

In Season Return to Play Issues for the Baseball Player



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KEYWORDS

- Baseball • Injury prevention • Return-to-play • Physical therapy • Workload management

KEY POINTS

- Managing in season injuries requires a collaborative effort from medical staff, coaches, and athletes for a safe return-to-play.
- Determining when the athletes can return-to-play safely requires close monitoring of the athlete's adherence to his rehabilitation protocol.
- Preparing the athletes for expected workload after returning from an injury is paramount to decrease risk of reinjury and additional missed time.

INTRODUCTION

Major League Baseball's (MLB's) regular season schedule has been widely regarded as one of the most physically demanding in all major sports.¹ Such a heavy burden of games present challenges for adequate physical preparation to avoid overuse or fatigue injuries during the season. This also places more importance on athlete monitoring and constant evaluation for any warning signs of injuries that can progress from missed games to season ending. Injuries in MLB from 1988 to 2015 were analyzed in a published study and found that a mean of 464 players annually are placed on the disabled list.² It was also shown that on a year-by-year basis, injuries and time spent on injured list increased.³

After a baseball player has suffered an injury during the season, it is crucial to follow a comprehensive rehabilitation program to ensure a safe return-to-play.⁴ The rehabilitation process should be tailored to the specific injury and guided by a sports medicine professional.⁵ This may include a combination of physical therapy, strength

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training, flexibility exercises, and sport-specific drills to address any imbalances and weaknesses that may have contributed to the injury.

In addition to rehabilitation, a structured conditioning program is essential for in-season return-to-play.⁶ This involves gradually increasing the player's cardiovascular and muscular endurance, as well as their overall physical readiness to return to the demands of baseball. The conditioning program should be progressive and carefully monitored to prevent re-injury and ensure the athlete is fully prepared to resume competitive play.

Overall, a collaborative approach between medical staff, athletic trainers, strength and conditioning coaches, and the player himself is vital in developing and implementing an effective rehabilitation and conditioning plan for in-season return-to-play.⁷ This will not only facilitate a safe return to the field but also reduce the risk of future injuries and optimize the player's performance.

This article will focus on several common shoulder and elbow injuries in professional baseball players that are likely to lead to lost playing time but when adequately treated do not have to be season ending and may allow the athlete to return during the season. Also, the challenges and considerations that arise when developing a rehabilitation and conditioning program for in-season return-to-play will be discussed.

ULNAR COLLATERAL LIGAMENT INJURIES

Ulnar collateral ligament (UCL) injuries are the sixth most common injury in Major and Minor League baseball and are the injuries that most likely end a player's season.^{1,2} Recently, there has been a significant increase in the number of UCL injuries and surgeries in professional baseball.^{2,3} Athletes who undergo UCL surgery spend significant time away from the sport because of the length of time it takes to adequately recover. However, depending on injury severity and early detection of injuries, non-operative management has shown promising results in terms of recovery and time to return-to-play.⁸

When a player sustains a suspected UCL injury, the first step is to assess the severity of the injury. This is typically done through physical examination and imaging tests such as MRI (\pm an arthrogram) or ultrasound. If the injury to the UCL is mild, such as a low-grade sprain or partial tear, conservative treatment can be initiated.^{8,9}

The non-operative rehabilitation protocol for UCL sprains typically consists of 3 to 4 phases.¹⁰ The first phase is the acute phase, which begins immediately after the injury occurs or is identified. During this phase, the focus is on reducing pain and inflammation. Rest, ice, compression, and elevation are typically used to manage pain and swelling. During this time, the athlete can be treated with NSAIDs and modalities such as cryotherapy or electrical stimulation. Bracing is rarely used except in cases of severe pain or instability. The goal of the initial rehabilitation phase is to control swelling, pain, improve range of motion, and to avoid any valgus stress. This initial treatment phase should also be complemented with shoulder strengthening exercises, scapular-based exercises, and core and lower extremity strengthening. However, care must be taken to protect the elbow while performing other body part exercises.^{10,11}

The second phase of the rehabilitation protocol is the subacute phase. This phase typically begins 2 to 3 weeks after the injury and its length depends on the athlete's progress. The focus during this phase is on restoring range of motion, strength, and flexibility. Players should work with trainers and therapists to perform exercises that target the flexor-pronator mass and supplementing with shoulder exercises, which have been demonstrated to help to avoid elbow injuries.^{10,12} These

exercises may include range-of-motion exercises, strengthening exercises, and stretching exercises.

The third phase of the rehabilitation protocol is the advanced phase. This phase typically begins once the athlete has regained full elbow range of motion, strength, and presents with no discomfort to elbow valgus maneuvers on examination. During this phase, the focus is on improving the player's functional abilities. Players may begin to perform more complex exercises, such as throwing drills and batting practice. The goal is to gradually increase the intensity of the exercises while ensuring that the player does not experience any pain or discomfort.

The final phase of the rehabilitation protocol is the return-to-play phase. During this phase, the focus is on preparing the player to return to the field. Players may participate in simulated games or scrimmages to test their abilities and ensure that they are ready to compete at a high level. It is important to expose the athlete to playing conditions including the workload they are expected to withstand when returning to play and monitoring their response.¹

If during the rehabilitation phases the athlete is not progressing as expected, another treatment modality that may be implemented is treatment with platelet-rich plasma (PRP).¹³ This can be used as part of initial treatment or if an athlete has a slower than expected recovery at around the 2-month mark. Combining PRP with established rehabilitation programs have been shown to promote healing of these UCL injuries and avoiding surgery.¹⁴⁻¹⁶ Although somewhat controversial, several studies have demonstrated good outcomes with PRP, and athletes have been able to return to play as soon as 12 weeks after injection.¹³⁻¹⁷

The time to return-to-play after a UCL sprain can vary depending on the severity of the injury, player position, and the effectiveness of the non-operative management as the authors have outlined earlier. In those less severe injury grades, athletes may be able to return to their sport within 8 to 16 weeks of initiating non-operative management and having completed their established rehabilitation protocol.¹⁸ However, it is important to note that each athlete's recovery timeline is unique, and some individuals may require a longer period of rehabilitation before they can safely return to play to avoid injury recurrence or injury progression requiring ending the season for the athlete.

ROTATOR CUFF STRAINS

With regards to anatomic location, the shoulder has been regarded as most prone to injury in baseball athletes.¹⁹ Of those injuries in the shoulder, rotator cuff strains are most frequently diagnosed in both batters and pitchers.²⁰ Pitchers are at highest risk for rotator cuff strains because of their inherent position demands with repetitive overhead throws at a high velocity. Positional players are also at risk for rotator cuff strains because of the occasional hard throws during games and the associated risks of batting.

When a baseball player is identified to have shoulder discomfort, prompt evaluation is necessary to diagnose and treat the condition. Injuries to the rotator cuff can result from acute trauma to the shoulder, from fatigue because of overuse or associated to the microtrauma of repetitive throwing.²¹ Symptoms of rotator cuff strains include pain and weakness in the shoulder, may present with difficulty lifting the arm, and a clicking or popping sensation when moving the arm. Initial imaging evaluation should include plain radiographs to rule out any associated bony injury, as well as evaluate glenohumeral stability. MRI (\pm an arthrogram) should be the next step to properly evaluate the shoulder for evaluation and assessment of the integrity of the rotator cuff, labrum, and articular cartilage.

Initial treatment for overhead athletes with rotator cuff injuries will consist of rest from aggravating activities and implementation of a comprehensive rehabilitation and conditioning program. There have been many shoulder rehabilitation programs designed for the throwing athlete with many of them consisting of the same principles to be applied to athletes with rotator cuff injury.^{22,23} Most of them are evidence-based rehabilitation programs divided in 4 phases. Initial phase of rehabilitation after rotator cuff injury starts with rest from throwing or the aggravating activity, reducing pain, inflammation, and restoration of normal range-of-motion. Overhead athletes with shoulder pathology usually present with alterations in total arc of motion between their throwing arm and non-dominant arm, which predisposes them to risk of shoulder injuries.

To improve pain and inflammation, different treatment modalities can be included as part of this initial rehabilitation phase including NSAIDs, corticosteroid injections, ice, laser, electrical stimulation, dry needling, massage, and manual therapies. This is a key part of the rehabilitation phase because it has been demonstrated in prior studies that a painful shoulder in an athlete will show decreased muscle activation with a reduction in rotational force production in the shoulder.²⁴ Thus, early pain and inflammation treatment will allow the athlete to regain their range-of-motion after injury, as well as allow them to progress to other phases of treatment.

Baseball players with injuries to the rotator cuff that are identified to have glenohumeral internal rotation deficits (GIRD) should be treated with posterior capsular stretching exercises as part of this initial phase.²⁵ It has been shown that 90% of throwers with GIRD respond favorably to stretching programs that include sleeper stretches or modified cross-body stretches.^{26,27} Once the athlete has demonstrated full range of motion compared with prior injury levels with adequate control of pain and inflammation of the affected shoulder, they can be progressed to the next phase.

The second phase should implement a progressive strengthening program that focuses on rotator cuff strengthening while also addressing the periscapular musculature. Throwers recovering from shoulder injuries are at risk of developing abnormal scapular kinematics and it is important to identify and evaluate scapular positioning in these athletes so this can also be addressed, if needed in this phase.²¹ Both open and closed kinetic chain exercises can be employed as part of the progressive strengthening program in these athletes. Different exercise modalities can be used to accomplish these strengthening goals. Recently there has been an increasing trend in blood flow restriction (BFR) training usage among baseball players because of its benefit of increasing muscle mass and strength, while allowing the injured area to heal.²⁸ For baseball players recovering from shoulder injuries, BFR training offers several benefits. Studies have found that BFR can provide benefit in gaining shoulder strength and range-of-motion. This is because BFR training allows for increased muscle activation and metabolic stress, even when using lighter weights.^{29,30}

Once the athlete has regained their strength to similar levels before injury, they can begin baseball-specific activities in addition to continued advanced strengthening and conditioning. Drills in this phase should consider the individuals position, exposing them to the specific demands they will encounter upon returning to play.¹ A throwing program can be implemented at this stage with importance of monitoring quantity of throws, distance, and intensity. Decision making on allowing an athlete to return to play will be undertaken after the athlete enters the final stage of rehabilitation, which will include again simulating real game conditions and evaluating how the athlete responds to the physical demands they will be exposed to.

Clearance for the athlete to return to play should be made collaboratively as a team including physician, training staff and the athlete. When the athlete demonstrates physical examination findings similar to prior injury status, including full range of motion, power, and muscular endurance, the decision can be made to be allowed to play with a gradual return in activity.³¹ On average it has been estimated that return-to-play after rotator cuff strain injuries may take a mean of 26.7 days but this will differ depending if it is a pitcher or position player.³ Once the athlete has returned to play it is imperative to monitor symptoms to avoid repeat injury because there is a high chance of recurrent injury.

SHOULDER SUBLUXATION OR DISLOCATION

Shoulder instability is a concern among professional baseball players including pitchers and position players. The repetitive overhead throwing motion puts significant stress on the shoulder joint for the pitcher and for the position player, the biomechanics of batting accompanied with acute trauma that can occur while sliding or diving puts their shoulders at risk as well.²⁷ Shoulder subluxation can be particularly debilitating and can potentially sideline players for a significant portion of the season. Camp and colleagues published in their study analyzing days missed from specific baseball injuries that between 2011 and 2016 there were 359 injuries diagnosed as shoulder instability.² The mean days missed per injury were 113 days, but this average considered combining season ending and non-season ending injuries. Marigi and colleagues demonstrated in their study that athletes with anterior instability missed an average of 52 days after injury when compared with those that had posterior instability who missed an average of 32 days.²⁰ However, with proper diagnosis, treatment, and rehabilitation, professional baseball players can make a successful return from shoulder subluxation within the same season.

Prompt and accurate diagnosis is crucial for the effective management of shoulder subluxation in professional baseball players.^{32,33} A thorough physical examination, including range-of-motion tests and specific provocative maneuvers to assess shoulder stability should be performed. Diagnostic imaging with radiographs and or MRI should be taken to rule out any additional injuries that might require surgery.

Like prior rehabilitation protocols mentioned in this article, phase 1 of rehabilitation for shoulder instability should be reestablishing full motion of the injured shoulder, allowing capsular healing, and decreasing pain and inflammation. During this phase NSAIDs, cryotherapy, electrical stimulation can be used to achieve the goals for this phase. When the athlete has achieved full motion of the shoulder with improvements in stability, progression to phase 2 can begin. The goals for this phase are to achieve dynamic stability of the shoulder, increasing strength in rotator cuff musculature, as well as periscapular muscles, and maintaining full motion.³⁴ Once the athlete has achieved adequate neuromuscular control with full range of motion of the shoulder, evaluation should be performed to assess if the athlete has regained strength levels to preinjury status.

When this is achieved, the athlete can progress to phase 3 introducing sport-specific drills, gradually reintroducing throwing motions and gradually increasing the intensity and volume of practice. It is vital to monitor the player's progress closely, ensuring that they are pain-free and demonstrating good shoulder stability before clearing them for phase 4, which would be the introduction of simulation games and conditions the athlete would expect while returning to play. Again, with shoulder instability the recovery timeline is unique for each athlete. Another important factor to consider is player position, as pitchers may require more time out from sport because

of the repetitive nature and stresses associated to throwing and position players may be weaned back into play a lot faster.

OTHER SHOULDER AND ELBOW INJURIES

The above-mentioned injuries are some that usually when encountered during the season will make the athlete miss significant time. However, there are other common upper extremity injuries that may be encountered that athletes may or may not miss time because of them. The second most common injury encountered in the shoulder is long head of the biceps tendinitis (LHBT).³ This injury depending on the position of the player that it occurs in may be treated like the rehabilitation protocol described before for rotator cuff strains or with pain management and monitoring the athlete's activity. If a pitcher is diagnosed with biceps tendinitis in his throwing shoulder and there is noticeable loss of effectiveness and changes in his pitching motion, it would be better to shut that pitcher down from throwing to avoid progression of injury to something more serious because of changes in his kinematics. Mean days missed for LHBT has been reported as between 17.2 to 22.6.^{3,20} It would be reasonable to plan for a return-to-play rehabilitation protocol to have the athlete back in 4 weeks with adequate completion of the program.

The third most common injury encountered in professional baseball is shoulder impingement or bursitis.^{3,20} Similar to LHBT injuries in professional baseball players this may present in a similar fashion and most of the time requires the same treatment of non-operative rehabilitation protocol as outlined before for rotator cuff strains and LHBT. Mean days missed for shoulder impingement has been reported as 24.4 to 26.1.^{3,20} Like LHBT, this is more of an inflammatory presentation on these athletes and pain management treatment modalities such as NSAIDs or judicious use of corticosteroids injections may be considered to get the athlete back to play or to better tolerate their rehabilitation protocol. If an athlete receives a corticosteroid injection to their shoulder, it is generally recommended to have them rest 1 or 2 days from aggravating activity.³⁵

With regards to the elbow, the second most common encountered injury after UCL is flexor-pronator strains.^{36,37} Similar to prior mentioned rehabilitation programs for UCL injuries treated nonoperatively, the initial treatment from a diagnosed flexor-pronator strain is rest from throwing or aggravating activity, maintenance, or restoration of full range of motion. Different treatment modalities can be used as mentioned before in this article, but it is also important to evaluate and address any changes in throwing kinematics in the athlete as there is an increased risk of shoulder injury after diagnosis of a flexor-pronator strain.^{36,37} Therefore dedicated time should be spent on the athlete to complete an adequate rehabilitation protocol with goals of obtaining full range of motion with a pain-free return to throwing. Players diagnosed with flexor-pronator strains are at higher risk of UCL injury when compared with those with no history of flexor-pronator strains. The median time spent on the disabled list ranges from 42 days up to a mean of 117 in some cases.^{3,37}

Other elbow injuries seen in baseball players are distal biceps or triceps tendinopathy, medial epicondylitis, and ulnar neuritis.^{3,37} Like prior elbow injuries discussed and with the aim of having the player return-to-play during the same season, and adequate trial of rest from throwing and pain management should be the initial steps. Most elbow injuries may alter the kinematics of throwing therefore evaluating shoulder and scapular motion is paramount for rehabilitation. Restoration of full pain-free elbow range-of-motion is important to progress through rehab phases. Ulnar neuritis treatment in the overhead athlete can be complimented with the use of a night splint for about 6 weeks for symptom relief.^{38,39} The above-mentioned elbow injuries may

take from 4 to 6 weeks with an adequate rehabilitation protocol for the athlete to return pain free. Being pain-free is important to clear the athlete to return-to-play to avoid risk of reinjury or a new injury.

DISCUSSION

Dealing with in-season injuries in professional baseball players can be a challenging task. Injuries are a common occurrence in sports, especially in baseball, where players are required to play long and grueling seasons. The key to success in dealing with in-season injuries is to have a well-planned strategy that can get the player back on the field as soon as possible, without risking further injury.⁷ In order to have a well-planned strategy, a collaborative team effort has to take place between the medical staff, athletic trainers, coaches, and players.

As medical staff to professional athletes, building a positive and trusting relationship with professional athletes is essential in managing injuries and facilitating a safe return-to-play.⁴⁰ The bond between medical staff and athletes can provide a foundation for successful injury prevention and rehabilitation programs, leading to improved health outcomes and a better overall team performance. It is imperative that medical staff establish open lines of communication with their athletes to gain a better understanding of their needs and concerns. This can help providers identify potential problems early on and develop strategies to prevent injuries from occurring. Additionally, open communication can ensure that athletes are receiving appropriate care and treatment when injuries do occur.

Getting the athlete to return-to-play during the same season will depend on the severity of the injury. Yes, there are substantial costs that have been demonstrated in having elite athletes miss games because of injuries but not properly assessing injury severity and rushing the athlete back to play before an adequate rehabilitation protocol has taken place may increase those costs to double the amounts.² Another factor to consider is that the treatment plan for each injury will vary depending on the individual player's needs. For instance, a pitcher with a shoulder injury may require a different treatment plan than an outfielder with a shoulder injury. Physical demands among each player's position should be considered when developing a treatment strategy for rehabilitation and return-to-play.¹

Data analytics which are readily available in all major sports is an essential tool to be used to track athlete's workload during the season.⁴¹ These data can be used to identify injury trends and patterns which can then help identify which players are at risk of injury or overuse. Another component of data analytics of workload in professional athletes is that after recovering from an injury, this information can be utilized to adequately expose the player to the expected workload conditions and monitor their response to see if they are ready to return to play.⁴² Communicating this information to the coaching and training staff will enable the players to get the right amount of rest and playing time without putting them at risk of injury.

Once the athlete has successfully completed their respective rehabilitation and return-to-play program, close monitoring of any decline in their performance after returning is ideal. Recovering from injury and having them return is crucial for the team, but having the athlete remain healthy for the remaining challenges they will face during the season is even more important.

SUMMARY

Managing in season injuries in professional athletes can be difficult but a well-planned strategy and collaborative team effort from medical staff, trainers, and coaches can

simplify things. Player health and longevity should be the priority in developing their treatment plan and rehabilitation. Establishing goals and expectations with athletes after an injury can help with their adherence to rehabilitation protocols. The decision to clear the athlete to return-to-play should be based on their progression to their established rehabilitation protocol and their response to the expected workload they will encounter once back to play.

CLINICS CARE POINTS

- Detecting injuries and treating them promptly with a collaborative effort may lessen time out from sport for baseball athletes.
- Managing workload demands for an athlete to return to play is equally important as the rehabilitation program to return to sport.
- The decision to return the athlete to play during the same season should be when the athlete is fully healthy with low risk of reinjury.

DISCLOSURE

The authors have nothing to disclose.

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