

Full clinical cases submission template

TITLE OF CASE <i>Do not include "a case report"</i>
Confusion and abdominal symptoms following a rugby tackle
SUMMARY <i>Up to 150 words summarising the case presentation and outcome (this will be freely available online)</i>
<p>A 19-year-old male was sent to the Emergency Department following a pitch-side assessment for suspected concussion, unexplained upper abdominal tenderness and vomiting, following a high impact tackle during a rugby match. A FAST scan performed in the Emergency Department suggested intra-abdominal free fluid, and subsequent head and abdominal CT imaging showed no intracranial lesion but confirmed a significant haemoperitoneum due to large splenic tear and bleeding. An emergency splenectomy was performed, which confirmed the rupture of an enlarged spleen with blood loss of almost 2 litres into the peritoneal cavity. The patient made a full recovery following surgery. A subsequent histological examination revealed granulomatous inflammation characteristic of infectious mononucleosis. This unique case illustrates that physically fit patients with early hypovolemic shock can present with symptoms mimicking concussion.</p>
BACKGROUND <i>Why you think this case is important – why did you write it up?</i>
<p>Rugby league is an internationally popular collision sport, with a missed match injury incidence of approximately 39.8 injuries per 1000 hours,[1] due to the high number of collisions and tackles in the game.[2,3] The tackle has been established as a cause of injury in rugby league ('rugby'), with 46.3% of injuries occurring whilst being tackled at professional and semi-professional levels.[4,5]</p> <p>Acute confusion is a common phenomenon, which may be present in a wide variety of conditions. In the context of contact sport, post-tackle confusion is commonly discussed as a manifestation of a concussive traumatic brain injury diagnosis. The sport concussion assessment tool (SCAT) is a standardized tool for evaluating concussive symptoms,[6] which consists of a battery of tests that evaluate mental status and neurological function. The results of each test are not combined into a composite score; rather each component is used independently to assess the likelihood of concussion.[6]</p> <p>Infectious Mononucleosis (IM), commonly known as glandular fever, is a benign lymphoproliferative disorder caused by primary infection with the Epstein-Barr Virus (EBV). Patients typically present with a classic triad of pharyngitis, fever and lymphadenopathy, and most cases have a self-limiting course, resolving within 1 month of onset.[7] The illness</p>

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classically affects young adults, with the highest incidence between 18 and 22 years of age. Amongst university students the incidence is 1112 per 100,000.[8]

IM is associated with some degree of splenomegaly in the majority of cases,[9] and consequently an increased risk of splenic rupture, both spontaneous and traumatic.[8] Such incidents are rare, occurring in 0.5-1% of patients with IM,[7,10] but are associated with severe risks, including death from haemorrhage, and lifelong susceptibility to bacterial and protozoal infections after splenectomy.[11]

CASE PRESENTATION *Presenting features, medical/social/family history*

The case of a 19-year-old male semi-professional rugby player is reported, who had been reviewed by a pitch side doctor for presumed concussion and sent to the Emergency Department (ED) with confusion, headache, and also nausea, vomiting, and upper abdominal tenderness after a rugby match. He described at least 2 “hard” tackles during the game but denied any short-term memory loss. He reported 18/22 symptoms listed on the SCAT.

Collateral history from the patient’s mother revealed that he had been suffering from an upper respiratory tract infection with productive cough for the previous 5 weeks, for which he was taking erythromycin. The patient had initially been prescribed amoxicillin in primary care, which had resulted in a rash, suggesting a potential EBV infection; however, the results of EBV serology were pending.

During pitch-side examination in the basic club medical facilities, the patient was found distressed, warm centrally, but sweaty, pale and cold peripherally with CRT 3s. Further examination revealed a pulse rate of 92bpm, which for a young athlete was suggestive of a relative tachycardia; blood pressure, respiratory rate and oxygen saturation were all within the normal range. He was confused, complaining of severe headache, blurred vision and balance problems, but his GCS was 15/15. However, he also reported a significant tenderness in the epigastric and LUQ areas on examination, with no tenderness over any of the ribs. There was no evidence of rebound tenderness, and bowel sounds were normal. He was sent to the closest ED for further investigation, and to rule out any significant intracranial and abdominal pathology.

In the ED his vitals were similar to pitch-side assessment. Blood samples were taken and sent for repeat EBV serology. A FAST scan of his abdomen was highly suspicious of haemoperitoneum,

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and therefore an urgent CT head as well as abdo-pelvis with contrast were performed. Findings on the contrast CT scan were consistent with a Grade IV splenic laceration with extensive haemoperitoneum, not amenable to embolization (Figure 1).
INVESTIGATIONS <i>If relevant</i>
DIFFERENTIAL DIAGNOSIS <i>If relevant</i>
TREATMENT <i>If relevant</i>
OUTCOME AND FOLLOW-UP
<p>An emergency splenectomy was performed, during which almost 2 litres of blood was evacuated from the peritoneal space.</p> <p>The day after the surgery, the patient was not confused and denied any headache, drowsiness or significant nausea. Subsequently, serology results confirmed the presence of EBV IgM in the patient's serum, suggesting a recent EBV infection, and histopathological examination of the spleen revealed granulomatous infiltration consistent with EBV infection. Haemoglobin normalised after approximately 6 weeks, and the patient made a full recovery after surgery. At time of writing he has returned to training for participation in rugby.</p>
DISCUSSION <i>Include a very brief review of similar published cases</i>
<p>This case represents an atypical presentation of traumatic rupture of the spleen, presenting as a potential concussion with nausea and vomiting. Confusion and nausea are common symptoms in many conditions including concussion and hypovolemic shock. In this case abdominal pain and tenderness prompted further investigations, and potentially lifesaving treatment. This case illustrates the particular risk of splenic rupture associated with high-impact sport in patients recovering from EBV infection.</p> <p>Rupture of the spleen most commonly occurs resultant of blunt abdominal trauma, and typical</p>

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symptoms include left-sided abdominal pain, a peritonitic abdomen, and symptoms of hypovolaemic shock if blood loss is severe. Less common symptoms include a palpable tender mass in the left upper quadrant of the abdomen (Balance's sign), and referred pain in the left shoulder due to diaphragmatic irritation (Kehr's sign).[12] Vomiting following splenic rupture is rare, but may occur following pressure on the stomach from a haematoma.[12] Occasionally patients have presented with chest pain, or even in full cardiorespiratory arrest, with a preceding history of worsening abdominal pain.[8] Rarely, patients have been seen to complain of a headache after splenic injury.[13]

The combination of headache, confusion and vomiting as described here led us towards an initial working diagnosis at the pitch-side of concussion. Concussive traumatic brain injury is a relatively frequent injury event within rugby union and league, with the head and neck the most common site of match injury in senior rugby,[2] and a pooled estimated 5.9 concussive injuries per 1000 hours of match-play amongst semi-professional players.[14] Whilst these symptoms were atypical for a patient with traumatic rupture of the spleen, we consider whether they might be explained by hypovolaemic shock in the setting of blood loss, vomiting, and sport-related dehydration.

According to the ATLS classification of hypovolemic shock, a confused mental state is associated with a loss of at least 30-40% of circulating fluid volume, or Class III, but this is also associated with hypotension and increased respiratory rate, which were not observed in our patient.[15] However, an analysis of some 36,000 trauma patients by Mutschler *et al* found that the ATLS classification underestimates the degree of mental disability in hypovolemic shock:[16] in severe trauma patients, a GCS of 12-14 was associated with no change in heart rate or systolic blood pressure, and a GCS of <12 was associated only with a modest reduction in mean systolic blood pressure to 117mmHg. As such it seems plausible that trauma patients may present with altered mental status due to hypovolaemic shock even with relatively stable haemodynamics. In our patient's case, his headache and confusion improved dramatically following fluid resuscitation, and thereafter he did not report any concussive symptoms (for which he was monitored). This course would be unusual for a sporting concussion, whereby recovery occurs gradually over hours or days, and a headache typically persists for approximately 48 hours (rarely less than 35).[17] Whilst we cannot exclude concussion as a possible additional diagnosis, the rapid recovery from concussive symptoms following treatment for hypovolemic shock, and lack of

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residual symptoms after a pitch-side score of 18/22 on the SCAT suggests that splenic injury and dehydration alone may have accounted for his presentation.

Infectious Mononucleosis and high-impact sport

As described above, IM is associated with splenomegaly, and the enlarged spleen is at an increased risk of rupture, both spontaneous and traumatic, due to structural changes that accompany infiltrative diseases.[18] Most splenic injuries in IM occur between 4 and 21 days after the onset of symptoms, but have been reported as much as 8 weeks later.[10] The majority are atraumatic, with only 14% of published cases reporting any preceding history of trauma; however this figure may underestimate the role of minor traumas that may go unnoticed and therefore under-reported.[8] Sonographic studies have shown peak splenic enlargement occurs within 2-3 weeks of symptom onset, and splenomegaly has typically resolved completely by 4-6 weeks.[19] Sonographic assessment of splenomegaly (and consequently, of its resolution) can only be reliably made in patients for whom baseline measurements have been taken, due to the variability of normal splenic dimensions in the population, though this remains an ongoing area of research.[20] Clinical assessment of splenomegaly is notoriously unreliable[10] and no correlation has been found between the severity of IM and risk of splenic rupture.[21] As such there is yet no definitive method for establishing when it is safe for an athlete with IM to return to contact sports, hence the advice to avoid high impact sport (as well as other high-risk activities like heavy lifting and vigorous activity) varies between 4-8 weeks after symptom onset for uncomplicated cases of IM.[10,8] The latter, more conservative approach, is based on a recent review of 85 published cases of splenic ruptures in IM with splenic rupture reported at up to 8-weeks after symptom onset.[8] Considering that the majority of cases reviewed had no preceding trauma, advice for the patients should focus on counselling regarding the red flag symptoms in addition to activity limitation.

This case report describes an unusual presentation of traumatic rupture of the spleen in a collision sport participant, who was predisposed to this event by an episode of Infectious Mononucleosis. This disease predominantly affects people in their late teens and early twenties, and consequently athletes of this age who receive a diagnosis of IM should consider a period of contact sport avoidance, given their increased likelihood of spontaneous or traumatic splenic rupture. This case leads us to support recent recommendations that IM patients avoid contact sports, heavy lifting

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and vigorous activities for a period of 8 weeks following the onset of symptoms.[8] Physicians and allied health professionals managing the care of young athletic populations - particularly those participating in collision sports - should be mindful of the potential for splenic injury following IM in this patient group, which may be insidious in nature, particularly in otherwise healthy individuals.

LEARNING POINTS/TAKE HOME MESSAGES *3 to 5 bullet points – this is a required field*

- Acute confusion following a rugby tackle is not pathognomonic for concussion.
- Young collision sports participants have an increased risk of splenic rupture following Infectious Mononucleosis.
- Presentation of splenic rupture may be insidious, so must be considered in any patient presenting with symptoms of shock after abdominal trauma.
- Patients with a diagnosis of Infectious Mononucleosis should exercise caution with contact sport participation and return to play after 8 weeks following the onset of symptoms.

REFERENCES *Vancouver style (Was the patient involved in a clinical trial? Please reference related articles)*

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FIGURE/VIDEO CAPTIONS *figures should NOT be embedded in this document*

Figure 1: coronal contrast CT abdomen showing enlarged spleen with extensive haemoperitoneum

PATIENT'S PERSPECTIVE *Optional but strongly encouraged – this has to be written by the patient or next of kin*

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