CASE REPORT

Novel presentation of a cricket ball-related intra-abdominal injury: genitofemoral nerve referred pain

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Accepted 16 August 2015

SUMMARY

Serious intra-abdominal injuries are very uncommon in cricket; traumatic cricket injuries are traditionally musculoskeletal, soft tissue or maxillofacial in origin. The cause of such cricket injuries can be broadly divided into collision type injuries (a result of direct contact with the ball or bat, another player, the ground or boundary) or overuse injuries (due to running, throwing, batting, bowling, repetitive movements and overexertion). This case report describes a rare cause of small bowel perforation and suspected genitofemoral nerve injury secondary to the direct impact of a cricket ball, and includes a brief review of blunt abdominal injuries resulting in isolated small bowel perforations.

BACKGROUND

Two recent deaths secondary to cricket ball injury, that of young Australian cricketer Phillip Hughes and Israeli umpire Hillel Oscar, have had a pronounced effect on the international cricket community and have drawn increased focus on this dangerous mechanism of injury. Cricket is considered a non-contact sport but is associated with a significant number of sports-related injuries. In Australia, cricket is ranked as the fifth greatest source of sport-related emergency department presentations, accounting for 7.3% of all sporting injury cases in those aged >15 years.¹ The majority of cricket injuries (48–61%) occurred when a player was struck by the ball, followed by falls (9–22%) and overuse injuries (7–21%).^{2–6} Although impact injuries are not uncommon in cricket, this case is the first documented case of a ruptured bowel due to the impact from a cricket ball. This report serves to increase clinician awareness that unsuspecting patient presentations may result in serious pathology, and we hypothesise a novel anatomic explanation of referred pain to explain our patient's unusual clinical presentation.

CASE PRESENTATION

A 40-year-old man presented to the emergency department after reporting being struck in the scrotum by a cricket ball. He recalled sustaining the injury while batting in a social game of cricket 2 h before presentation. He had been unable to continue the game due to severe lower abdominal and testicular pain. He was not wearing a protective box or any other protective equipment at the time of injury. He had no medical history of note. On examination, his vital signs were unremarkable and his abdomen was soft with mild lower abdominal tenderness. Scrotal examination revealed no scrotal

haematoma and non-tender testicles. An ultrasound of the testicles was also normal. After a short period of observation, the patient was discharged home.

The patient re-presented the following morning with worsened lower abdominal pain and, on examination, bruising had now developed in the abdominal wall of the right lower quadrant. He was found to have a systemic inflammatory response and generalised peritonitis. A CT scan of the abdomen demonstrated intraperitoneal free fluid and air in keeping with perforated hollow viscus ([figure 1](#)). The patient was resuscitated with intravenous fluid, administered broad-spectrum antibiotics and taken for urgent laparotomy. An isolated perforation of the distal ileum was initially identified, and the caecum and the terminal ileum were both mobilised from their retroperitoneal attachments to facilitate full inspection of the injury location. It was after this point intraoperatively that the underlying right psoas muscle deep in the retroperitoneum was identified, and a small laceration and contusion were observed in this muscle. The anatomical location of the injury to the right psoas muscle was consistent with a possible concomitant genitofemoral nerve injury. Inguinal hernia was not present. The peritoneal cavity was lavaged, and the perforation repaired primarily. The patient's recollection of events did not change throughout the postoperative period, he consistently reported being struck in the scrotum. He made an unremarkable recovery, and was discharged on the seventh postoperative day.

OUTCOME AND FOLLOW-UP

The patient made an unremarkable recovery and did not require any further follow-up.

DISCUSSION

Perforation of the small bowel relating to the impact of a cricket ball has not previously been reported (PubMed, Embase, Ovid, Medline). Serious blunt abdominal injuries are more typical of high-contact sports such as football and ice hockey rather than cricket (a non-contact sport).^{7,8} A small bowel perforation following blunt abdominal trauma has been described in other sports, for example, after an 18-year-old man was struck on the abdomen during a high-school football game.⁹ The current literature on blunt abdominal injuries resulting in isolated small bowel perforations is largely limited to reports of seat-belt injuries, paediatric trauma (resulting from falls, physical abuse and bike handlebar intrusions)⁶ and horse

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To cite: Philipoff AC, Rowcroft A, Weber DG. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2014-208024

Figure 1 Axial CT scan demonstrating intra-abdominal free fluid and air.

kicks to the abdomen.¹⁰ A cricket ball can represent a lethal mechanism of injury. It is a hard, high-density object that travels at high speed (up to 160 km/h) and proved deadly for Australian cricketer Phillip Hughes and Israeli umpire Hillel Oscar in November 2014. One other reported case of serious intra-abdominal injury from a cricket ball, a case of splenic rupture, was identified in South Africa.³

Recent prospective reviews on injury surveillance in both domestic and international cricket matches have contributed to an increased awareness of traumatic cricket injuries.^{11–14} Anatomically, the most frequently injured areas included: the lower limbs (30–50%), upper limbs (19–34%), and back and trunk (18–33%).^{11–14} Soft tissue injuries predominated. Low back injuries including lumbar spine fractures were consistently associated with the highest proportion of match days missed.^{11–14} Injuries to the abdomen were not uncommon (8.7% of injuries),¹¹ however, no review identified an abdominal hollow viscus injury. Most cricket injuries are caused by collision type incidents. Being struck by the ball was the most likely cause (48–61%), other causes of collision type injuries included falls (9–22%) and collision with another player (2–7%).^{5–6} Overuse injuries (due to repetitive movements such as bowling, throwing and batting) were less common (7–21%), however, they more often caused low back injuries, the injury pattern with the greatest morbidity.^{13–14}

The clinical presentation of patients with trauma may be complicated by unreliable patient histories. In this case, we hypothesise the inaccurate history may have been the result of referred pain, rather than inaccurate recollection. The impact over the terminal ileum (directly causing the ileal and psoas injuries) will have imparted forces into the right retroperitoneum, and likely injured the genitofemoral nerve. Irritation of the genital branch of the genitofemoral nerve may present as testicular pain.^{15–17} Chronic testicular pain associated with genitofemoral nerve injury is well established.^{15–19} However, acute testicular pain following lower quadrant blunt trauma has seldom been described.¹⁵ Lower abdominal nerve entrapments are a well-recognised pathology that have frequently presented as diagnostic challenges,^{20–22} and also provide a pathophysiological basis for our hypothesis of genitofemoral nerve irritation causing referred pain in the patient described.

The genitofemoral nerve arises from the L1 and L2 nerve roots, consisting mainly of sensory fibres.¹⁸ The genitofemoral nerve travels through the psoas muscle, where it divides into a genital and a femoral branch. In men, the genital branch passes with the spermatic cord to innervate the cremasteric muscles,

and provides sensory innervation to part of the scrotal skin. Testicular pain may result from compression or injury to the genitofemoral nerve anywhere along its path.^{16–18}

Early recognition of isolated small bowel perforations secondary to blunt abdominal trauma remains difficult,¹⁰ though extrapolation from data series on penetrating abdominal trauma may predict that the majority of these patients will develop peritonism within 12 h.^{23–24} Clinicians will benefit from considering referred pain as a contributing factor that may obscure the clinical presentation of a patient with trauma. The patient in this case primarily reported testicular pain secondary to suspected testicular trauma. A traumatic terminal ileal perforation, which also resulted in concomitant injury to the genital branch of genitofemoral nerve, may explain this unusual patient presentation.

Learning points

- ▶ Referred pain and unreliable patient histories may obscure trauma patient presentations and delay diagnosis.
- ▶ We hypothesise that trauma to the genital branch of the genitofemoral nerve may result in referred pain to the scrotum, due to abdominal pathology.
- ▶ Clinical examination can be unreliable to diagnose an isolated small bowel perforation secondary to blunt abdominal trauma on initial presentation.

Contributors ACP, AR and DGW contributed equally to the writing and editing of the manuscript. DGW had the idea for the manuscript and was the treating surgeon involved in the patient's care; he is also the guarantor.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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