded draft picks using an orthopaedic rating system. The vignettes covered both operative and nonoperative and recent and past treatment (successful return to pitching for 1 year).

Results: The orthopaedic grades assigned by respondents were as follows (minimal, moderate, severe risk): past UCL reconstruction (73%, 27%, 0%), recent UCL reconstruction (19%, 77%, 4%), past UCL strain (28%, 60%, 12%), recent UCL strain (0%, 48%, 52%), past SLAP repair (52%, 48%, 0%), recent SLAP repair (4%, 64%, 32%), past SLAP nonoperative (28%, 60%, 12%), recent SLAP nonoperative (0%, 36%, 64%), past internal impingement operative (24%, 68%, 8%), recent internal impingement operative (8%, 32%, 60%), past internal impingement nonoperative (24%, 68%, 8%), and recent internal impingement nonoperative (4%, 48%, 44%).

Conclusion: Team physicians are optimistic regarding the outcome of UCL reconstruction. In contrast, UCL strains, type II SLAP lesions, and internal impingement carry a guarded prognosis. For all diagnoses, regardless of treatment, the prognosis improved if a player returned to pitching for 1 full season.

Clinical Relevance: This study represents a first step toward developing a standardized orthopaedic rating system that will facilitate more accurate player assessment and clearer communication among physicians.

Keywords: rating; grading; draft; baseball; Major League Baseball

Major League Baseball (MLB) teams annually evaluate potential draft picks based on multiple parameters, one of which is past and present orthopaedic injury. Orthopaedic surgeons, acting in their capacity as team physicians, are intimately involved in this process. The result is that each team assigns an orthopaedic grade to a potential draft pick with the hope that it will predict the athlete's performance and longevity in the MLB. Unlike the National Football League (NFL), where this process occurs in a more organized fashion at the NFL combine¹ (with access to medical history, imaging studies, and orthopaedic examination), MLB team physicians are typically faced with assigning grades based on limited medical

records and without an orthopaedic examination. Despite these limitations, team physicians do their best to assign an orthopaedic grade based on all available data.

While this process is well known to those involved in professional sports, little has been published on the topic. In 2008, Brophy et al¹ demonstrated that the orthopaedic grade assigned at the NFL combine correlated with the probability of playing in the league. To the best of our knowledge, no similar study has been performed in the MLB. In our organization, each player is assigned an orthopaedic grade on a scale of 1 to 5 (Table 1), with 1 being a player with no orthopaedic injury and 5 indicating a "do not draft" recommendation.

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Table 1. Orthopaedic rating system for potential draft picks and current players

Grade	Risk	Explanation
1	Perfect candidate	No history of serious injury and minimal risk of future injury
2	Minimal risk	History of serious injury with minimal risk of reinjury
3	Moderate risk	History of serious injury with moderate risk of reinjury
4	High risk	History of serious injury with high risk of reinjury
5	Do not draft	History of serious injury with no clear orthopaedic solution

Grades are individually assigned by 3 orthopaedic surgeons and then averaged to give a final grade, which management then uses when considering potential draft picks. Although a process similar to this is used by the majority of MLB teams, no standardized rating system has been established, nor has a rating system been shown to be effective at accurately predicting player performance. Furthermore, even with respect to players with the same diagnoses, orthopaedic surgeons disagree as to which grade should be assigned. This should perhaps come as no surprise as the return-to-play rates reported in the literature vary greatly for several common diagnoses, especially among pitchers.^{3,5,9,11-13}

The goal of our study was to assess the prevailing attitudes among MLB team physicians regarding 3 common diagnoses in MLB pitchers: ulnar collateral ligament (UCL) injuries, type II superior labrum anterior posterior (SLAP) tears, and internal impingement associated with glenohumeral internal rotation deficit. The study also aimed to detect any difference in assigned orthopaedic grades on the basis of whether these conditions were treated operatively or nonoperatively. Finally, the study investigated how successful return to pitching for 1 full season influences the assigned grade. Our hypothesis was that the assigned orthopaedic grades would vary among MLB team physicians, which is consistent with the variable return-to-play rates for these conditions reported in the literature. In addition, we hypothesized that grades would be higher for prospects who successfully returned to pitching for 1 full season following injury.

Although formal orthopaedic rating systems are typically used by only professional organizations, the same thought process applies to both the “elite” and the “recreational” athlete. In fact, physicians, trainers, therapists, patients, athletes, and parents are all contemplating the same questions when faced with an injury: What is the injury, and what is the best treatment? What is the prognosis, and what is the chance of returning to the same level of play? How will this injury be perceived by coaches, trainers, scouts, organizations, universities, or fellow athletes? While this study focuses on

the approach to the elite overhead athlete, the same rationale applies to all clinicians in various practice settings.

METHODS

A brief survey was approved by our institutional review board and electronically sent to the head team physician of all MLB teams. The interpretation and application of the rating system was left to the discretion of the respondents. Participation in the survey was voluntary and extended to all team medical staff, including orthopaedic as well as nonorthopaedic physicians. Responses were collected electronically and analyzed with the aid of Microsoft Excel.

The survey consisted of 18 questions and took approximately 5 to 10 minutes to complete. Twelve questions pertained to the operative and nonoperative treatment of UCL injuries, type II SLAP tears, and internal impingement/glenohumeral internal rotation deficit in the form of clinical vignettes (Table 2). Those surveyed were asked to grade potential draft picks based on their diagnosis and an initial positive response to either operative or nonoperative treatment. In a follow-up question, respondents were asked to regrade players with the same diagnosis and treatment after successful return to pitching for 1 year. The goal of this question was to ascertain how assigned grades may change for the same diagnosis and treatment after successful return to pitching.

RESULTS

Of the 30 MLB teams surveyed, there were 26 respondents from 19 teams. Eighty-nine percent were orthopaedic surgeons, and 73% of those orthopaedic surgeons had been in practice over 10 years. Forty-six percent of those surveyed had been an MLB team physician for over 10 years. Eighty-one percent of respondents answered “yes” when asked if their team currently uses an orthopaedic rating scale. Ninety-two percent felt that orthopaedic rating systems are a valuable resource to MLB teams as they attempt to predict player performance and future risk of injury. When asked about the utility of the rating system

Table 2. Clinical vignettes and the assigned orthopaedic grades^a

1. 22-year-old collegiate pitcher underwent UCL reconstruction 2 years ago with a gracilis autograft and docking technique, without ulnar nerve transposition. He has now returned to his prior level of performance and pitched a full collegiate season without pain.	<table border="1"> <thead> <tr> <th>Grade</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>1</td><td>0.0%</td></tr> <tr><td>2</td><td>26.9%</td></tr> <tr><td>3</td><td>73.1%</td></tr> <tr><td>4</td><td>0.0%</td></tr> <tr><td>5</td><td>0.0%</td></tr> </tbody> </table>	Grade	Percentage	1	0.0%	2	26.9%	3	73.1%	4	0.0%	5	0.0%
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GIRD, glenohumeral internal rotation deficit; MRI, magnetic resonance imaging; SLAP, superior labrum anterior posterior; UCL, ulnar collateral ligament.

^aThe y-axis represents the assigned orthopaedic grade, and the bar graph represents the percentage of each grade.

used in the survey, 28% felt that it was “overly simplistic,” while 72% felt that the rating system was “just right.”

DISCUSSION

Despite the fact that 80.8% of respondents reported that they currently use an orthopaedic rating system and 92% felt that these systems were valuable to MLB teams, there is no published literature on their use in MLB. Brophy et al¹ reported on one team's use of an orthopaedic rating system at the NFL combine. They demonstrated that the orthopaedic grade positively correlated with the probability of playing in the league. However, unlike the NFL combine, where physicians have ready access to the potential draft pick's medical history, imaging studies, and orthopaedic examination, MLB physicians are typically faced with assigning grades based on limited medical records and without an orthopaedic examination. There is an inherent conflict in this process, with potential draft picks wanting to appear as healthy as possible while team physicians attempt to assign a grade based on past and present orthopaedic injury, as well as risk of future injury. Ideally, this grade is then used by management as the organization evaluates a player in light of both his talent and orthopaedic grade.

The results of this study reflect the relatively good prognosis for UCL reconstruction.⁴ When asked to rate a prospect who recently underwent a UCL reconstruction, 77% of respondents graded him a moderate risk (grade 3); however, after a successful return to pitching for 1 year, 73% graded him a minimal risk (grade 2). This is in contrast to team physicians' outlooks on UCL sprains. When asked to evaluate a prospect with a UCL sprain who had not yet returned to pitching, 52% of respondents graded him high risk (grade 4). Even after return to pitching for 1 year with a UCL sprain, the prospect was still graded as high risk by 12%. This risk assessment reflects the guarded prognosis for UCL sprains to the uncertain outcome of nonoperative management and the potential need for future reconstruction.^{12,13}

Although the diagnosis of type II SLAP tears has become increasingly common over the past 2 decades, the clinical significance of this finding remains uncertain. In fact, MRI of the shoulder in asymptomatic professional baseball players has been shown to reveal a high prevalence of labral abnormalities.⁸ Whether these findings are adaptive or pathologic remains a point of controversy. However, there does seem to be consensus that a clinically significant type II SLAP injury does exist and can be defined through a detailed history, physical examination, and appropriate imaging.^{2,6}

The results of this study reflect the guarded prognosis for type II SLAP injuries in overhead athletes.¹¹ When asked to grade a prospect who had recently undergone a SLAP repair, 32% of respondents graded him high risk. Even after successful return to pitching for 1 season, 48% of respondents still graded him moderate risk. With respect to the nonoperative management of type II SLAP lesions, respondents were even

less optimistic. When evaluating a prospect with the recent diagnosis of a type II SLAP lesion, 64% of those surveyed graded him high risk. Even after a successful return for 1 full season, 12% still considered him high risk. These findings underscore the difficulty in predicting the natural history of nonoperatively treated SLAP lesions, the possible need for future surgery, and the variable results of surgical intervention found in the literature.^{9,11}

Internal impingement is a pathologic condition characterized by the repetitive contact of the greater tuberosity with the posterior-superior glenoid with the arm in a position of abduction and external rotation.⁴ Although this condition can occur in athletes and nonathletes alike, it has become increasingly recognized as a source of morbidity in baseball players.¹⁰ Although the cause of internal impingement continues to be debated, the diagnosis can be made through a careful history, physical examination, and characteristic imaging findings.⁴

The results of this study demonstrate a guarded prognosis for internal impingement. When asked to evaluate a prospect that had recently undergone surgical treatment for internal impingement, 60% of respondents graded him as high risk. Even after the successful return to throwing for 1 full season, 68% of those surveyed classified him as moderate risk. Similarly, when asked to evaluate a player treated nonoperatively, 44% classified him as high risk. Even after a successful return to pitching for 1 full season, 68% graded him as a moderate risk. The results of this survey reflect the lack of evidence in the literature regarding internal impingement and the historically poor results with operative intervention.^{7,14} Furthermore, our current understanding of the condition is that of a chronic, overuse syndrome. The presence of such chronic findings in a young prospect may portend a poor prognosis.

The present study demonstrated that MLB team physicians are less optimistic regarding the natural history and surgical outcomes of type II SLAP tears and internal impingement as compared with UCL injuries in professional pitchers. This should perhaps come as no surprise, as the outcomes for UCL reconstruction are more predictable.³

In a consensus article borne out of the Disabled Throwing Shoulder Summit, Kibler et al⁶ urged surgeons to view SLAP lesions and internal impingement in light of the concept of “adaptive pathology.” To withstand the demands of competitive throwing, the shoulder adapts appropriately. This includes humeral and glenoid retroversion, chronic SLAP lesions, articular-sided partial-thickness rotator cuff tears, hyperexternal rotation, internal rotation deficits, and anterior laxity. Therefore, what may be considered pathologic in the nonthrowing shoulder may actually be adaptive in the thrower's shoulder and allow for the extremes of external rotation required for high-velocity throwing.

However, despite these adaptive changes, clinically significant injuries to the throwing shoulder do exist. The challenge for the clinician is first to decide when these adaptive changes have become pathologic and second to find a surgical or

nonsurgical solution that addresses the patient's pathology while respecting the adaptive changes of the shoulder. Unfortunately, in the case of type II SLAP tears and internal impingement, these solutions remain elusive.

The orthopaedic rating system used in this study (Table 1) is similar to that used by most MLB teams. The strength of this particular rating system is its simplicity, while its weakness is a lack of nuance. Twenty-eight percent of respondents felt that this system was "overly simplistic." For example, many teams like to accompany each grade with a plus/minus ($\pm$) to provide further detail. In addition, it would be helpful to differentiate present injuries that, if treated, carry a favorable prognosis (eg, UCL injury) versus present injuries that, even if addressed, carry a more guarded prognosis (eg, type II SLAP). Finally, incorporating a "talent rating" may be helpful.¹ Note that in this study, the interpretation and application of the rating system were left to the discretion of each physician. This was done to assess the attitudes among team physicians regarding various diagnoses. However, in clinical practice, it may be beneficial to provide guidelines to render the system more reliable among evaluators.

There are several limitations to this study. The first is the inherent weakness of a survey study. The clinical vignettes were meant to be representative of common scenarios facing MLB physicians but, nevertheless, cannot completely capture the subtleties of real-life situations. Second, our response rate (63%) was not ideal. A final limitation is a lack of statistical analysis, which is another inherent weakness of a survey study.

CONCLUSION

This study provides unique insight into the approach taken by MLB team physicians as they grade prospects based on the risk of past, present, and future orthopaedic injuries. Specifically, team physicians are relatively optimistic regarding the outcome of UCL reconstruction. In contrast, UCL strains, type II SLAP lesions, and internal impingement carry a much more guarded prognosis. With respect to operative versus nonoperative

treatment, team physicians believe that UCL injuries and type II SLAP tears respond better to operative as opposed to nonoperative intervention. For all 3 diagnoses, regardless of treatment, the prognosis improved significantly if a player was able to return to pitching for 1 full season following treatment.

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