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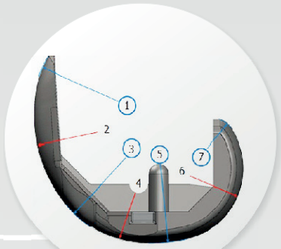

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Sodium hyaluronate is a physiological substance that is widely distributed in the extracellular matrix of connective tissues in both animals and man. For example, it is present in the vitreous and aqueous humor of the eye, the synovial fluid, the skin, and the umbilical cord. Sodium hyaluronate derived from various human or animal tissues does not differ chemically.

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· Do not inject HA-KEM extra-articularly or into the synovial tissues and capsules. This will generally result in local and systemic adverse events.
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· The effectiveness and safety of the use of HA-KEM in joints other than knee have not been established.
· The safety and effectiveness of the use of HA-KEM concomitantly with other intra-articular injectables have not been established.
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· The pre-filled syringe is intended for single use. Use the contents of the syringe immediately after its packaging is opened. Discard any unused HA-KEM.
· Opened or damaged packages of HA-KEM should not be used. Always store in the original packaging (protected from light) below 30° C.
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Aims and Scope

Journal of Arthroscopy and Joint Surgery (JAJS) is committed to bring forth scientific manuscripts in the form of original research articles, current concept reviews, meta-analyses, case reports and letters to the editor. The focus of the Journal is to present wide-ranging, multi-disciplinary perspectives on the problems of the joints that are amenable with Arthroscopy and Arthroplasty. Though Arthroscopy and Arthroplasty entail surgical procedures, the Journal shall not restrict itself to these purely surgical procedures and will also encompass pharmacological, rehabilitative and physical measures that can prevent or postpone the execution of a surgical procedure. The Journal will also publish scientific research related to tissues other than joints that would ultimately have an effect on the joint function.

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Editorial

Role of platelet rich plasma in early osteoarthritis of knee

Osteoarthritis of the knee is one of the commonest degenerative diseases encountered in clinical practice and a solution to provide relief from pain is a challenge faced by pain specialists and orthopaedicians worldwide. Attempts to slow disease progression have used modalities ranging from intra-articular steroids, oral chondroprotectives to viscosupplementations, each with variable outcomes. The 21st century has seen a significant usage of Intra-articular Platelet rich plasma (PRP) injections and the data so far has been promising.

Platelet rich plasma is a process of natural (biological) healing which relies upon the pool of growth factors contained within the alpha granules. Growth factors within alpha granules of platelets are capable of improving the physiology of Osteoarthritic joints by their chondro-protective properties. PDGF and TGF-1 act by upregulating the production of endogenous hyaluronic acid. PDGF also regulates levels of TIMPs which are a critical part of catabolic pathway. There are recent reports that show that PRP use in patients of early osteoarthritis may improve the cartilage structure and helps in slowing down the progression of disease.[1,2]

PRP use in orthopaedics was first explored in tendinopathies; soon investigators started using this in OA knee after preliminary studies by Sanchez and Anitua established the safety of Autologous PRP for intra articular use.[3] They conducted some animal studies and in vitro studies and postulated chondral remodelling as one of a cause for the beneficial effects. Subsequent studies compared PRP with hyaluronic acid,[3–6] and demonstrated the safety profile and beneficial effects of PRP in OA Knee. Spaková et al[4] concluded the effectiveness and safety of autologous PRP in early osteoarthritis knee (Kellgren and Lawrence Grades 1, 2, or 3 osteoarthritis) by comparing PRP injection with hyaluronic acid in their RCT which had 120 patients. Similar observations were noted by Cerza et al[5] in their RCT on 120 patients wherein autologous PRP group had better WOMAC scores than HA group. Kon et al[6] compared autologous PRP with HA injections and observed better symptom control and sustained effects in autologous PRP group. Kon et al[7] in their initial study in 2010 had established the good outcomes (IKDC scores) of intraarticular PRP in early degenerative cartilage lesions. Patients with degenerative chondropathy had better results than patients of early OA, who in turn had better results than advanced OA. In both studies Kon et al[6,7] stressed on better results in younger patients, Low BMI patients and those with less degree of cartilage degeneration.

Indian RCTs[1] have compared physiological control (normal saline) with single and double injections, and showed significant improvement in clinical scores (WOMAC scores) persisting till the 6th months; mechanisms other than chondral remodelling happening within the joint have been postulated to be responsible for the clinical benefit. It is also presumed that the improvement in some patients could be explained by the anti-inflammatory property of injected platelets by acting at different levels rather than stimulating Chondral remodelling[8] as was postulated before. The above hypothesis was based on the findings wherein they noted that patients were experiencing benefits as early as 18 days and also noted a slight worsening of benefits by 6 months. Sundman et al demonstrated the anti-inflammatory and anti-nociceptive activities of PRP and supported its use in OA joints to relieve pain.[2]

With the availability of commercial centrifuge table top devices, PRP therapy can be more easily given by clinicians to their patients in their OPD. Most of the commercial machines now provide Leucocyte free PRP in adequate concentration. Nevertheless the clinician must ensure a closed chain and complete infection protection.

Anitua et al[9] has recently postulated that PRP in combination with HA enhances the migratory potential of fibroblasts based on her in vitro studies. The idea of positive interactions between HA and PRP was further supported by Marmotti et al[10] in his vitro study. Since HA and PRP are not mechanical but biological approaches, the ability of PRP + HA to change the biological status of the joint and promote tissue healing will be particularly critical during the initial stages of OA, before the onset of structural changes. Based on this concept Andia[11] has postulated that a combination of HA and PRP may prove to be better than PRP alone; however this requires controlled studies to verify critical aspects of character and performance of the composite. Several key aspects such as the molecular weight of HA and the concentration to be mixed with PRP should be analysed before conducting clinical trials.

With our evolving understanding, PRP holds a lot of promise for those suffering from pain due to early OA knee; although the evidence available today is not completely confirmatory, many reports point to the fact that WBC filtered PRP injections definitely hold a high position in the pain ladder treatment of early OA compared to other modalities. Nevertheless there is great scope for further research on the role of PRP in OA, both clinically and in vitro, to better understand the mechanism of action and hence evolve further in our understanding.

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Review Article

The shoulder in cricket: What's causing all the painful shoulders?

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ABSTRACT

Background/objectives: Shoulder injuries account for roughly 5% of all injuries sustained by cricketers, most likely an underestimation of a larger problem facing the sport. The cause for shoulder injuries has been sparsely investigated among cricketers. The aim of this review is to summarize the available literature on possible mechanism for shoulder injuries among cricketers.

Method/materials: MEDLINE and EMBASE (Search terms: ''cricket'' AND ''shoulder injuries''; ''cricket'' AND ''rotator cuff tears''; ''cricket'' AND ''impingement''; and associated synonyms) were performed in March 2014. The authors further canvassed the reference list of selected articles and online search engines such as Google Scholar. Inclusion criteria were studies that assessed shoulder injuries among cricketers. A total of 9 studies was identified on primary search, and later expanded to 15 studies.

Results/discussion: Bowlers and fielders are most frequently affected by shoulder injuries, likely a result of their overhead throwing actions. Spin bowlers tend to be worse for wear that fast bowlers. A number of possible theories have been proposed as to the cause for shoulder pain among cricketers including: scapular dyskinesia, glenohumeral internal rotation deficit and weak musculature surrounding the cuff. Most cricketers with shoulder pain appear to have an increase in external rotation and loss of internal rotation range of motion in the affected shoulder.

Conclusion: We propose a combined mechanism of injury that results in shoulder pain among cricketers. Further work is needed to identify the cause of the problem and implement targeted interventions aimed at each step of the proposed pathway.

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1. Introduction

Shoulder injuries account for roughly 5% of all injuries sustained by cricketers,[1] although this is most likely an underestimation of a much larger problem. The cause for shoulder injuries among cricketers has been sparsely investigated, largely because of their small share of global injuries compared to other more common injuries such as hamstring strains. The aim of this review is to summarize the available literature on possible mechanism for shoulder injuries among cricketers and provide recommendations for future research in this field.

2. The problem

Injuries in cricket are common. A review of long-term injury surveillance studies by stretch (2007) across Australia, South Africa and England, found that most injuries occur early in the season when the least cricket is being played.[2] Upper limb injuries constituted 29% of all injuries in this review.

The England and Wales Cricket Board reported that 5.5% of all injuries among first-class County Cricketers, during the 2001 and 2002 season affected the shoulder, with similar findings reported in South Africa (5.2%) and among the first-class Australian teams (7%).[1,3,4] A recent Australian injury study over 11 seasons, found that shoulder tendon injuries account for 0–1.4% of all injuries per season, with other shoulder injuries having an incidence rate of 0–1.5%.[5] Prevalence rates of shoulder tendon injuries range from 0.1 to 1.4% and prevalence for other shoulder injuries range from 0 to 1.0%.[5] In another 10 year study, the mean shoulder injury incidence was 1.1 per season with a mean prevalence of 0.9%.[4] Australian injury surveillance data encompassing the years 1995–2001, demonstrates that shoulder injury prevalence among batters was 0.3%, fast bowlers 0.9% and spin bowlers 1.1%.[1]

In contrast, a recent study of English county cricket players suggested that up to 23% may experience some form of shoulder injury, with the majority affected in the throwing arm.[6] This suggests that there may be an underestimation of shoulder injuries in cricket.[7] A limitation of the above data set is that three countries (Australia, South Africa and England) have produced data with none available from other cricket-playing nations. There is a need for all cricket playing nations to monitor injury rates among cricketers so that inter-country differences may be explored and appropriate targeted interventions developed.

3. Which cricketers are most affected?

Traditionally, overhead athletic activity has been associated with shoulder injuries. Cricket is no different, with fielders and bowlers engaged in overhead throwing activities the most prone to shoulder injury.

Australian data shows that bowlers have roughly three to four times the shoulder injury prevalence rate of batters.[1] Injuries for bowlers are well above the average for all other cricketers at each age group and show an increase as players' age. Interestingly, among bowlers spin bowlers tend to be worse for wear with respect to shoulder injuries than fast-bowlers.[1] In a study of 112 first-class English bowlers ($n = 42$ spin; $n = 70$ fast), Gregory et al (2002) found that spin bowlers have a higher incidence of shoulder injuries (0.055 injuries/1000 balls) versus fast-bowlers (0.007 injuries/1000 balls).[8]

During bowling in cricket, the internal shoulder rotators are involved in the acceleration phase of the arm through concentric contractions, while the external rotators are involved in the deceleration phase.[9] Shoulder injuries were more common in fast bowlers with a front-on action than bowlers with a side-on or mixed-action and shoulder injuries were more common in wrist spinners than finger spinners.[10] In wrist spin the bowlers appear to rotate the bowling shoulder internally, while the arm circumducts.[10] Gregory et al speculated that this action of internal rotation during spin bowling may predispose one to impingement and injury.[8] It has been suggested that the presence of possible dysfunction in the shoulder rotators, combined with front-on bowling action and external rotation hypermobility are possible predisposing factors for chronic shoulder injuries in cricket fast bowlers.[10]

However, the majority of shoulder injuries in cricket are related to tendon injury and though to be more likely related to fielding, particularly throwing, than to bowling.[3,4] Throwing a cricket ball from the outfield is likely to be a provocative activity for shoulder injury. It is common for cricketers with shoulder problems to field in positions that reduce the distance to be thrown.[6]

Clearly, fielders and bowlers engaged in overhead throwing activities and abnormal torques across the shoulder joint are most at risk for shoulder injuries.

4. What causes shoulder injuries among cricketers?

During the overhead throwing motion the shoulder complex functions as a regulator of forces generated by the legs and the trunk.[11] It is this regulating function as well as the high velocities that accompany the throwing motion that places large forces across the glenohumeral joint.[12] These forces as well as the frequent repetition of the overhead throwing action produce severe stresses on the muscles, bones and joints of the upper extremity.[13]

Previous studies of overhead athletes in other sports have found that those with shoulder injuries have higher training loads,[14,15] have altered scapula kinetmatic,[16] altered muscular strength patterns[17] and greater internal rotation (IR) to external rotation (ER) range of motion in the dominant shoulder.[17] Cricketers, similarly, also have been shown to have a glenohumeral internal rotation range of motion deficit[7] and weak scapula stabilizer musculature.[18]

Repetitive overhead activities likely lead to adaptation to the pillars that constitute the shoulder joint – the bones (including the scapula), the cuff and the muscle stabilizers. Whether the subsequent change in shoulder kinematics is adaptive[17,19,20] or the result of pathology[21–23] remains an area of debate.

5. Range of motion

Repetitive overhead activities stretch the anterior joint capsule over time and tighten the posterior capsuloligamentous/muscular complex,[24] leading to decreases in IR and increases in ER.[19,25] The stretching may lead to antero-superior migration of the humeral head, accounting for the development of subacromial impingement and shoulder pain.[26–28] This mechanism of soft tissue adaptation is supported by Hsu et al who stretched the posterior shoulder joint capsule of cadaveric shoulders to demonstrate an increased IR[29] and by Burkhart and colleagues who reported that internal rotation can be increased when the posterior capsule is stretched.[11]

When the decrease in IR is beyond the gain in ER, the condition is known as glenohumeral internal rotation defect (GIRD).[11] Burkhart et al (2003) proposed that GIRD may be associated with injury to the throwing shoulder.[11]

In contrast to the soft tissue adaptation mechanism, GIRD has been attributed to bone remodeling of humeral neck to a retroverted position which may act as a protective adaptation to reduce shoulder injury.[30,31] Our proposed combined mechanism is presented in Fig. 1.

Giles and Musa (2008) in their study of 133 male and female elite junior English cricketers found that cricketers who regularly engage in overhead actions had less internal and greater external rotation in dominant shoulder versus non-dominant shoulder, and that cricketers who experienced shoulder pain had greater internal rotation difference between dominant and non-dominant shoulder than those who did not.[7] Increased ER and decreased IR have been documented in a variety of other unilateral overhead sports including tennis and baseball[32–34].

Stuelcken et al (2008) found significant differences in external rotation range of motion and internal rotation range of motion for bowlers with shoulder pain ($n = 12$) versus total cohort ($n = 26$) of elite female Australian fast-bowlers. However, there was no difference in range of motion or torque between bowlers with and without a history of shoulder pain.[35] Further, in their study of 66 elite bowlers, Sundaram et al (2012) found that fast-bowlers and spin bowlers who bowl regularly have decreased IR and increased ER for dominant shoulder versus non-dominant shoulders.[12]

The role of age is also important. Rotational motion differences between dominant and non-dominant shoulders of baseball players increase as age increases.[25] Kibler and colleagues found a significant correlation between increasing IRD with both increasing age and years of tennis exposure, supporting adaptive change response to repetitive overhead activity among 39 high level tennis players.[34]

There is a need to better determine the range of motion of cricketers with shoulder pain and to actively target physiotherapy interventions to compensating for any losses in IR and gains in ER.

6. The scapula

Scapula dysfunction has been implicated as a contributor to throwing-related to pathologic internal impingement of the

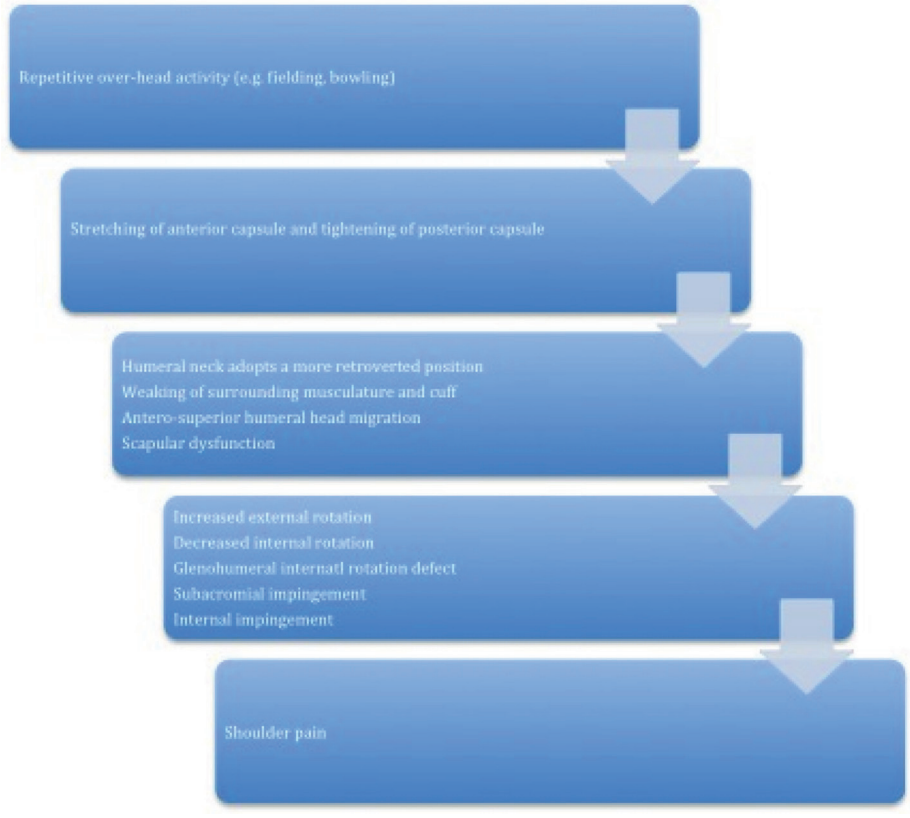

Fig. 1 – Our proposed combined mechanism for shoulder pain in cricketers.

shoulder due to its role in increasing the contact between the greater tuberosity and the posterior-superior glenoid, thereby impinging the posterior rotator cuff tendon/s and labrum (Fig. 1).

In a review of the role of scapula positioning and movement in pathological and non-pathological shoulder, Struyf et al (2011) found that the literature was inconsistent. At rest the scapular is positioned approximately horizontal, 35° of internal rotation and 10° of anterior tilt. During shoulder elevation, most researchers included in the review suggested that the scapula tilts posteriorly and rotates both upwards and externally. It is suggested that during shoulder elevation, patients with shoulder impingement syndrome demonstrate a decreased upward scapular motion, decreased posterior tilt and decrease in external rotation. Similarly, in patients with glenohumeral instability, a decreased scapular upward rotation and increased internal rotation is seen.[36] This suggests that the scapula plays an important role in pathologic states of the shoulder.

Laudner et al (2006) in a case–control study compared scapular position in baseball players with ($n = 11$) and without ($n = 11$) internal impingement (using MRI and EMG motion tracker) found that players with clinical evidence of internal impingement have increased sternoclavicular elevation and scapular posterior tilt position during humeral elevation in the scapular plane.[16]

Green et al (2013) studied scapula position in 60 elite junior male Australian cricketers. Participants were subjectively divided into two groups – those with a shoulder problem in the last 12 months and those without. They found that patients with a shoulder problem had a consistently downward rotated scapula during almost all shoulder positions, suggesting that this scapula position predisposes cricketers to ongoing injury through shoulder impingement syndrome and through increased load placed on the rotator cuff muscles acting along the glenohumeral joint during throwing.[37] A limitation here is that a single subjective tool was used to subdivide cricketers into the two groups.

Further work is needed to study the scapula in the shoulders of cricketers and to determine whether scapular dyskinesia is primary or secondary[22] to overuse.

7. Muscles surrounding the cuff

It has been postulated that weakening of the support musculature around the cuff (Fig. 1) is likely the result of underlying pathology and perpetuates a vicious cycle of altered shoulder kinematics which aggravates shoulder pain.

A video-motion analysis study of 18 Australian female fast-bowlers, found that there was a large peak shoulder distraction force during the early stages of the follow-through of the bowling action.[38] The amount of the force was similar to values reported for baseball and soft-ball pitchers, both high risk groups for shoulder injuries. This peak distraction force, although likely to stretch the capsule primarily, also produces moment stress on the musculature which may allow more force transmission to capsule and also disturb scapula kinematics.

In a video-motion analysis study complemented by EMG testing of seven muscles, two bowlers, with and without current shoulder pathology, were compared.[39] The bowler without a shoulder pathology, had no significant difference for duration of movement and ball velocity, however did have variations for muscle activity particularly for biceps brachii and infraspinatus. Conclusions from this study are limited by the small sample size, however do question whether abnormal muscle firing predisposes to shoulder pathology or vice versa.

There is a need to better understand the status of muscles surrounding the cuff in the shoulders of affected and non-affected cricketers.

8. Conclusion

Shoulder injuries account for roughly 5% of all cricket injuries, most likely an underestimation of the disease burden. Bowlers and fielders are the most affected specialties. The authors propose a combined mechanism for shoulder pain in cricketers which addresses range of motion defects, scapula dyskinesia and abnormalities in musculature surrounding the cuff. Further work is needed to understand and address the problem as cricket becomes increasingly popular in the new century.

Conflicts of interest

All authors have none to declare.

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