

However, in some cases, patients present with only indirect signs with a consequent risk of delayed diagnosis. Thirty percent of patients with abdominal arterial injuries are haemodynamically stable on admission.³³⁸ When bleeding has remained contained by retroperitoneal tamponade, patients with IVC, iliac, and other retroperitoneal vascular injuries may present in a haemodynamically stable condition.³³⁹ The patient's haemodynamic status determines whether to perform immediate surgical exploration or to proceed with diagnostic imaging.

5.2. Diagnostic imaging

CTA is the primary imaging investigation for abdominal vascular injuries and abdominal trauma in general.^{95,340,341} Arterial phase imaging provides optimal visualisation of the arterial structures and bleeding and, in combination with portal venous phase imaging, can help differentiate between arterial and venous haemorrhage.^{342,343}

5.3. Intra-operative management of retroperitoneal haematoma

Patients in shock with ongoing haemorrhage and suspicion of major abdominal injuries should be taken immediately to the operating room for exploration, bleeding control, and resuscitation using a major haemorrhage protocol.³⁴⁴

Recommendation 61			
Immediate surgical exploration and haemorrhage control are recommended for patients in shock with ongoing bleeding and suspicion of major abdominal vascular injury.			
Class	Level	References	ToE
I	C	Sorrentino <i>et al.</i> (2012) ³⁴⁴	

Damage control principles should be used in patients with active haemorrhage. If there are significant amounts of free blood intraperitoneally at trauma laparotomy, resuscitative packing should be performed after evacuation of blood and clots, and bowel evisceration. If major haemorrhage continues despite peritoneal packing, or the patient arrests when the abdominal cavity has been opened, the aorta should be compressed at the hiatus. If cardiac arrest occurs before the abdominal cavity is entered, an antero-lateral emergency thoracotomy should be performed for thoracic aortic compression.

The management of retroperitoneal haematomas has a low level of evidence but has evolved from trauma experience over decades and observational studies.^{345–347} The approach to retroperitoneal haematomas has traditionally depended on the haemodynamic status of the patient, mechanism of injury, location of the retroperitoneal haematoma, and the presence of associated injuries.^{332,345} Management of retroperitoneal haematomas related to the zone classification was developed prior to widespread CTA availability and the increased use of endovascular techniques. Retroperitoneal haematomas are not limited by zone boundaries.

Patient haemodynamic status and the stability of the retroperitoneal haematoma will determine the management approach. Haemodynamic stability and a retroperitoneal

haematoma not expanding, pulsatile, or actively bleeding (stable retroperitoneal haematoma) provide an opportunity for further investigation with CTA to direct management. In patients who are haemodynamically unstable or have an unstable retroperitoneal haematoma (expanding, pulsatile, or actively bleeding), surgical exploration of the retroperitoneal haematoma during trauma laparotomy is needed. Where expertise to explore the retroperitoneum is not available, some haematomas may be temporarily controlled with packing techniques, to await arrival of expertise or transfer to another institution. Where packing does not control substantial arterial injuries, an attempt at exploration and control must be made. Pre-peritoneal packing of unstable intrapelvic haematoma associated with pelvic fracture can be a bridge to endovascular control by embolisation.^{332,345} Where packing does not stabilise the retroperitoneum, exploration for internal iliac artery ligation may be required.

Recommendation 62		
Surgical exploration of retroperitoneal haematomas during trauma laparotomy is recommended in patients who are haemodynamically unstable OR who have an unstable retroperitoneal haematoma (expanding, pulsatile, or actively bleeding).		
Class	Level	References
I	C	Consensus

Recommendation 63		
A non-exploratory approach of retroperitoneal haematomas during trauma laparotomy, with subsequent computed tomography angiography imaging, is recommended for patients who are haemodynamically stable AND have a stable retroperitoneal haematoma (not expanding, not pulsatile, and not actively bleeding).		
Class	Level	References
I	C	Consensus

Surgical exploration of the retroperitoneum for traumatic injuries is principally via right or left medial visceral rotation (Fig. 4). Of these, right visceral rotation provides access to

