

# Major Abdominal Trauma

## Critical Decisions and New Frontiers in Management



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### KEYWORDS

- Major abdominal trauma • Focused abdominal sonogram for trauma • FAST
- Resuscitative endovascular balloon occlusion of the aorta • REBOA

### KEY POINTS

- Be on the lookout for patients with abdominal trauma who have an immediate indication for laparotomy. These patients should be aggressively resuscitated and prepared for transfer to the operating room in consultation with a trauma surgeon. Axial imaging is contraindicated in this patient population.
- The peritoneum can accommodate nearly all of a patient's circulating blood volume and, therefore, represents an uncontrollable and potentially catastrophic source of internal hemorrhage. In the unstable multisystem trauma patient, the priority is usually aggressive resuscitation and rapid surgical control of hemorrhage.
- Stable patients with serious injuries can deteriorate without warning. Isolated drops in blood pressure or significant base deficit predict recurrent episodes of hypotension and the need for early therapeutic intervention.
- In stable patients for whom immediate axial imaging is planned, abdominal focused abdominal sonogram for trauma (FAST) adds little additional clinical information and can be omitted. Assessment with FAST should not be used to determine the need for computed tomography (CT) imaging.
- Axial imaging is an excellent test for determining the specific anatomy and severity of injury but when used in the wrong population confers significant risk of harm. CT imaging should be avoided when indications for immediate trauma laparotomy are present.
- Local wound exploration is a safe and effective way to exclude intraabdominal injury in patients with anterior abdominal stab wounds.

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## WHAT ARE THE IMMEDIATE MANAGEMENT PRIORITIES IN THE UNSTABLE PATIENT WITH ABDOMINAL TRAUMA?

The primary survey should proceed in a stepwise and systematic fashion for all trauma patients, regardless of injury pattern, and should address immediate threats to life. The Advanced Trauma Life Support program provides a preliminary framework that allows for a systematic and organized approach; however, when resources permit, multisystem assessment and resuscitation should proceed in parallel rather than in sequence. Specific to the abdomen, the key to efficient management is ruling in or out life-threatening hemorrhage, usually with a combination of mechanism of injury, physical examination, and bedside imaging. The patient who has suffered blunt or penetrating abdominal trauma and is hemodynamically unstable should be aggressively resuscitated and evaluated immediately for surgical exploration. Rapid transport to definitive surgical care is of paramount importance for those with abdominal injuries and ongoing hemodynamic instability. In hypotensive patients with gunshot wounds, delaying operative management by more than 10 minutes is associated with a 3-fold increase in mortality.<sup>1</sup>

Unlike thoracic trauma, hemodynamic instability from intraabdominal injuries arises exclusively from major hemorrhage; therefore, resuscitation should involve the early use of blood and blood products. Excessive crystalloid administration in this context disrupts the coagulation cascade, inhibits clot formation, and should be avoided. A damage control approach that includes permissive hypotension, early tranexamic acid, and a balanced ratio of blood products is preferred until definitive hemostasis can be achieved.<sup>2</sup> Massive or refractory hemodynamic instability should prompt consideration for massive solid organ or vascular injury. Patients with serious blunt abdominal trauma rarely have single-system injuries; other sources of obstructive or hemorrhagic shock should be actively sought and excluded. In general, large-bore peripheral intravenous cannula (14 or 16 gauge, placed in the bilateral antecubital fossae) provides excellent vascular access for the purpose of volume resuscitation. If major abdominal or pelvic trauma is suspected, peripheral and central lines should be placed above the diaphragm, in the subclavian or internal jugular veins. Temporary vascular access can be obtained via intraosseous placement in 1 or both humeral heads.

Intraabdominal hemorrhage resulting in hypotension requires definitive surgical treatment regardless of associated injuries. As a third space for hemorrhage, the peritoneum presents the dual dangers of a noncompressible source of bleeding that can accommodate nearly all of a patient's circulating blood volume, making it the priority for management even in the face of other serious injuries. Traumatic brain injury (TBI), contained blunt thoracic aortic injury, extremity injuries without severe hemorrhage, and ischemia to any extremity may be addressed once hemorrhage control occurs. Patients with both major abdominal hemorrhage and a significant pelvic fracture that remains unstable after resuscitation and application of a pelvic binder are best managed in the operating room (OR)<sup>3</sup> in the absence of a hybrid room. Compared with angiography, the OR is typically available immediately, and allows for management of both intraabdominal injuries and temporizing of pelvic bleeding with preperitoneal packing. Angiography can still proceed after laparotomy and preperitoneal packing if ongoing pelvic bleeding is suspected. The advent of the hybrid OR allows some institutions to bring the patient to a single location for all hemostatic procedures, including exploratory laparotomy, angiography, and orthopedic and neurosurgical interventions. This is the most ideal place for the patient requiring multiple emergent procedures. TBI is often not fully characterized until a computerized tomography (CT) scan is performed, which usually occurs after hemorrhage control. If a patient has

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