

Doc, When Can He Go Back in the Game?

Mark D. Miller, MD
*Robert A. Arciero, MD
Daniel E. Cooper, MD
Darren L. Johnson, MD
Thomas M. Best, MD, PhD

Abstract

In the injured athlete, several criteria must be considered before return to play. There are separate considerations for knee injuries, shoulder injuries, and general upper and lower extremity injuries, as well as concussion, hypertrophic cardiomyopathy, mononucleosis, and spondylolysis. It is important that surgical indications, postoperative rehabilitation, and risk for reinjury are reviewed by the surgeon before the athlete is allowed to resume activity.

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There is very little written in the current literature regarding return-to-play criteria for various sports medicine injuries and illnesses. Most often, these decisions are based on empirical guidelines and the experience of team physicians and athletic trainers.

Knee Injuries

Meniscal Tear

Meniscal tears can be caused by trauma or result from age-related degeneration. In athletes, meniscal tears most commonly are caused by a twisting injury on a flexed knee. Symptoms usually are readily apparent and include focal pain, swelling,

and occasionally a mechanical catch or giving way of the knee. Tears are most common in the white-white zone (central third) of the meniscus, and healing potential is limited; these tears are best treated with a partial meniscectomy. Very peripheral tears (in the red-red zone of the meniscus) usually are associated with anterior cruciate ligament (ACL) tears and are best repaired if surgery is done early. Vertical mattress sutures remain the gold standard technique, although many all-inside devices are now available that have produced results similar to those of inside-out or outside-in techniques.¹

After a partial meniscectomy, return to play is allowed when the athlete is pain free, effusion has resolved, and quadriceps function has returned (typically 2 to 3 weeks after surgery).² If a meniscal repair is done, return to sports participation is delayed. These patients typically are kept at 50% weight bearing for 6 weeks, can return to straight-ahead running at 3 to 4 months, and can return to high-impact and contact sports (including soccer) 6 months after surgery. It is critical to discuss these details with the patient ahead of time. The dilemma regarding the appropriate treatment option for meniscal tears that occur pre-season and midseason can be difficult, but the long-term best interests of the patient must be the primary consideration.

Medial Collateral Ligament Injury

Medial collateral ligament (MCL) injuries are common in collision sports. This injury results from a valgus load to the knee, most commonly caused by a direct hit to the lateral side of the knee. Grading is

*Robert A. Arciero, MD or the department with which he is affiliated has received research or institutional support from Arthrex.

Table 1
MCL Injury Types and Treatment

Grade	Ligament Damage	Signs/Symptoms	Instability
I	Stretched, some fibers torn	Minor pain and stiffness	Minimal or no instability; < 5 mm on valgus testing (1+)
II	Considerable tearing of fibers but not complete tear	Major pain and tenderness at inside of knee, sometimes swelling	Some instability, especially when cutting or pivoting; 5 to 10 mm on valgus testing (2+)
III	Complete tear	Considerable pain and tenderness, some swelling, some times difficulty bending the knee	Marked instability; giving way > 10 mm on valgus testing (3+)

based on the amount of medial joint opening with valgus stress (grade I, 0 to 5 mm; grade II, 5 to 10 mm; and grade III, \geq 10 mm). The hallmarks of this condition include medial pain, presence or absence of a pop at time of injury, and laxity on valgus stress testing. The diagnosis can be confirmed by MRI, which also is useful to rule out other associated ligament and meniscal injury. The grading of MCL injuries is outlined in Table 1.

Treatment for grade I and II injuries involves bracing (low-profile hinged brace) and return to play based on symptoms and performance (sometimes even in the same game).³ Treatment for grade III, or complete, MCL injuries is more prolonged. In general, a long-hinged brace is used full time for 6 to 8 weeks.⁴ Some authors recommend bracing with restricted range of motion in the brace at 4 weeks.

The athlete with a grade III MCL tear generally can return to play approximately 5 to 6 weeks after injury. There are wide variations in the literature, with some reports showing return as early as 3 weeks and others reporting return closer to 10 weeks.

Anterior Cruciate Ligament Injury

An ACL injury most often is a non-contact injury. It commonly is asso-

ciated with meniscal pathology as well as osteochondral and articular cartilage injury. Although few sports may allow an athlete to return to play with an “isolated” ACL injury caused by a hyperextension mechanism, most patients require ACL reconstruction within 1 month of acute injury with concomitant treatment of meniscal and articular cartilage pathology.

Return-to-play criteria after an ACL injury often are sport dependent.⁵ The athlete must have no signs of an inflamed knee and less than a 10% to 15% deficit on functional evaluation testing before sport-specific training is begun. Most patients require at least 6 months and often up to 12 months to complete this process.⁶ After ACL reconstruction, athletic performance remains decreased in the first return season, with a return to normal performance levels in the second return season. Attempts by high-performance athletes to return to play with an ACL-deficient knee usually are unsuccessful.

Posterior Cruciate Ligament Injury

Posterior cruciate ligament (PCL) injuries in sports usually are caused by a direct blow to a flexed knee. The diagnosis is made by the presence of a knee effusion, positive

drawer testing, and occasionally stress radiographs or MRI. Treatment is based on the degree of injury, with grades I and II isolated PCL tears treated nonsurgically with quadriceps strengthening and bracing. Grade III tears, combined ligamentous injuries, or grade II tears that fail to respond to adequate conservative care often require surgical reconstruction of the ligament.

If nonsurgical treatment is indicated, return to play is allowed when the effusion resolves, quadriceps and hamstring strength reach 85% of the unaffected leg, and the athlete is able to perform sport-specific drills including running and cutting without pain or instability.^{7,8} Surgical reconstruction usually requires 6 months of postoperative rehabilitation before return to play is allowed.

Shoulder Injuries

Acromioclavicular Joint Injury

Acromioclavicular (AC) joint injuries commonly occur in athletes as a result of a direct fall on the “point” of the shoulder and are characterized by acute onset of pain localized to the AC joint and often an associated deformity. Treatment is based on the degree of severity of the injury of the affected side.⁹ The types of injury and treatment are outlined in Table 2.

Return to play after type I and II AC separations depends on the amount of time required for the return of pain-free shoulder range of motion. Although somewhat controversial, pregame injections of a local anesthetic are commonly performed in competitive athletes and are associated with very little morbidity. Return-to-play decisions for athletes with type III injuries must be individualized.¹⁰ Type IV AC separations can undergo closed re-

Table 2
Acromioclavicular (AC) Joint Injury Types and Treatment

Injury Type	Treatment
Type I, AC sprain	Nonsurgical
Type II, AC tear, coracoclavicular (CC) intact	Nonsurgical
Type III, AC and CC torn, up to 100% displacement	Controversial; depends on degree of symptoms and impairment
Type IV, AC and CC torn, clavicle displaced posteriorly on axillary view	Surgical*
Type V, AC and CC torn, over 100% displacement	Surgical
Type VI, AC and CC torn, clavicle inferiorly displaced	Surgical

*With a closed reduction technique under anesthesia, it may be possible to convert a type IV AC separation into a type III injury.

duction and can be treated nonsurgically.¹¹ If surgical reconstruction is required, immobilization of the shoulder usually is necessary for the first 6 weeks, with gradual return of motion and strength. Contact and collision sports are avoided until 6 months after the procedure.

Anterior Shoulder Dislocation

Acute anterior shoulder dislocations are common in the athletic population¹² but can prove to be challenging in terms of return to play issues in an “in-season” athlete.¹³ Initial treatment can be conservative, but this condition is associated with a high recurrence rate in young patients and those participating in collision sports. Stabilization procedures often are required either during the season or after the season is over, depending on the individual athlete and the degree of limitation. Some athletes may be able to get through the season with a brace that limits abduction and external rotation, but this is not possible for skilled positions in football. Acute Bankart repair may be necessary if the athlete is unable to return to his or her preinjury level of participation and is a means of restoring anatomy and function with predictable improved outcomes.¹⁴

The decision to proceed with a Bankart repair represents a season-ending injury. Most surgeons now advocate arthroscopic repair, even in collision athletes. Return to full participation in collision sports is delayed until at least 4 to 6 months after Bankart repair. The shoulder is immobilized in a sling for the first 5 to 6 postoperative weeks, with progression of passive and active motion after the sling is discontinued. Typically, external rotation is limited for at least the first 8 weeks after surgery and then slowly advanced along with rotator cuff strengthening exercises.

Clavicle Fracture

Clavicle fractures often are caused by direct trauma. Traditionally, these fractures have been treated conservatively unless they are severely displaced or shortened or cause significant tenting of the skin. More recently, several studies have advocated more aggressive surgical fixation of clavicle fractures, especially in the athletic population, in whom earlier healing leads to earlier return to play.¹⁵

As with other fractures, return to play typically is allowed when the athlete can exhibit full pain-free range of motion and the fracture is united on radiographs. Whether

fractures recur after the athlete who has had nonsurgical or surgical treatment and returns to play is a topic of debate.

Superior Labral Anterior to Posterior Tear

Superior labral lesions may occur in isolation from a contact mechanism or be part of a continuum in association with shoulder instability lesions in the glenohumeral joint in throwing or nonthrowing athletes. Isolated and combined lesions are often fixed arthroscopically with suture anchors.

Return to play often is customized to the specific athlete based on sport-specific factors and arm dominance.¹⁶ A throwing athlete with isolated lesions in the nondominant arm may be allowed to return to play in 3 to 4 months, whereas an overhead throwing athlete who has a complex tear with associated anterior labral pathology with shoulder instability may not be allowed to return to play for up to 9 months.¹⁷ Criteria include careful examination of capsular mobility compared with the nonsurgical shoulder, with the arm adducted and in 90° of abduction. Strength training must include core muscles, as well as scapular strength and kinematics. Athletes must have normal glenohumeral and scapular kinematics before returning to play.

Lower Extremity Injuries

Thigh Contusion/ Myositis Ossificans

Severe thigh contusions can cause anterior compartment hematomas that calcify, resulting in myositis ossificans. The initial treatment of these injuries includes immobilization in flexion. Return to play too early, while a bone scan of the lesion is still “hot,” may be career ending

because of permanent loss of motion. Once the lesion has been confirmed by examination and radiographs, return to play is only allowed once pain is gone and range of motion has returned to normal.¹⁸

Return to play is guided by degree of pain, thigh circumference measurements, radiographs, and functional testing of lower extremity musculature. Return to play too early can be catastrophic with respect to the development of severe myositis that restricts lower extremity function and therefore athlete performance.¹⁹

Hamstring Strain

Hamstring strains are common in athletes, and the severity of the injury is the primary determining factor in treatment and return to play. If the distal and proximal attachments are intact and the injury is in the muscle belly itself, treatment is conservative with rest, modalities, restoration of strength, functional rehabilitation, and occasionally corticosteroid injection.²⁰ Surgery is not indicated for a midsubstance hamstring injury.

Return-to-play considerations revolve around pain, strength, position-specific functional capacity in sports, and the risk of recurrent injury. Because the risk of reinjury is real, and second-time hamstring strains tend to be worse than the initial injury, ongoing rehabilitation is recommended even after the athlete has returned to play. Corticosteroid injections have been shown to speed recovery after focal hamstring muscle belly injuries without significantly affecting reinjury rates. Some evidence exists that these corticosteroid injections might reduce reinjury rates.

Anterior Cortical Stress Fracture of the Tibia

Anterior cortical stress fractures (“dreaded black line”) of the tibia are

a progression of the more common stress fracture seen in runners or athletes involved in repetitive jumping sports. Once this fracture progresses, it can be seen on plain radiographs. Nonsurgical treatment consists of rest, pneumatic bracing, and bone stimulation; these fractures can take 6 to 9 months to heal. Intramedullary nailing is an alternative treatment that can be done acutely or after 6 months of unsuccessful nonsurgical treatment.^{21,22}

There is no consensus on when the athlete can return to play after this injury. Even with early intramedullary nailing, return to play should be restricted until symptoms have completely resolved and bone union is confirmed on radiographs.^{23,24}

Jones Fracture

A fifth metatarsal fracture, or Jones fracture, may be caused by trauma or stress-related changes in the base of the fifth metatarsal and is defined as a fracture that occurs at the proximal metaphyseal/diaphyseal junction of the fifth metatarsal bone. Although not common in athletes, a Jones fracture can be problematic in this particular population, with high rates of delayed union or nonunion and even refracture after surgical fixation. Most authors now recommend early surgical fixation of the fracture with a large screw of at least 4.5 mm in high-performance athletes.^{21,22}

When to return an athlete to sports participation after either nonsurgical or surgical treatment of a Jones fracture has been a controversial topic. Although some reports show early return to play after surgical fixation (as early as 10 days), most agree that return to play should be delayed until there is radiographic evidence of healing, which typically is not until 8 weeks after the procedure.^{23,24}

Upper Extremity Injuries

Elbow Dislocation

Elbow dislocations, although uncommon, occur as a result of direct trauma to the upper extremity during collision sports. Posterolateral dislocations occur in approximately 80% of elbow dislocations. Treatment involves closed reduction with splinting at 90° for 7 to 10 days if the elbow is stable after reduction.²⁵ Unstable reductions may require an additional period of splinting for up to 3 weeks. Concurrent injury such as radial head and neck fracture are relatively common and should be evaluated with radiographs both before and after reduction, if possible.²⁶

Return-to-play considerations for athletes with an elbow dislocation will vary depending on the degree of instability after reduction. This dislocation pattern typically involves complete disruption of the ulnar collateral ligament, which may require surgical repair in patients with persistent instability. Bracing usually is helpful and may speed return to play if surgery is not immediately indicated.

Scaphoid Fracture

Scaphoid fractures are the most common carpal bone fracture and should be suspected any time an athlete falls on an outstretched hand.²⁷ Snuffbox tenderness is the characteristic physical finding. These fractures usually can be seen on plain radiographs, although repeat films should be taken if pain persists 1 week after the injury if the original radiographs were negative.²⁸ Nonsurgical treatment consists of thumb spica casting for 4 to 6 weeks, but complete healing of the fracture and therefore return to play can take 3 to 4 months. Because the vascular anatomy of this bone leads to a high rate of nonunion, early fixation with screws has been advo-

cated, possibly leading to early return to play (as soon as 10 to 14 days after treatment).²⁹ These athletes should wear a protective splint or padded thumb spica cast.

Ulnar Collateral Ligament Injury of the Thumb Metacarpal (Skier's or Gamekeeper's Thumb)

This injury often occurs in athletes participating in ball-handling and contact sports. Acute partial tears, although rare, are managed with a hand-based thumb spica splint or a cast for 4 weeks; this often allows the athlete to return to play while protecting the thumb from additional injury.

Because the ulnar collateral ligament plays a significant role in the athlete's ability to provide pinch grip, and because the results of nonsurgical management are unpredictable, anatomic repair is generally required for complete disruption of the ulnar collateral ligament in a competitive athlete.³⁰ The adductor aponeurosis often will be interposed between the two ends of the torn ligament (Stener lesion); this scenario usually mandates surgical repair.

Once repair or reconstruction is done, protected immobilization is mandatory for 6 weeks. Depending on the specific sport, protection may be required for a full 3 months. Return to play depends entirely on the sport and the requirements of the hand. Orthotic modifications can be made for most athletes to facilitate early return to sports participation.

Jersey Finger

Jersey finger is an avulsion of the flexor digitorum profundus tendon from its insertion at the base of the proximal interphalangeal joint. This injury is so named because the mechanism involves forced exten-

sion of the finger, as occurs when the finger gets caught in the jersey of an opposing player.³¹ Because the tendon tends to retract, treatment involves retrieval and reattachment of the tendon.

Because most patients with jersey finger require surgery, return to play is usually limited for 3 months after the surgery. Surgery can be delayed if the ruptured tendon end stays distal, because the blood supply remains intact. The athlete may be able to return to certain drills and conditioning before that time if the finger is properly protected. "Unskilled" position players may be able to return to play in a well-padded cast (club) within 2 weeks of surgery.

Medical Conditions

Infectious Mononucleosis

Infectious mononucleosis is an acute, self-limited disorder diagnosed by clinical and hematologic measures. Current consensus (level IV evidence) supports that athletes be afebrile, well hydrated, and asymptomatic with no palpable liver or spleen enlargement before safe return to sports participation. These conditions for return to play do not guarantee that the spleen has returned to normal size and function or that the risk of spleen rupture has returned to baseline. The rate of splenic rupture is said to be 1 in 1,000 in individuals with mononucleosis; however, the reported number of cases suggests that the true incidence is much lower. Most splenic ruptures occur during the first 3 weeks of illness, and very few occur beyond weeks 4 to 5. Physical examination is too insensitive to reliably detect the enlarged at-risk spleen, hence the more recent reliance on ultrasound to document spleen size.³² Limitations of this approach include the variable size of a

normal spleen and the lack of a baseline, preillness ultrasound. Additional studies are required to support the routine use of ultrasound and for decisions regarding return to play. It is likely that a single ultrasound is of limited value, and it is recommended that clinical judgment should prevail. Nonsurgical treatment guidelines suggest a 3-week period of rest after diagnosis and a 4-week gradual return to full activity if there is no splenomegaly. Others suggest that if spleen size is normal, the athlete can return to play in 3 to 5 weeks after the onset of illness, beginning with 1 week of gradual activity.³³ The risk for splenic rupture should be carefully discussed with the athlete before return to play.

Hypertrophic Cardiomyopathy

Hypertrophic cardiomyopathy (HCM) is a disorder of the cardiac muscle with an estimated prevalence in the general population of 1 in 500. Left ventricular hypertrophy involving the septum is the predominant type of hypertrophy. In general, wall thickness of more than 13 mm is uncommon in highly trained athletes. Left ventricular wall thickness can vary from mild (13 to 15 mm; normal, < 12 mm) to massively increased, including the most substantial hypertrophy observed in any cardiac disease (> 30 mm). It may be difficult to distinguish mild HCM from normal left ventricular hypertrophy in a highly trained athlete.

Despite the relatively benign course for most patients with HCM, this disease continues to be the most common cause of sudden death in athletes younger than 30 years. Because sudden death results primarily from ventricular arrhythmias, implantable cardiac defibrillators are effective in preventing sudden death in

patients with HCM. The Bethesda Guidelines on sports participation are currently being revised. According to these guidelines, the risk of competing athletically with an implantable cardiac defibrillator is unacceptably high.³⁴ Individuals with an implantable cardiac defibrillator should refrain from sports more strenuous than bowling and golf, even though participation in these sports has not been proved safe and despite underlying structural heart disease. These guidelines are based on expert opinions, as data on this population are limited and generally speculative.

Concussion

Recent statistics suggest that approximately 300,000 sports-related traumatic brain injuries occur annually in the United States. Soccer, rugby, football, and ice hockey all are sports considered to place participants at high risk for a concussion. Return-to-play decisions are some of the most difficult tasks for physicians caring for athletes with a concussion. Over the past decade, a tremendous amount of sport-specific research has improved understanding of mild traumatic brain injury, and there is significant variability in the evaluation and management of this condition. The advent of neuropsychologic testing for a concussive injury has improved the assessment of cognitive dysfunction that occurs in the absence of structural brain abnormalities. The severity of injury is determined by the nature, burden, and duration of the symptoms. Athletes must be asymptomatic and have a normal neurologic and cognitive evaluation before return to play. The return-to-play decision should be individualized to each athlete; several factors, including age, injury severity, and history of prior mild traumatic brain injury, are involved.³⁵ Func-

tional MRI represents an important evolving technology for the understanding of brain recovery after concussion and may help shape return-to-play guidelines in the future.³⁶

Spondylolysis/Spondylolisthesis

Spinal injuries are a significant concern in the athletic population. Severe spinal injuries, including spinal cord injury, are uncommon but are controversial because the literature is lacking in randomized controlled trials examining sport-related spinal injuries. Most authors agree that the participant must be symptom-free, have full active range of motion, and have near to full strength (level IV evidence) before returning to play.³⁷ There are no randomized controlled trial-tested treatment protocols for spondylolysis, but some general principles can be applied to any treatment plan. After 4 to 6 weeks of relative rest, the athlete can return to sports participation in a brace as long as he or she has no symptoms.³⁸ The use of bracing in the treatment of spondylolysis has been controversial. Many authors advocate the routine use of a rigid brace, yet there are reports by others who do not routinely use a brace in the management of these patients. Bony healing has been shown to occur with the use of either a rigid brace, a soft brace, or no brace. Excellent clinical outcomes frequently are obtained in the absence of bony healing, and no association has been noted between the stage of the fracture and the clinical outcome, with the exception that bilateral defects may develop an associated spondylolisthesis with time. Athletes participating in sports in which the brace would impede performance must be pain free with lumbar extension, be able to successfully perform a one-legged stork test, and have improvement of ham-

string flexibility before undergoing a gradual return to play (level IV evidence). Surgery is indicated if patients have persistent neurologic symptoms, have refractory pain, or have progressed to a grade III or grade IV spondylolisthesis (> 50% up to 100%). Lumbar vertebral fusion for slips usually requires 6 to 12 months before an athlete can compete in noncontact sports (level V evidence).

Summary

Although there are several criteria to consider before an injured athlete can return to play, there is little consensus and limited high-level studies in the literature. Ultimately, the team physician must make the critical decision on whether an injured athlete can be allowed to resume sports activity.

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