CASE REPORT

Clinical and magnetic resonance imaging features of cricket bowler's side strain

D Humphries, M Jamison

Br J Sports Med 2004;**38**:e21 (<http://www.bjsportmed.com/cgi/content/full/38/5/e21>). doi: 10.1136/bjism.2003.005272

The clinical features of 10 cases of lateral trunk muscle injury in first class cricket pace bowlers are described. Typically the injury occurs during a single delivery, is associated with considerable pain, and prevents the bowler from continuing. The clinical picture is typical of a muscular or musculotendinous injury. The most consistent clinical tests were focal tenderness on palpation and pain with resisted side flexion towards the painful side. The magnetic resonance image in 70% of cases was consistent with an injury to the internal oblique, the external oblique, or the transversalis muscles at or near their attachments to one or more of the lowest four ribs. The injury occurs on the non-bowling arm side. Recovery can be prolonged. The injury was a recurrence in six of the 10 cases. The biomechanics of the injury are not yet understood.

A number of epidemiological¹⁻³ and review papers⁴ have been published on cricketing injuries. In these papers injuries to the lateral trunk muscles are noted as occurring in bowlers. These injuries have been identified as having a significant incidence and prevalence.¹ There is no clinical description of this injury in the literature, nor has the anatomical pathology been defined. The injury appears to be relatively unique to cricket bowlers although, anecdotally, similar injuries are said to occur in javelin throwers.

METHODS

Part of the Australian Cricket Board (ACB) injury prevention and management programme is a continuing survey of the injuries sustained by state and national level players throughout Australia. The survey noted that injury to the lateral trunk is a common and serious injury in first class cricket bowlers. For this study, clinical and magnetic resonance imaging (MRI) data were collected by the medical and physiotherapy staff involved in first class cricket in Australia on a standardised form, to gain an insight into the clinical pattern and anatomical details of this injury. Ten cases in pace bowlers, for which both the clinical details and the MRI findings were available, were collected over two seasons. The data collected included: when in the action the injury occurred, on which side of the body the injury occurred (bowling or non-bowling arm side), whether the bowler was able to continue bowling, clinical signs (including a number of physical tests devised for the study), treatment, duration of time before bowling competitively again, and whether this was the first incidence of this injury for this player. All MRI scans included axial PD and T2 images and coronal T1, PD and STIR images. One MRI unit also performed non-orthogonal cuts in the plane of the oblique muscles. Most of the MRI scans were reviewed by a single specialist radiologist.

These data have been used to reach a clinical description thought to best represent this particular injury group. The MRI findings are also described.

RESULTS

Table 1 summarises the relevant results of the data collection.

The most notable features are the consistency of the injury occurring on the non-bowling arm side, the positive side flexion test, and the high rate of a previous similar injury.

In table 1, the term full recovery was defined as returning to the same bowling level as before the injury. Physiotherapy treatment (Physio) varied from electrotherapy to massage and a strength programme; no consistent pattern of treatment was followed. Corticosteroid injection (CSI) was used at different intervals after the injury, and again no consistent protocol was followed. Reduced load meant match bowling at some stage of rehabilitation but at a reduced pace.

DISCUSSION

From the data collected, it would appear that the "bowler's side strain" has a number of variants. In all the pace bowlers studied, the injury occurred on the non-bowling arm side when the bowler's non-bowling arm was being pulled down from a position of maximum elevation with some lateral trunk flexion during the final delivery action. It was not possible to determine whether the injury occurred at the start, the early phase, or the mid phase of this action. The pain in all cases occurred in roughly the mid-axillary line over one or more of the lowest four ribs. The patients seen by us personally were asked to illustrate the area of maximum pain, and this was found to correlate well with the area of maximum tenderness. Of the specific tests devised, it was found that all bowlers had noteworthy pain when asked to perform a resisted action of side flexing to the painful side, from a starting position either side flexed away from the painful side or from neutral. All injuries required some treatment, primarily physiotherapy aimed at pain relief, recovery of mobility, and recovery of strength. Corticosteroid injection was performed later in the treatment plan of three cases, but owing to a lack of understanding of the natural history of the condition and no consistent protocol for such injections, no conclusion could be drawn about the value of this intervention. The value of corticosteroid injections is similarly uncertain in other muscular injuries, such as hamstring tears, but may have some role.⁵ Whereas four bowlers were able to continue bowling (at least temporarily), six stopped bowling at the time of injury. The average time to returning to bowling competitively was 29.7 days, but individually this varied from one to 70 days. No definite correlation between the MRI appearance and the time to recovery could be drawn.

Six of the bowlers had previously suffered at least one similar injury. Anecdotally this injury had been described as a "rite of passage", which never recurred; however, these data show that recurrence is common.

Table 1 Clinical features, magnetic resonance imaging (MRI) findings, and treatment

Case number	Onset	Side	Continued to bowl	Side flex test	Full recovery	Previous side strain	MRI findings	Treatment
1	Acute	Non-bowling arm	No	Positive	35 days	No	Tear E/O at rib 10	Rest, NSAID, ice, physio
2	Acute	Non-bowling arm	No	Positive	70 days	Yes	Tear E/O at rib 10	Rest, NSAID, ice, physio
3	Acute on chronic	Non-bowling arm	No	Positive	1 day	Yes	No abnormality	Restricted training load
4	Acute	Non-bowling arm	No	Positive	34 days	No	No abnormality	Rest, physio CSI
5	Gradual	Non-bowling arm	Yes	Positive	4 days	Yes	No abnormality	Ice, reduced load, physio
6	Gradual	Non-bowling arm	Yes	Positive	35 days	No	Transversalis strain	Reduced load, physio
7	Acute	Non-bowling arm	No	Positive	28 days	No	Tear E/O ribs 9,10 and 11	Ice, physio
8	Acute	Non-bowling arm	Yes	Positive	15 days	Yes	Partial tear I/O at rib 11	Physio, CSI
9	Acute	Non-bowling arm	No	Positive	55 days	Yes	Tear I/O at rib 11	Physio
10	Gradual	Non-bowling arm	Only 12 balls more	Positive	20 days	Yes	Strain I/O at rib 12	Reduced load

MRI notes: E/O, external oblique; I/O, internal oblique; strain, muscle oedema without fibre disruption; tear, muscle fibre or musculotendinous disruption. Physio, Physiotherapy; CSI, corticosteroid injection.

Fast and medium pace bowlers are classically described as “front on”, “semi-open” or “side on”, which is in part a description of the truncal position at the time of delivery. They are also further described as having “correct” or “mixed” actions. It is possible that these factors may determine whether it is the internal or external oblique muscle that is damaged, but the number of subjects in this report was not sufficient for statistical significance, and further biomechanical analysis would be required to test this hypothesis.

The MRI scans showed increased signal on the STIR and T2 weighted images in the internal oblique in three cases, the external oblique in three cases, and the transversalis in one case, generally at or near their attachment to one or more of the lowest four ribs (fig 1). Anatomically this corresponds to the sections of the oblique muscles that are primarily responsible for lateral trunk flexion.⁶ Such signal characteristics are consistent with muscle strain, tear, or avulsion. In three cases, no abnormality was seen, suggesting that the pain may have been due to more minor muscular injury, periosteal injury, or pain referral from the thoracic spine. MRI scans did not reveal any evidence of bony injury, although anecdotally some of these injuries have been described as stress or avulsion fractures. It is not generally necessary to perform an MRI scan to make the diagnosis; the scans were performed in these patients to further our understanding of this injury. Ultrasound scanning was not analysed to determine if it was a useful tool for assessing this injury.

CONCLUSION

The side strain is an injury of significance in cricket bowlers. It can be recurrent and may cause lengthy periods of absence from play. The clinical presentation and MRI findings are primarily those of a muscle injury. At present, the only identifiable risk factor is a history of a previous side strain. Further research will be aimed at determining the predisposing factors, optimal management, and effective prevention strategies for this injury.

ACKNOWLEDGEMENTS

We acknowledge the assistance of Dr Michael Alcock, for his input with the MRI scans, and Drs McCann and James, with data collection. We also acknowledge the support and partial funding of this research by the ACB.

Figure 1 Magnetic resonance image of internal oblique full thickness tear (arrow). Note external marker at point of maximum tenderness.

Take home message

Cricket bowlers commonly sustain an injury to the lateral muscles of the trunk as a result of bowling. Characteristically such injuries result in considerable pain and impairment of performance. Current management principles are empirically aimed at resolution of the muscular tear and restoration of muscle function.

Authors' affiliations

D Humphries, Private Practice, Sports Medicine, St Helens Hospital, Hobart, Tasmania, Australia

M Jamison, Tasmania Sports & Physiotherapy Clinic, Hobart, Tasmania, Australia

Correspondence to: Dr Humphries, Private Practice, Sports Medicine, St Helens Hospital, 186 Macquarie Street, Hobart, Tasmania 7000, Australia; drdavid@ozemail.com.au

Accepted 20 May 2003

REFERENCES

- 1 Orchard J, James T, Alcott E, *et al.* Injuries in Australian cricket at first class level 1995/1996 to 2000/2001. *Br J Sports Med* 2002;**36**:270–4.
- 2 Stretch R. Epidemiology of cricket injuries. *Int J Sports Med* 2001;**2**.
- 3 Stretch RA. The seasonal incidence and nature of injuries in schoolboy cricketers. *S Afr Med J* 1995;**85**:1182–4.
- 4 Myers P, O'Brien B. Cricket: injuries, rehabilitation and training. *Sports Med Arthrosc Rev* 2001;**9**:124–36.
- 5 Levine WN, Tessler BJ, Moorman WCT 3rd. Intra-articular corticosteroid injection for hamstring injuries. A 13-year experience in the National Football League. *Am J Sports Med* 2000;**28**:297–300.
- 6 McMinn RMH. *Last's anatomy: regional and applied*, 8th ed. 1990: 295–7.