

Blunt injury of the infrarenal inferior vena cava — imaging and conservative management

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Summary

Isolated rupture of the infrarenal segment of the inferior vena cava due to blunt trauma is relatively rare. It may be missed clinically and even diagnostic peritoneal lavage may prove negative. The mainstay of diagnosis remains a high degree of clinical suspicion together with sectional imaging. If the patient is haemodynamically stable after initial resuscitation and there is no other indication for exploratory surgery, these lesions can be managed conservatively with good outcome as shown in the case described in this report.

Blunt traumatic injuries of the inferior vena cava (IVC) are rare.^{1,2} There is a high mortality rate associated with all blunt IVC injuries,²⁻⁴ but this is usually related to associated morbidities. Not only are these lesions difficult to diagnose in isolation,⁵⁻⁸ this requiring sectional imaging,⁹ but surgical exploration and repair is also difficult and associated with a high mortality.^{10,11}

Case report

A 53-year-old cyclist was admitted to the trauma unit at Sunninghill Hospital having sustained multiple blunt injuries after being knocked down by a motorist. On admission his blood pressure was 120/70 mmHg and pulse rate was 74/min. He had fractures of the third and fourth right ribs and a right pneumothorax and lung contusion. Other injuries included fractures of the right clavicle, right femur and both ankles and an anterior dislocation of the right hip. The abdomen was soft and non-distended. Microscopic haematuria was detected initially but cleared several hours later. The haemoglobin concentration on admission was 7.2 g/dl. Diagnostic peritoneal lavage (DPL) was not done. Computed tomography (CT) scans of the brain, cervical spine, chest and abdomen were performed, and while the cranial and cervical scans were negative the thoracoabdominal scan showed contusion of the right lung and resolution of the pneumothorax with no abnormalities of the heart and mediastinum in the thorax, and a large retroperitoneal haematoma with circumferential disruption of the infrarenal IVC (Figs 1 and 2). No associated solid organ or hollow viscus injury was noted. The aorta was intact.



Fig. 1. Axial contrast-enhanced lower abdominal multi-slice CT scan shows the disrupted IVC with an enlarged lumen (pseudo-aneurysm) and adjacent retroperitoneal haematoma.

The patient received several units of blood during and after resuscitation. As he remained stable it was decided to manage the IVC injury non-operatively. He underwent surgery to relocate the hip and fix the right femur. A follow-up abdominal CT scan 2 weeks after the initial scan showed no change in the appearance of the ruptured IVC and retroperitoneal integrity. He made a good recovery from his injuries and remains clinically well 14 months after discharge.

Discussion

Blunt injuries of the infrarenal IVC are relatively uncommon.^{1,2} The overall mortality for blunt rupture of the IVC ranges from 50% to 85%.²⁻⁴ This is, however, mainly related to the associated injuries, particularly hepatic injuries, hypotension, transfusion-related complications and multi-organ failure. Because of the retroperitoneal position of the infrarenal IVC as well as the low intraluminal pressure, spontaneous localised containment of a ruptured IVC can occur within the intact retroperitoneum. As a result these injuries may be missed, particularly if there are no associated abdominal injuries that prompt appropriate imaging or require surgical exploration. Isolated infrarenal injuries



Fig. 2. Coronal (A) and sagittal (B) multiplanar reconstructions demonstrate the exact position and length of the affected (infrarenal) segment of the IVC.

may present clinically with mild hypotension that responds easily to intravenous fluid administration,^{5,6} while others may be normotensive. In an isolated and tamponaded injury there may be little or no free intraperitoneal blood, with the result that DPL may be negative.^{7,8} The diagnosis of an isolated infrarenal IVC rupture may therefore only be suspected or confirmed by means of ultrasound or CT imaging.⁹

Surgical exploration and repair of the ruptured IVC carries a high rate of mortality of up to 40%, mainly due to uncontrolled haemorrhage as the tamponaded injury is decompressed and before the active haemorrhage can be adequately controlled.¹⁰ Rapid surgical control of active bleeding in the infrarenal IVC is extremely difficult owing to the extensive network of collateral and tributary veins in this region.¹¹ There is therefore a tendency to favour conservative management of clinically stable isolated IVC injuries.^{11,12}

In conclusion, any patient presenting after trauma with an otherwise inexplicably low haemoglobin concentration, even if initially mildly hypotensive or normotensive, and with a soft abdomen and/or negative DPL, should undergo sectional abdominal imaging, preferably by means of contrast-enhanced CT scanning. Once identified, and in the absence of any other reason for laparotomy, conservative (non-operative) treatment for an isolated infrarenal IVC injury should be considered.

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