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Initial Evaluation and Triage of the Injured Patient: Mechanisms of Injury and Triggers for Operating Room Versus Emergency Department Stabilization

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Abstract Trauma anesthesiologists are uniquely juxtaposed with the multidisciplinary trauma team, serving both an administrative role in preparing the operating room (OR) and allocating resources for resuscitation, and a direct patient care role, providing definitive airway management and advanced resuscitation. Trauma anesthesiologists must have an intimate understanding regarding mechanisms of injury, appropriate diagnostic modalities, and current practices regarding OR versus emergency department or radiology suite (IR) resuscitation. In this review, current practices regarding assessment and triage, mechanisms of injury, and the concepts of surgical, orthopedic, and radiology "damage control" approaches to the severely injured trauma patient are discussed.

Keywords Triage · Trauma anesthesiology · Damage control orthopedics · Damage control resuscitation · Damage control radiology · Mechanism of injury

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Introduction

Trauma anesthesiologists are uniquely juxtaposed with the multidisciplinary trauma team, serving both an administrative role in preparing the operating room (OR) and allocating resources for resuscitation, and providing direct patient care through definitive airway management and advanced resuscitation. Both patient assessment and diagnosis are time-dependent processes, and trauma anesthesiologists must have an intimate understanding regarding mechanisms of injury, appropriate diagnostic modalities, and current practices regarding OR versus emergency department (ED) or radiology suite (IR) resuscitation. In this review, current practices regarding assessment and triage, mechanisms of injury, and the concepts of surgical, orthopedic, and radiology "damage control" are discussed.

Mechanisms of Injury Prompting Urgent Intervention

Pre-hospital triage of the seriously injured trauma patient begins in the field and is fraught with difficulty. Estimations of blood loss are woefully imprecise and classically taught shock classifications are commonly confounded by extremes of age and variations in physiological reserve [1]. In 2011, the Centers for Disease Control and Prevention (CDC) along with the National Highway Traffic Safety Administration (NHTSA) collaborated with the American College of Surgeons' Committee on Trauma (ACS-COT) to revise previous field triage decision schemes in order to reduce over triage of patients with non-life threatening injuries, and to help direct patients in most need of lifesaving interventions to appropriate trauma centers [2]. Current guidelines recommend a four-step assessment to assist pre-hospital providers with making decisions about which patients are most in need of transport to a trauma center. Briefly summarized, the four steps for assessing the need for trauma center referral are (1) physiological considerations, including systolic blood pressure <90 mmHg, Glasgow Coma Scale ≤13, respiratory rate <10 or >29 (or need for ventilatory support); (2) anatomical considerations, to include any penetrating injury to the head, neck, torso, and extremities (proximal to the elbow or knee), chest wall instability/deformity, amputation proximal to the wrist or ankle, pelvic fracture, open/depressed skull fracture, and paralysis; (3) mechanisms of injury (discussed in the section that follows); and (4) special patient or system considerations such as age >55 years, children, patients on anticoagulants, or with bleeding disorders, burns (to be triaged to designated burn centers), and pregnancy >20 weeks.

Traditionally, mechanism of injury has been referred to as *blunt* versus *penetrating* trauma, with no further delineation as to how much energy was imparted, or information regarding anatomical and physiological insults. Some studies have suggested that mechanism of injury alone is a poor predictor for trauma center referral [3, 4]. Others have demonstrated that distinct mechanisms, such as ejection from a vehicle or prolonged extrication time, clearly warrant trauma center team activation [5, 6]. In a study by Lerner et al., the ACS Field Triage Decision scheme was examined, and interviews conducted with emergency medical technicians who transported patients to trauma centers based on mechanism alone [7]. Only three mechanisms of injury reliably predicted the need for referral to a trauma center when patients did not meet anatomical or physiological injury criteria: death of an occupant in the vehicle, fall greater than 20 feet, and extrication time greater than 20 min [7]. Additional studies have justified mechanism of injury as a parameter that helps reduce inappropriate transport of patients with major trauma to non-trauma centers [8, 9].

Blunt and penetrating injuries are regularly disparate in presentation but may share similarities in terms of extent of injury [10]. Penetrating injuries are identified as ballistic and non-ballistic. The point of injury in the patient with penetrating trauma may be utterly discernible—even to the inexpert provider—but the extent of tissue damage and depth of shock may be less detectible compared to the patient suffering from a blunt traumatic injury [10]. Conversely, the patient with penetrating trauma will lose blood volume externally together with loss into body cavities, whereas the patient with blunt trauma may present in hemorrhagic shock with no obvious signs of hemorrhage. Multiple blunt traumatic insults, bleeding into compartments (e.g., unstable long bone fractures), retroperitoneal hemorrhage (e.g., pelvic fractures, major vascular injury, and solid organ damage) and bleeding into other body cavities may present as indolent hemorrhagic shock [11, 12].

The performance of a thorough patient assessment, application of rapid diagnostic tests, and early activation of resources is vital for ensuring optimal outcomes in patients with severe traumatic injuries [13]. Primary assessment, use of Focused Assessment with Sonography in Trauma (FAST) exam, initial radiographic studies and computed tomography (CT) scans—hemodynamic stability permitting—will specify a definitive diagnosis of injury and plan of treatment [11, 14].

Who Should Go Directly to the OR?

In selected cases with obvious, imminent exsanguination, patients should be directly admitted to the operating room, bypassing the ED, and radiology suite. Historically, it has been shown that up to a third of preventable trauma deaths may be caused by delays getting to the OR; in one registry study, mortality was increased by 1 % for every 3 min of delay to laparotomy among hypotensive patients with abdominal injuries [15–17]. Steele et al. were among the first to describe a "direct to the OR" approach in San Diego, reporting data gathered over a 10-year period [18]. Patients with traumatic cardiac arrest, systolic blood pressure persistently <100 mmHg, amputation, or uncontrolled external hemorrhage, were admitted directly to the OR for resuscitation, regardless of mechanism of injury. These triage criteria had poor sensitivity (24.1 %) but high specificity (98 %) in identifying patients truly in need of immediate surgery. Observed compared to predicted survival was significantly higher in this observational study. In another 10-year retrospective analysis from Portland, Oregon, Martin et al. used the same triage criteria as Steele et al., with the addition of the following indications for "unstable" patients requiring direct-to-OR admission: patients with a chest injury; acute abdomen; crush injury to the torso, or evisceration of abdominal contents; penetrating injuries to the neck, chest, abdomen or pelvis; impaled objects in the neck, chest, abdomen, or pelvis; or massive blood loss on scene or en route [19]. From 2000 to 2009, 1407 patients were admitted directly to the OR (5 % of all admissions). After excluding patients who died on arrival (8 %), 3.6 % died in the OR, and overall observed (5 %) mortality was significantly lower than predicted (10 %). Emergent surgical procedures were started within 30 min of arrival in 77 % of patients and within 60 min in 92 %.

Not every seriously injured patient requires direct admission to the OR. In the sections that follow, "damage control" concepts are briefly discussed, as well as the evolving role of less invasive techniques.

Damage Control Resuscitation

If hemorrhagic shock is present, damage control surgery (DCS) and damage control resuscitation (DCR) should immediately follow the primary survey and FAST exam [20–22]. A term originally coined by the US Navy in reference to preventing a badly damaged vessel from sinking by implementing procedures to stabilize the ship, the principle of *damage control* has now been applied to trauma care [23]. Tenets of DCS and DCR include compressible hemorrhage control; hypotensive resuscitation; rapid surgical control of bleeding; avoidance of the overuse of crystalloids and colloids; prevention or correction of acidosis, hypothermia, and hypocalcemia; and hemostatic resuscitation with the early use of a balanced amount of red blood cells, plasma, and platelets [24, 25]. DCR and DCS have been associated with higher successful non-operative management rates and survival in patients with a variety of injuries, including severe blunt liver injuries [22] and severe thoracic injuries [26]. While an in-depth discussion of DCS and DCR is beyond the scope of this report, the reader is referred to several excellent reviews on the topic [24, 25, 27, 28••].

Patients with non-compressible hemorrhage ought to be taken immediately to the operating room for DCS as well as DCR [29]. However, with the advent of rapid diagnostic tests and therapeutic interventions, alternative resuscitation strategies continue to evolve, serving as temporizing measures en route to the OR or radiology suite. One such modality is the Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) for non-compressible torso hemorrhage. This procedure involves placing a balloon occlusion catheter into the common femoral artery in order to reach the proximal descending thoracic aorta where the balloon is deployed to occlude blood flow [30, 31]. When employed by knowledgeable and skilled providers, the REBOA has been associated with positive outcomes thus far in selected patients for whom the procedure is clearly indicated [32, 33]. Additional mechanical (i.e., bandages impregnated with zeolite, kaolin, chitosan, etc.) and injectable hemostatic adjuncts (e.g., tranexemic acid and prothrombin complex concentrates) represent early DCR measures that can be utilized in the pre-hospital arena, addressing the lethal triad of acidosis, hypothermia, and coagulopathy, and providing physiological support for the patient requiring definitive repair of injuries [25, 34].

Damage Control Orthopedics

Fractures and soft tissue injuries are injuries frequently encountered with polytrauma patients [23]. Ideally, definitive repair of fractures in the OR (i.e., "early total care") saves costs, improves mobilization, and allows for more efficient utilization of OR staff and orthopedic surgeons [23]. However, in patients with multiple injuries, a staged strategy is employed to reduce serious complications. This strategy is called "damage control orthopedics (DCO)" (Table 1).

The decision to use DCO is based on the status of the severely injured patient. Four classes of patients have been described by Pape et al. [35].

DCO consists of four phases [36]. In the first phase, lifesaving interventions are performed according to ATLS. In the second phase, measures are taken to control hemorrhage and temporarily stabilize major skeletal fractures. External fixation and traction techniques are often used during this phase [37]. Phase three consists of intensive care unit management and stabilization of additional injuries (i.e., pulmonary contusions, fluid shifts, and immunological changes). In the final phase, fractures are definitively repaired. In general, definitive fixation usually occurs between the 5th and 10th days post-injury [23, 38]. During days 2–4, definitive orthopedic repair is not advised due to ongoing immunological changes, tissue edema, and fluid shifts; patients undergoing definitive repair during this timeframe have been observed to have a higher risk for multiple organ dysfunction syndrome and other complications, such as acute respiratory distress syndrome (ARDS) [39, 40]. A DCO strategy is preferred for femur fractures in patients with multiple injuries based upon this rationale [40–42].

Pelvic ring injuries are relatively rare, but associated with a poor prognosis, particularly when associated with hemorrhagic shock. The pelvis can accommodate up to 4 l of blood before the pressure from a hematoma tamponades bleeding vessels [43]. 90 % of all bleeding in pelvic fractures originates from venous disruption; arterial bleeding is less common [23]. Hence, selective angiographic embolization is frequently utilized to achieve hemodynamic stability (discussed in the section below) [44]. The care of these patients requires a unique multidisciplinary approach since the decision to take the patient to the OR for a laparotomy and pelvic packing is only prudent for hemodynamically unstable patients [23, 44, 45]. The overall strategy for managing patients with radiologically confirmed or suspected pelvic fractures is described in Fig. 1.

The ideal timing of spine fracture internal fixation in patients with multiple severe injuries remains controversial [46]. Some have proposed that delayed fixation of thoracolumbar fractures may help avoid lethal complications, as has been shown with femur fractures [46]. There is currently no consensus on the ideal timing and modality of spine fracture fixation in multiply injured patients, and prospective multicenter trials are indicated to provide clarification on which groups of patients might benefit from DCO.

Damage Control Radiology

The decision to take a patient to the OR for the management of life-threatening hemorrhage presupposes that operative intervention is the best method of controlling active hemorrhage. For example, the finding of free fluid in the abdomen during a FAST exam in the setting of

Table 1 Indications for damage control orthopedics (DCO)

Parameter	Stable (grade I)	Borderline (grade II)[a]	Unstable (grade III)	Extremis (grade IV)
Shock				
Blood pressure (mmHg)	≥100	80–100	60–90	<50–60
Lactate (mmol/L)	0–2	2–8	5–15	>15
No. of PRBCs (2 h)	Normal	≈2.5	>2.5	Severe acidosis
Base excess (mmol/L)	Normal	–	–	>6–18
ATLS classification	I	II–III	III–IV	IV
Urine output (mL/h)	>150	50–150	<100	<50
Coagulation				
Platelet count (mcg/mL)	>110,000	90,000–110,000	<70,000–90,000	<70,000
Factor II & V (%)	90–100	70–80	50–70	<50
Fibrinogen (g/dL)	>1	≈1	<1	DIC
D-Dimer	Normal	Abnormal	Abnormal	DIC
Temperature				
(°C)	>35	33–35	30–32	≤30
Soft tissue injuries				
PaO_2/FiO_2 ratio	>350	300	200–300	<200
Chest AIS	AIS I or II	AIS ≥ 2	AIS ≥ 2	AIS ≥ 3
Thoracic trauma score	O	I–II	II–III	IV
Abdominal trauma score	≤II	≤III	III	≥III
Pelvic trauma (AO)	A	B or C	C	C (crush, rollover with abdominal trauma)
Extremity AIS	AIS I or II	AIS II–III	AIS III–IV	Crush, rollover (with extremity injuries)

Patients meeting criteria in grades II–IV should have a DCO approach

Adapted from Pape et al. [35], with permission from Wolters Kluwer Health

Pelvic trauma modified Muller AO classification-A, posterior arch intact; B, rotationally unstable/vertically unstable/incomplete disruption of the posterior arch; C, rotationally and vertically unstable/complete disruption of the posterior arch. (From Muller [65]). (I) DIC-disseminated intravascular coagulation, abdominal trauma score, (II) any injury to common hepatic artery, splenic artery or vein, right/left gastric arteries, gastroduodenal artery, inferior mesenteric vessel; (III) any injury to superior mesenteric vessels, iliac vessels, hypogastric vessel, infrarenal vena cava; (IV) any injury to superior mesenteric vessels, celiac axis, suprarenal, or infrahepatic aorta; (V) portal vein, retrohepatic/duprahepatic vena cava, and suprarenal/subdiaphragmatic aorta. AIS-abbreviated injury score[a]Additional factors to consider in "borderline patients:" Injury severity score >20 with additional thoracic trauma (AIS 2), polytrauma with abdominal/pelvic trauma and hemodynamic shock, ISS 40 or above in the absence of additional thoracic injury, bilateral lung contusions on radiographic studies

penetrating trauma will almost always necessitate an operative exploration without the need for further evaluation [47]. In the setting of blunt trauma, however, the operative decision tree can be more complex, even in the unstable patient. In the setting of blunt abdominal trauma, the utility of the FAST exam has been questioned and more importance placed on the whole-body CT scan, particularly in the hemodynamically stable patient [48]. The hemodynamically unstable blunt trauma patient has been more of a challenge with a positive FAST exam typically leading to an exploratory laparotomy [48]. Recent changes in radiologic technology may alter future management strategies in the hemodynamically unstable patient with blunt and penetrating trauma where non-operative options such as endovascular stenting or transarterial catheter embolization (TAE) may be a preferred management strategy. The anesthesiologist managing the traumatically injured patient should understand the evolving practice of Damage Control Radiology (DCRad) and how this interacts with their role in the perioperative management of these patients.

The concept of DCRad was described by Gay and Miles in their review of imaging used in trauma decision making for wartime casualty management [49]. The aims of DCRad are listed in Table 2.

To achieve these aims, imaging studies must be fast, accurate, and sufficiently detailed if they are to be of value in the decision making process while not unduly delaying definitive care. Traditional imaging such as digital chest radiographs immediately available for review at the point of resuscitation and the FAST exam are routinely used in the primary survey although each of these has limitations in selected settings. With DCRad, more importance is placed on whole-body CT scans with the use of contrast although questions remain about the appropriate sequencing and

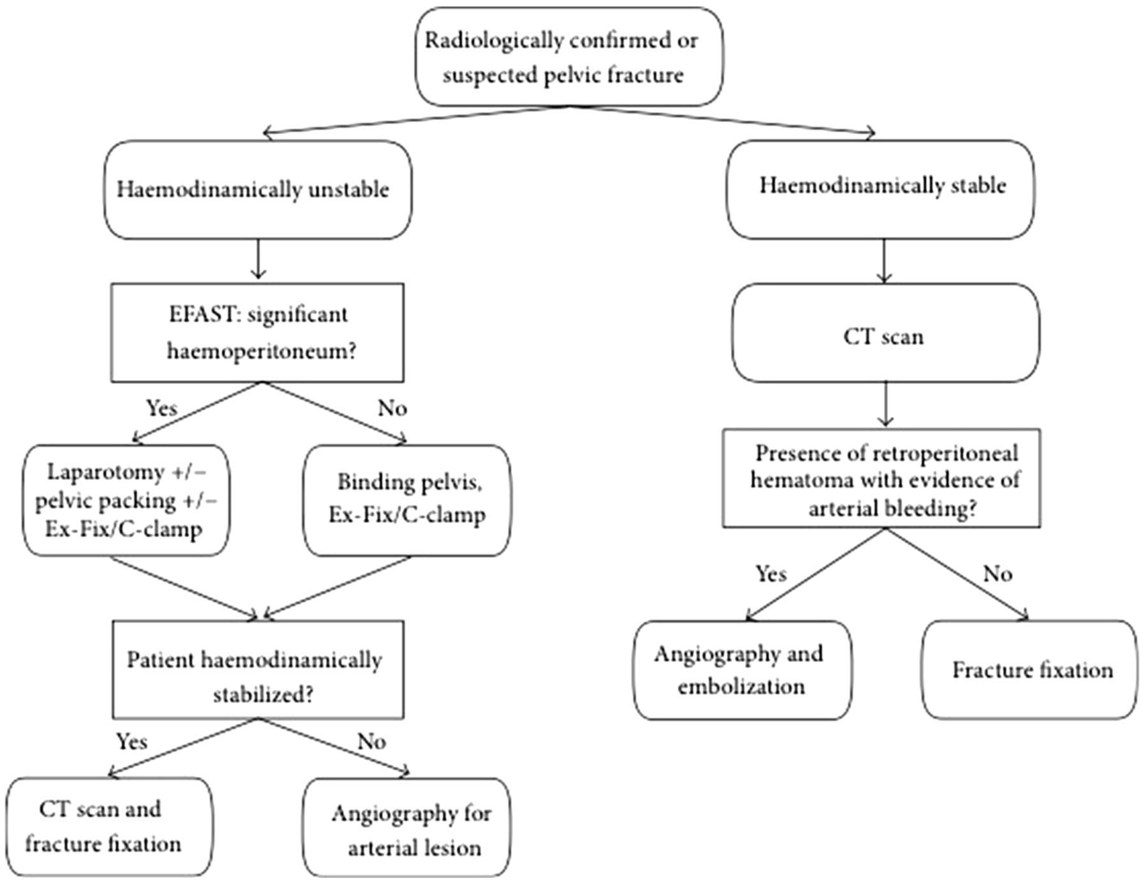

Fig. 1 Algorithm for management of pelvic fractures in the patient with multiple severe injuries. *EFAST* extended focused assessment sonography for trauma, *CT* computerized tomography, *Ex-Fix* external fixation. From Nicola [23]. ©2013 Ratto Nicola

interpretation of these studies in the unstable patient. Expanding on the role of DCRad as a diagnostic tool, early involvement with interventional radiology can also be very useful in the management of the bleeding trauma patient.

One of the longstanding arguments for not routinely obtaining CT evaluation of the unstable trauma patient is the delay in care caused by movement to and from the scanner combined with the study acquisition and interpretation time. It has been suggested that "the philosophy of care that the 'unstable' patients should not be taken to the CT scanner is widely accepted but not based on any evidence" [50••]. With the positioning of multidetector CT scanners in close proximity to trauma resuscitation units and EDs, it is now feasible to rapidly obtain a non-contrast head CT scan followed by a dual-phase contrast injection for the neck and trunk to identify injuries requiring the most urgent management including any active bleeding or solid organ laceration [50••]. Typically these scans can be completed in less than 3 min in addition to the transport and patient positioning time. With rapid review of the results by trained radiologists, the trauma surgeon and resuscitation team can more quickly define specific injury patterns compared to "traditional" assessment methods [51].

Several studies have suggested that CT scans can be accomplished without increased mortality in hypotensive patients provided they are obtained quickly and with ongoing resuscitation [52, 53••]. Wada et al. examined the impact of obtaining a CT scan prior to interventions in a retrospective blunt trauma patient population that subsequently required emergency bleeding control [52]. In a multivariate analysis, obtaining a CT scan was an independent predictor for probability of increased 28-day survival. In a subgroup analysis of patients with more severe trauma (Trauma and Injury Severity Score Probable Survival, TRISS Ps <50 %) and shock index >1 before CT scan, they observed a better survival rate for CT scan patients than that predicted by the TRISS method. Additionally, there was no difference in survival rate of non-CT scan patients suggesting that whole-body CT scans performed in the most seriously injured and unstable blunt trauma patients may be associated with improved survival. Looking at a retrospective population of 909 blunt trauma patients, Fu and colleagues identified 91 (10 %) patients who remained hypotensive (systolic blood pressure, SBP <90 mmHg) after their initial resuscitation [53••]. Fifty-eight (63.7 %) of the hypotensive patients underwent full body CT scan before receiving definitive

Table 2 Aims of damage control radiology

Identification	Interventions
– Life-threatening injuries – Need for emergent thoracic or abdominal surgery – Traumatic brain or spinal cord injury in multi-trauma patient requiring additional monitoring or therapeutic interventions	Provide control of ongoing bleeding through interventional radiology techniques including: Temporary balloon arterial occlusion Embolization to occlude arteries Stent grafting to repair injured vessels Refinement of surgical and therapeutic options

Adapted from Gay and Miles [49], with permission from BMJ Publishing Group Ltd

treatment compared to 68.8 % of the non-hypotensive patients. There was no difference in mortality or the time to definitive hemostasis with surgery or angiography with embolization for either group suggesting the CT scan did not alter the treatment timeline. During the review period, the authors also noted that the percentage of hypotensive patients getting a CT scan increased from 26 % in 2008 to 88 % by 2013.

In the only published randomized trial comparing the effects of early CT scans obtained immediately in the resuscitation room compared to CT scans obtained at a more remote location, the authors found no improvement on clinical outcomes with only trends toward decreased mortality with earlier CT scans despite faster completion of the CT scan [54]. Unfortunately, this study was done in two different facilities with all patients in each arm of the study coming from a different institution introducing potential treatment bias into the results. A follow-on study to this work, the Randomized Study of Early Assessment by CT Scanning in Trauma Patients-2 (REACT-2) trial, is a multicenter randomized clinical trial comparing whole-body CT scan during the primary survey to local conventional trauma imaging protocols supplemented by selective CT scans [55]. The results of this study should help clarify the role of early whole-body CT scans in both the stable and hypotensive blunt trauma patient.

With an increased usage of early whole-body CT scans in the actively bleeding patient, the anatomical knowledge gained from these studies allows greater choice between open and endovascular control of hemorrhage in several clinical scenarios. Increasingly, personnel involved in the initial management of the severely traumatized patient, including surgeons, emergency medicine physicians, and anesthesiologists, will need to interface with IR to control active bleeding prior to an operative intervention, secondary control after an operative procedure, or as the primary means of hemorrhage control in order to avoid a trip to the OR. While many of these procedures are handled outside of the traditional OR, the advent of hybrid ORs with combined operative and IR support has brought these patients more into the perioperative environment. The anesthesiologist should be familiar with triage decisions in these patients to better prepare for support of ongoing resuscitation during IR treatment or to anticipate subsequent operative requirements. Common scenarios that have both open and IR management options include: splenic, liver, and pelvic hemorrhage.

Splenic injury is a common finding after blunt trauma and has largely become a non-operative diagnosis except in the setting of hypotension or peritoneal signs where emergent laparotomy is used to make the diagnosis. The increase in non-operative management, however, does show significant institutional variation with an early operative rate between 7 and 67 % in the United States in 2005 [56]. Need for angiographic evaluation and possible TAE is now largely limited to patients with Grade IV or V injury, presence of contrast blush or pseudoaneurysm on CT scan, moderate hemoperitoneum, or evidence of ongoing splenic bleeding (unexplained decline in hemoglobin over time) [57, 58]. In the most recent multicenter prospective observational study of non-operative management of blunt splenic injuries not requiring operative management within the first 24 h, Zarzaur et al. noted that 70 of 383 patients (18.3 %) underwent angiography on admission with 61 (15.9 %) also undergoing TAE [59]. Interestingly, the likelihood of subsequently requiring splenectomy after TAE (2.8 %) was not statistically different than those patients not undergoing TAE. Similarly, in a recent single-center study comparing protocolized TAE for all patients with Grade III or higher injuries, a 5 % failure rate was observed compared to a historical failure rate of 15 % with non-operative management with less use of TAE [60]. With the increasing availability of hybrid ORs and vascular surgeons taking on more responsibility for trauma-related angiography/TAE cases, these patients will be increasingly seen by anesthesiologists in the perioperative environment.

Severe blunt liver injury has similarly shifted to a more non-operative management strategy in the stable patient. Current recommendations from the Eastern Association for Surgical Trauma (EAST) for blunt liver injury in the setting of hemodynamic instability or diffuse peritonitis remain the same as those for splenic injuries with emergent exploratory laparotomy being a Level 1 recommendation. In a recent review of blunt hepatic injury management, Melloul and colleagues reviewed studies covering 4946 patients [61]. They noted that a median of 66 % of patients were managed non-operatively and only 3 % required TAE with a 93 % success rate. Despite the reportedly high success rate, 9–30 % of patients ultimately required a laparotomy. More importantly, of the 31 % requiring initial operative management, 12–28 % of these patients went on to get secondary TAE in the setting of recurrent or uncontrolled hepatic bleeding. Current recommendations suggest that the patients with blush on CT scan or who fail non-operative management should be considered for TAE [61, 62].

A final group of patients that may also require early TAE with or without operative requirements are those with pelvic fractures and associated hemorrhage. This group of patients, unlike those with solid organ injuries, may benefit from earlier TAE rather than operative interventions since surgical control of retroperitoneal hemorrhage is difficult if not impossible in many patients. Of note, much of the hemorrhage may come from the venous plexus or bleeding cancellous bone making control through TAE difficult. Current EAST guidelines recommend that patients with pelvic fractures and hemodynamic instability or signs of ongoing hemorrhage should be considered for pelvic angiography and TAE with avoidance of an exploratory laparotomy if possible [48]. The timing for embolization remains a question since many institutional protocols strive for external pelvic fixation prior to TAE, whereas others pursue embolization as the first priority [36, 63, 64].

There is some evidence that earlier embolization may affect survival. Tanizaki et al. performed a retrospective review of 140 patients with pelvic ring fractures with 68 (49 %) undergoing angiography and TAE [64]. They found that patients embolized within 60 min of arrival had a significantly lower mortality rate (16 vs 64 %) than those with a longer time to embolization (average time to embolization was 76 min). A pelvic binder was placed if hypotension was present but angiography was not delayed for external fixation.

Not all studies have shown a benefit to earlier TAE in the patient with unstable pelvic fractures. Thorson et al. reported on their experience over a 12-year period from 1999 to 2011 with 2922 patients with pelvic fractures [45]. Of those patients, only 183 (6 %) underwent angiography. When looking at the sequencing, 49 (27 %) went to the OR before angiography and the remainder went to angiography first. The rate of TAE was similar between groups (71 vs 62 %) with no difference in mortality or length of stay. In a recent Italian consensus conference, the participants felt that the current level of evidence did not support the use of angiography and TAE as the initial treatment strategy and recommended preperitoneal pelvic packing and external fixation as the first line of therapy.

Conclusion

In summary, there appears to be a trend toward a more "damage control" approach in the early management of the severely injured patient for both diagnosis and therapeutic interventions. When combined with the advent of hybrid ORs and surgeons trained in interventional radiology approaches, it is clear that the anesthesiologist participating in the care of these patients should have an understanding of the triage approach for both operative and non-operative management. Decisions regarding ongoing resuscitation, transfers for imaging, and whether IR or surgery is the appropriate approach to manage bleeding are complex in this heterogeneous population and should include the anesthesiologist participating in the perioperative management of the patient.

Compliance with Ethics Guidelines

Conflict of Interest Samuel M. Galvagno Jr., Robert A. Sikorski, Christopher Stephens, and Thomas E. Grissom declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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