REVIEW ARTICLE

Cricket Injuries: an Orthopaedist's Perspective

Mohamed Shafi, MS, MCh, UK

ATMS Hospital, Gangavalli, Tamil Nadu, India

A decade ago, cricket has traditionally been regarded as relatively injury free, although it has been classified as having a "moderate" injury risk. At present, cricket has evolved into shorter and more competitive versions involving greater aggression and often played for long periods of time. This has expectedly ensued in an increase in the number of cricketing injuries similar to those seen in other sports which involve running, throwing, or being hit by a hard object. However, there are some injuries to look out for especially in cricket players. In this article, we have reviewed information about cricket injuries that will help orthopaedists make the correct diagnoses and initiate appropriate treatment. Orthopaedic surgeons and physiotherapists should work as a team to detect treatable cricket injuries at an early stage and ensure that every precaution is taken to minimize the risks of injury.

Key words: Cricket; Injuries; Orthopaedics; Surgeon

Introduction

Cricket, a popular sport played in many countries, is enjoyed by players of all levels of ability. Cricket both requires considerable skill and is physically demanding because of the length of the game and the sudden changes of pace that it involves. These abrupt changes in pace can put a lot of strain on muscles and soft tissue as they try to adapt to sudden changes in length¹. If inadequately prepared, such muscles can become injured and strained. Although cricket is a non-contact sport, there is a wide variety of causes of injuries. It is a multi-dimensional sport in which players engage in a wide range of diverse activities, namely batting, bowling, fielding (catching and throwing) and wicket keeping. Injuries on the cricket field tend to fall into one of two categories: repetitive/overuse and impact². Overuse injuries occur predominantly in bowlers and in fielders who have to throw the ball frequently during matches or training. Impact or collision injuries can occur in a number of ways in the cricket field: as a result of direct contact with a ball, another player, the ground or the boundary.

Very few studies have reported the incidence of cricket injuries. A survey conducted by the British Sports Council reported 2.6 injuries per 10,000 hours played³. A similar survey conducted by the Australian Cricket Board reported an incidence of 24.2 per 10,000 player hours¹, which is considerably higher than the rate reported by the British survey. Several

studies have described the characteristics of cricket-related injuries at the level of elite competition⁴. In general, injuries to the upper limb account for between 25% and 32% of all injuries. Such injuries occur particularly in fielders (26%), a possible explanation being the forces around the joints of the upper limb involved in forceful throwing over a large distance⁵. Data from India concerning the incidence of upper limb injury in cricketers indicated a rate of 1.24 per 10,000 hours of play⁶. This is a relatively low incidence compared with that reported by other studies¹⁻⁴. Batters can sustain injuries caused by impact, primarily in the form of fractures, dislocations and contusions of the fingers^{2,4}. Repeated bowling, especially fast bowling, causes excessive strain throughout the lumbar spine^{2,4}.

In cricketers, many orthopaedic complaints initially come to the attention of physiotherapists. Although some common conditions can be adequately managed by physiotherapists, many cricket injuries need the attention of orthopaedists. Although most relevant published reports have focused on incidence, biomechanics of cricket injuries and prevention of such injuries, no articles have formally focused on cricket injuries in general from an orthopaedics surgeon's perspective. This review does not address the various levels of cricket played but rather emphasizes the patterns of injury in cricketers and their management.

Address for correspondence Mohamed Shafi, MS, ATMS Hospital, 9/449 Attur Main Road, Gangavalli, Salem, Tamil Nadu State, India. Tel: +0091-4282-232322; Email: drmohamedshafi@hotmail.com

Disclosure: There are no conflicts of interest, including specific financial interests and relationships and affiliations relevant to the subject of the manuscript.

Received 6 December 2013; accepted 1 March 2014

Upper Limb Injuries

Shoulder

The cricketing activity most often associated with shoulder injury is fielding, followed by bowling and then batting⁷. Repeated throwing can result in overuse shoulder problems, degenerative changes in the rotator cuff, tendinitis in the biceps or a tear of the supraspinatus tendon⁸.

In cricket, an imbalance between the agonist and antagonist muscle groups is one of the major risk factors for developing shoulder injuries such as impingement, deficiencies in external rotator strength possibly resulting in injuries. During the acceleration phase of a bowling action, the external rotators are contracted eccentrically in order to decelerate and control the arm; thus, any external shoulder rotation weakness can contribute to impingement syndrome⁹. The greater relative strength of the internal rotators compared with the external rotators results in decreased deceleration of internal rotation resulting in migration of the humeral head. This leads to a decrease in the subacromial space, which in turn can cause impingement of the rotator cuff tendon. Therefore, fast bowlers should be advised to strengthen their external rotators to about 66% and 100% of the internal rotator concentric and eccentric strength, respectively¹⁰.

Bowling produces very few acute injuries and only occasional overuse injuries. With a good bowling action, the shoulder is not subjected to forces that would lead to instability; however, labral tears and superior labral anterior posterior (SLAP) lesions can occur⁷. Overuse injuries can weaken the rotator cuff, allowing increased translational movements of the humeral head to occur, resulting in shoulder pain. With increased translation of the humerus, the long head of the biceps is recruited to help stabilize the joint. This can in turn lead to traction on the long head of the biceps tendon, predisposing the shoulder to tendonitis and SLAP lesions¹⁰. In summary, the arm does not get into a position of apprehension (abduction and forced external rotation) during bowling and as such is not subject to forces on the capsular ligaments that threaten instability. Thus, shoulder injuries in cricketers tend to result from throwing, but can be aggravated by bowling (Fig. 1).

Treatment depends on the specific condition; however, initial management is as for any soft-tissue injury. In the early stages, rest and anti-inflammatory treatment alone may suffice. In longstanding cases steroid injections and non-steroidal anti-inflammatories may be helpful. The usual recommended regimen for this is never more than three injections at 3-weekly intervals and rarely to be used in the young. Steroid injections are helpful both diagnostically and prognostically. The effect of the steroid is to reduce inflammation and hence thickening due to edema. Recommendations for protecting cricket players from shoulder injuries include resistance exercises and a throwing program with a long toss component as well as post-throwing scapular stabilization and rotator cuff exercises. A player should only be allowed to return to match play when fully recovered, otherwise the player runs

Fig. 1 Axial, T1-weighted fat-suppressed MR arthrogram images show a superior labral tear (arrow) in 30-year-old professional cricket player.

the risk of re-injury and a shortened career with further shoulder problems.

Elbow

Improper batting and bowling techniques as well as inappropriate equipment, such as bats that are too heavy, put unnecessary strain on the elbow, causing tennis elbow or lateral epicondylitis. This injury is managed using physiotherapy and rehabilitation to correct strength imbalances of the forearm. The throwing mechanism required by both fielders and fast bowlers is a whip-like motion of the arm which places repetitive traction strain on the shoulder and elbow joints. The radiological changes at the medial epicondyle of the humerus caused by excessive valgus stress as a result of overuse are referred to as little leaguer's elbow (medial epicondylar apophysitis) because they have been described in baseball players, specifically pitchers and catchers¹¹. A similar pattern has been described in adolescent cricket players¹². The physis, being the weakest link between the bone and musculotendinous complex, bears the brunt of overuse injury in children who play sports. The medial condylar epiphysis is vulnerable to injury while bowling if the player places undue stresses on his elbow to increase the speed of his ball. Complaints of elbow pain and swelling in an adolescent who plays cricket should be taken seriously. In this type of cases, X-rays may be taken to assess the status of the growth plate. Most cases are treated with 6 weeks of complete rest from bowling. Once pain-free with daily activity and on examination, the player may begin to

Fig. 2 Proximal phalanx fracture in an amateur cricket player that happened during catching the ball.

progressively return to bowling. Sometimes physical therapy is used to address any areas of stiffness or weakness in the shoulder, elbow or core muscles.

Hand

The way the hand and wrist are used in different sports affects the manner in which they may be injured. In amateur cricketers, most hand injuries are sustained while trying to catch the ball, which often strikes the end of the finger causing serious damage to joints, dorsal fracture-dislocation of the proximal interphalangeal joint in particular¹³ (Fig. 2). It is reasonable to reduce any dislocation, but essential to have the joint X-rayed immediately afterwards so as not to overlook an associated fracture. Splinting alone may be inadequate: it may be necessary to transfix the reduced joint with a Kirschner wire. In some cases, especially when the bony fragment is large, open reduction and internal fixation may be indicated. Physiotherapy is important to ensure that the finger and hand do not become stiff during healing. Mismatching a cricket ball sometimes results in forced flexion of the distal interphalangeal joint of any of the fingers, causing *mallet finger*. Bowling actions often repeatedly traumatize the end or middle finger joints; sometimes the consequent osteoarthritic changes may be severe enough to prevent further participation in the sport¹⁴. Most other hand injuries sustained during cricket have good outcomes, but prevent the cricketer from playing for three to twelve weeks.

Side Strains

Many papers on cricket injuries mention injuries to the lateral trunk muscles that can occur in bowlers^{1,2,4,15}. These injuries reportedly have a significant incidence and prevalence¹. They appear to be relatively unique to cricket bowlers although, anecdotally, similar injuries are said to occur in javelin throwers¹⁶. In all the pace bowlers studied, the injury occurred on the non-bowling arm side as a result of the bowler's non-bowling arm being pulled down from a position of maximum elevation with some lateral trunk flexion during the final delivery action¹⁶. The tips of the lowest ribs can enlarge and rub against the pelvis during the delivery stride (bony impingement) or the soft tissue can get pinched between the two structures (soft tissue impingement). Sometimes the bone and cartilage tips of the lower ribs can even break off. Occasionally, these injuries are true "side strains", in which the muscle between the ribs tears. In all cases, the pain occurs in roughly the mid-axillary line over one or more of the lowest four ribs. Treatment involves modifying bowling technique, taping and a rehabilitation program aimed at pain relief, and recovery of mobility and strength.

Back

Fast bowlers have a high incidence of serious lumbar spine injuries, such as lesions in the pars interarticularis¹⁴ (Fig. 3). More specifically, spondylolysis, a stress fracture occurring at the pars interarticularis, the vulnerable pivot between the vertebral body and the posterior apophyseal joints, represents a serious threat to their careers¹⁷. Hereditary factors, incorrect bowling technique, poor preparation and overuse (repetitive stress) all play a part¹⁸.

Fig. 3 Lateral radiograph of 25-year-old professional cricket player with spondylolysis in lumbar spine.

Compared with the 6%–7% prevalence of lumbar spondylolysis in the general male population¹⁹, pars lesions have been identified by cross-sectional radiological examinations in 20 and 55% of retired and adolescent bowlers, respectively²⁰. The pars lesions of the lumbar spine were also identified in 27% of professional fast bowlers examined in a cross-sectional magnetic resonance imaging (MRI) study²¹. A prospective study of fast bowlers specifically reported an incidence of 24%¹⁹. Other cross-sectional studies have reported higher prevalence figures ranging from 45% to 67%²². Overall, these figures indicate that the prevalence of these injuries is disproportionately high in fast bowlers compared with the general community and other athletes. Pars lesions occur most often at the L₄ and L₅ levels in fast bowlers¹⁹. L₄ pars lesions in the fast bowlers develop as symptomatic unilateral lesions on the non-bowling-side (e.g., in right-arm bowlers the stress lesions occur through the left L₄ pars). Presumably, asymmetric loading of the lumbar spine is associated with specific motions such as lateral flexion and/or axial rotation of the trunk during fast bowling, predisposing the L₄ pars on the non-bowling-arm side to injury in bowlers with these unilateral neural-arch lesions²³.

In cricketers, this condition usually presents with mechanical low back pain. The pain is typical, occurring initially after bowling, then earlier during spells from bowling until the bowler is unable to bowl at all. Associated disc degeneration can occur and signs of an associated disc prolapse should be sought¹⁹. Appropriate investigation to exclude spondylolysis is essential; this may include plain radiographs, including oblique views, technetium bone scan and computerized tomography.

In most cases, the treatment of choice is complete rest from the sport, ideally for 6 weeks to allow the bone to heal. During this time, a progressive rehabilitation program can be initiated. This should involve strengthening of the structures supporting the lumbar spine, such as the transverse abdominis, multifidus, spinal erectors and abductors of the hip. Improving trunk core stability and flexibility of the trunk and lower extremity is also undertaken. can be made to the bowling action. Surgical repair is required in recalcitrant cases, particularly at the L₅ level²⁴. Once training is resumed, subtle modifications may need to be made to the bowling action to reduce the stresses on the vertebrae. By modifying their technique, bowlers may be able to reduce lumbar loads, thus decreasing the risk of lumbar injury.

Lower Limb

Knee

Injury to the collateral ligaments occurs more often to bowlers than other players of cricket and is caused by twisting or turning, often on a fixed foot, such as when a shoe stud catches in the turf or when sliding or landing awkwardly. The injury can either be a strain, or in extreme cases, a tear. The first line of treatment includes rest, ice and elevation followed by physiotherapy, which should include stretching and strengthening exercises. In contrast to contact sports, in cricket there are

fewer chances of developing major knee ligament (anterior and posterior cruciate ligaments) injuries. Acute meniscal injuries to the knee rarely occur during fielding or other aspects of cricket. One case report describes development of an acute meniscus tear in a cricketer who used the sliding stop method of fielding (in which the fielder intercepts the ball by sliding at speed on the hip and knee and then standing and throwing the ball, all in one swift and smooth maneuver)²⁵. This fielding technique needed to be used carefully in order to prevent meniscus injuries.

Another knee problem that occurs in cricketers is patellar tendinopathy, which has been shown to occur in up to 20% of athletically active people¹⁴. Patellar tendinopathy is seen as an overuse injury and occurs often in cricketers, especially bowlers. Overload of the tendon, either as a one-off event or over a period of time, can lead to breakage of the fibers in the tendon at a microscopic level. Although damage can occur anywhere in the tendon, it is most often found in the posterior or deep portion of the proximal patellar tendon, near the tip of the patella. In the early phase, pain is present only after bowling, whereas in the more advanced stages, the pain is present during and after the activity. An ultrasound and MRI examination help in confirming the diagnosis. Various therapeutic approaches have been adopted for treating patellar tendinopathy. Initial treatment typically includes rest, ice, electrotherapy, massage, taping, anti-inflammatory medication or corticosteroid injections²⁶. Furthermore, physiotherapy, including eccentric training protocols, and extracorporeal shock-wave therapy, can be tried. However, in difficult cases in which results are poor, surgical treatment may be considered.

Leg

In cricket, fast bowling involves many sudden, explosive movements and rapid changes of direction; these can result in hamstring strains. Diagnosis is based on the typical injury mechanism and clinical findings of local pain and loss of function, demonstrated by palpation, range of motion and muscle testing²⁷. Imaging is more likely to be performed on elite cricketers who have severe pain and no obvious mechanism of injury, or in patients who are not responding to treatment. Sonography, CT scan and MRI can provide information on the extent of injury, MRI being the most sensitive²⁷. A plain radiograph is needed initially to screen for acute avulsion of the ischial apophysis, particularly in adolescent cricketers²⁸.

Physiotherapy consists of gradual stretching exercises to ensure that the muscle does not heal in the shortened state. Strength training during which the recovering is subjected to muscle resistance training is very important. Very rarely is surgery required to repair the torn muscle. The most common sequel to hamstring injury is recurrence of the same injury²⁷. If the sports person resumes the sport before healing is complete, a re-tear may occur.

Foot and Ankle

Epidemiologic studies of cricket injuries have established that 11% of injuries afflicting fast bowlers involve the foot and

ankle, no distinction having been made between the forefoot and hindfoot¹. Biomechanical studies have shown that the forefoot is more prone to acute injuries during high peak sagittal moments during bowling, whereas the hindfoot may be more susceptible to overuse injuries such as lateral ankle instability²⁹. Smith reported a high incidence of posterior talar impingement in elite cricket bowlers; this injury is associated with application of rapid force and plantar flexion of the ankle during forefoot impact³⁰. Fast bowlers who plantar flex their forefoot in their delivery stride have posterior impingement which, when present for many years, can eventually result in formation of a bony spur. In a small proportion of cases,

surgery may be required to reduce impingement on tissue by bone or to release a restricted tendon. Other management techniques include strengthening to allow controlled landing of the foot and assessing the bowling biomechanics to prevent poor landing mechanics.

In general, there are various countermeasures available for preventing specific types of overuse and impact injuries; there are also other, more general, strategies, which can be used to prevent a wide range of injuries. Good stretching programs before and after play, as well as comprehensive conditioning and technique programs before and during the season, are important injury prevention measures.

References

1. Orchard J, James T, Alcott E, Carter S, Farhart P. Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *Br J Sports Med*, 2002, 36: 270–274.
2. Stretch RA. Cricket injuries: a longitudinal study of the nature of injuries to South African cricketers. *Br J Sports Med*, 2003, 37: 250–253.
3. Weightman D, Browne RC. Injuries in eleven selected sports. *Br J Sports Med*, 1975, 9: 136–141.
4. Stretch RA. Incidence and nature of epidemiological injuries to elite South African cricket players. *S Afr Med J*, 2001, 91: 336–339.
5. Finch CF, Elliott BC, McGrath AC. Measures to prevent cricket injuries: an overview. *Sports Med*, 1999, 28: 263–272.
6. Dhillon MS, Garg B, Soni RK, Dhillon H, Prabhakar S. Nature and incidence of upper limb injuries in professional cricket players a prospective observation. *Sports Med Arthrosc Rehabil Ther Technol*, 2012, 4: 42.
7. Ranson C, Gregory PL. Shoulder injury in professional cricketers. *Phys Ther Sport*, 2008, 9: 34–39.
8. Arroyo JS, Hershon SJ, Bigliani LU. Special considerations in the athletic throwing shoulder. *Orthop Clin North Am*, 1997, 28: 69–78.
9. Hackney RG. Advances in the understanding of throwing injuries of the shoulder. *Br J Sports Med*, 1996, 30: 282–288.
10. Copeland S. Throwing injuries of the shoulder. *Br J Sports Med*, 1993, 27: 221–227.
11. Benjamin HJ, Briner WW Jr. Little league elbow. *Clin J Sport Med*, 2005, 15: 37–40.
12. Nag H, Murugappan KS, Chandran PSM, Mohan MR, Das RB. Little leaguers' elbow in an adolescent cricket player. *Eur J Orthop Surg Traumatol*, 2009, 19: 97–99.
13. Barton N. Sports injuries of the hand and wrist. *Br J Sports Med*, 1997, 31: 191–196.
14. Corrigan AB. Cricket injuries. *Aust Fam Physician*, 1984, 13: 558–562.
15. Myers P, O'Brien B. Cricket: injuries, rehabilitation and training. *Sports Med Arthrosc Rev*, 2001, 9: 124–136.
16. Humphries D, Jamison M. Clinical and magnetic resonance imaging features of cricket bowler's side strain. *Br J Sports Med*, 2004, 38: E21.
17. Johnson M, Ferreira M, Hush J. Lumbar vertebral stress injuries in fast bowlers: a review of prevalence and risk factors. *Phys Ther Sport*, 2012, 13: 45–52.
18. Elliott BC. Back injuries and the fast bowler in cricket. *J Sports Sci*, 2000, 18: 983–991.
19. Engstrom CM, Walker DG. Pars interarticularis stress lesions in the lumbar spine of cricket fast bowlers. *Med Sci Sports Exerc*, 2007, 39: 28–33.
20. Annear PT, Chakera TM, Foster DH, Hardcastle PH. Pars interarticularis stress and disc degeneration in cricket's potent strike force: the fast bowler. *Aust N Z J Surg*, 1992, 62: 768–773.
21. Ranson CA, Kerslake RW, Burnett AF, Batt ME, Abdi S. Magnetic resonance imaging of the lumbar spine in asymptomatic professional fast bowlers in cricket. *J Bone Joint Surg Br*, 2005, 87: 1111–1116.
22. Gregory PL, Batt ME, Kerslake RW. Comparing spondylolysis in cricketers and soccer players. *Br J Sports Med*, 2004, 38: 737–742.
23. Engstrom CM, Walker DG, Kippers V, Mehnert AJ. Quadratus lumborum asymmetry and L4 pars injury in fast bowlers: a prospective MR study. *Med Sci Sports Exerc*, 2007, 39: 910–917.
24. Hardcastle P, Annear P, Foster DH, et al. Spinal abnormalities in young fast bowlers. *J Bone Joint Surg Br*, 1992, 74: 421–425.
25. Von Hagen K, Roach R, Summers B. The sliding stop: a technique of fielding in cricket with a potential for serious knee injury. *Br J Sports Med*, 2000, 34: 379–381.
26. Peers KH, Lysens RJ. Patellar tendinopathy in athletes: current diagnostic and therapeutic recommendations. *Sports Med*, 2005, 35: 71–87.
27. Hoskins W, Pollard H. The management of hamstring injury – Part 1: issues in diagnosis. *Man Ther*, 2005, 10: 96–107.
28. Speer KP, Lohnes J, Garrett WE Jr. Radiographic imaging of muscle strain injury. *Am J Sports Med*, 1993, 21: 89–95.
29. Hurriem PD, Dyson R, Hale T. Simultaneous measurement of back and front foot ground reaction forces during the same delivery stride of the fast-medium bowler. *J Sports Sci*, 2000, 18: 993–997.
30. Smith C. Ankle injuries in fast bowlers: posterior talar impingement syndrome. The South African experience[C]//Abstracts of the 5th IOC World Congress on Sport Sciences, 31 October–5 November 1999, Canberra, ACT, Australia: 1999; 245.