Chapter 3
Initial Management Priorities: Beyond ABCDE

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BLUF Box (Bottom Line Up Front)

1. Prepare for combat trauma surgery by reading, review of case scenarios, and visualization.
2. Focus on one patient at a time. During multiple casualty events, stay with the casualty to whom you are assigned.
3. In combat trauma C comes before A and B. Assess for and control hemorrhage immediately, it is what will kill most of your patients.
4. Assessment of airway (A) should be rapid in combat casualties; it is generally an "all or nothing" phenomenon. Intubation can often wait until you get to the OR.
5. B is for tension pneumothorax, auscultate and augment with ultrasound or CXR.
6. Check tourniquets for adequacy and tighten or augment with pneumatic tourniquets, particularly for proximal amputations.
7. Perform a FAST exam early. Obvious abdominal injury in unstable patients should prompt abandonment of the FAST and rapid movement to the OR.
8. Portable chest and pelvis x-rays can be taken in the trauma bay and brought to the OR – they may provide valuable data.
9. Get help in the OR, particularly for multi-system combat casualties. Do your damage control procedures in tandem, not in series.
10. Intra-operative findings should match patient physiology – if they don't, you need to conclude the operation you are doing and look for the real hemorrhage sources.

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M. Martin and A. Beekley (eds.), *Front Line Surgery: A Practical Approach,*
DOI 10.1007/978-1-4419-6079-5_3,

How varied was our experience of the battlefield and how fertile the blood of warriors in rearing good surgeons.

Thomas Clifford Allbutt

Multiple casualties have arrived. You can hear more Blackhawks landing on the helipad outside. The first casualty has rolled into the next trauma bed after being assigned to your colleague by the triage officer. You notice exposed brain bulging from a jagged hole in the frontal bone. Omentum hangs from wound on his left flank. The left lower extremity is missing from about mid-thigh – two tourniquets are in place side by side. The area around the litter is a bustle of activity.

The next casualty is brought into you. You have an initial wave of anxiety. You haven't been here long. Aside from an obvious open tibia/fibula fracture in his right leg, he is talking, telling you he is okay and to help his buddies first. Your cursory primary survey appears negative – airway intact, breath sounds clear, and palpable radial pulse. You begin to drift over to the first casualty. He is clearly going to need a lot of operations and your colleague is hard at work…

The scenario just described can happen any day at any surgical unit in Afghanistan, Iraq, or any other modern conflict. You may find yourself as the only surgeon or only one of two surgeons available to handle multiple severely injured casualties at once. Hence, any discussion on "initial management priorities" must take into account that these priorities may change based on the ratio of severely injured casualties to surgeons. One day, a casualty with a brain injury may get full resuscitative efforts; the next day, the same casualty may be made expectant due to the nature of the other casualties and the resources available. Triage and initial management priorities are not set in stone, but are dynamic processes that always take the local conditions and capabilities into account.

The process is triage, a simple sorting and prioritization that occurs with multiple casualties. This topic will be discussed further in another chapter. The process by which the surgeon approaches the individual multiply-injured combat casualty, however, should also be thought of as a sorting and prioritization exercise. Every move you make, particularly in the first few minutes of the trauma evaluation, should be prioritized toward identifying life threatening injuries and bleeding, followed by likely injuries that require immediate intervention, and lastly a detailed survey to identify occult or lower priority injuries. Even if the patient is "stable," proceed like he could become rapidly unstable in the next minute. You don't want to be shooting a femur x-ray when the patient becomes unstable and you realize you haven't done a FAST exam or a chest x-ray yet. Like all operations surgeons perform, this exercise can be simplified by breaking it down into a series of steps.

The first step, and perhaps the most important one, is FOCUS on your patient. One of my most senior surgeon mentors and friends used to say that the surgeon must develop the ability to block out distractions, both internal and external. The surgeon's pounding heart, sweaty hands, and self-doubt are internal distractions. Each surgeon must figure out on his own how best to minimize and overcome the stress of caring for severely injured brothers and sisters in arms. Some surgeons do not suffer much from doubts ("often wrong, never in doubt"), but many of us do

(if we are honest with ourselves). Some surgeons choose to mentally prepare by reading textbooks; others, by presenting hypothetical surgical challenges and figuring out what to do with them. Choose a method and PREPARE ahead of time. Regardless of your background, prior deployments (or lack thereof), and civilian trauma experience (or lack thereof), you WILL be challenged by combat casualties. Mental preparation, study, and visualization can lessen the stress the first time. And ALWAYS ask for help when needed – trauma is a team sport in the combat or disaster setting.

The casualty with exposed brain, evisceration, and a missing limb on the next litter is an external distraction. External distractions must be minimized in order for you to serve your patient best. The key point for surgeons new to the combat environment to learn is to STAY WITH YOUR PATIENT, particularly during multiple casualty events (which happen frequently). Focus on one patient at a time. The surgeon in the scenario at the beginning of the chapter is at risk for drifting away from his assigned casualty and missing important findings. If you are needed elsewhere, the triage officer will re-assign you if your patient is truly stable. In the meantime, attend to your patient until you are confident that your workup is complete or you have appropriately handed the casualty off to another provider.

Initial Management Priorities

Sick or Not Sick?

When the surgeon approaches a combat casualty for his initial evaluation, his first determination should be binary: is this patient sick or not sick? In other words, is this patient at risk for dying? This should always be the surgeon's first assessment, regardless if the patient was triaged into a delayed or minimal status. This determination can be the one that leads the surgeon down the path to success – or to failure if this determination is wrong. Simple techniques are right most of the time. They require hands-on engagement with the patient. Talk to him: "How are you doing, bud? What happened to you? Can you hold up 2 fingers?" While you are asking these questions, feel for the casualty's radial pulse. A casualty that answers you, can hold up two fingers (GCS motor score of 6), and has an easily palpable radial pulse is usually not too sick.

Casualties that are initially deemed "not sick" can usually have a relatively thorough and detailed assessment, including CT scans and plain films for suspected injuries. Casualties that fail any of these initial assessments should immediately raise your level of concern and focus. They should be considered unstable and seriously injured until proven otherwise. Patients who fall into this category (unstable or "sick") should prompt the surgeon to perform a rapid search to find the source of their illness and think about moving them expeditiously to the OR.

Hemorrhage Control Über Alles

Although the A of the Advanced Trauma Life Support ABCDE algorithm stands for "airway," in the combat casualty the airway is rarely the source of threat to life. This is particularly true if they have survived the evacuation process to reach you with an intact airway. When there is a significant airway issue, it is usually quite obvious and will be apparent that this has to be dealt with first. The biggest threat to a combat casualty's life is usually from hemorrhage, so in combat trauma the C should come first. Hence, the initial evaluation in the unstable casualty, while still involving a primary survey, must rapidly move to finding and treating the hemorrhage sources. These include external hemorrhage sources and intra-cavitary hemorrhage; into the chest, into the abdomen, and into the pelvis. In the end, these sources can all be found fairly quickly, usually in a matter of minutes with a focused physical exam augmented with basic and rapid imaging or interventions as needed. Figure 3.1 outlines the basic initial management algorithm and targeted priorities in the combat casualty.

One advantage of combat trauma is 95% of the mechanisms are penetrating. Casualties have holes in them. Their injuries are frequently obvious and often dramatic. Hence, unstable casualties with limbs missing, blood draining, abdominal evisceration, or large holes in the chest should pretty much go to one place – the OR. These obvious injuries should prompt the surgeon to establish intravenous lines, begin resuscitation, and activate the OR, but should not keep him from fully evaluating the casualty. Combat casualties may also suffer blunt or blast mechanisms (which may not create holes in the body), or they may have holes from head to toe. So, after a RAPID primary survey, at a minimum these casualties should have: (1) inspection of the entire body surface; (2) inspection of tourniquets for adequacy/tightness vs. application of tourniquets for suspected extremity hemorrhage sites; (3) FAST exam; (4) a portable chest x-ray; (5) a portable pelvis x-ray; (6) quick scan and hands-on palpation for extremity injuries/long bone fractures; and (7) establishment of large-bore intravenous or intra-osseous access.

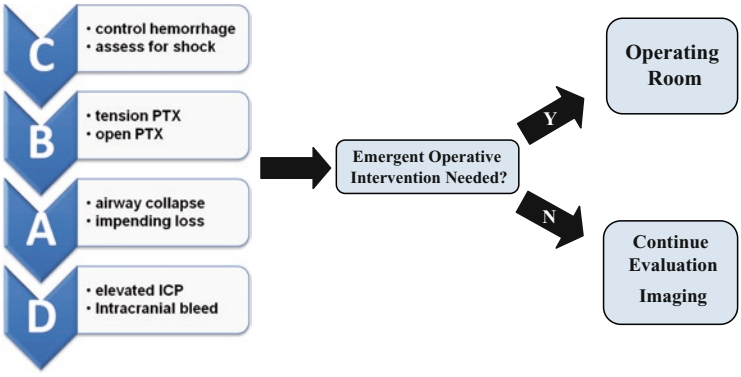

Fig. 3.1 Algorithm for initial management and prioritization in combat trauma

All of these diagnostic tests and maneuvers can be performed at the patient's bedside. The utility of each is discussed below.

1. Inspection of the entire body surface: casualties must be exposed and their body surfaces examined. The critical part of this is the log-roll. This step is easily overlooked, which can have grave consequences for the patient. A casualty may present with a normal looking anterior and have a devastated posterior, the extent of which is only known once he is rolled. These wounds are seen with increasing frequency due to explosions going off under vehicles or behind foot patrols. Profoundly hypotensive patients may have stopped bleeding from posterior wounds, which can then re-bleed under the surgical drapes once the patient gets some resuscitation. Knowledge of these posterior wounds can be critical for the operating surgeon. For example, findings on abdominal exploration that are not compatible with the casualty's level of shock should prompt the surgeon to re-examine the posterior wounds.
2. Tourniquets may have been applied after the patient had already become hypotensive. Less force than normal may have been required to stop hemorrhage, or if the hemorrhage had stopped spontaneously the medic would have no cues to tell him how tight to make the tourniquet. Resuscitation may precipitate re-bleeding, so all tourniquets should be checked and consideration given to supplementing them with pneumatic tourniquets. Assurance of tourniquet adequacy should be done early – it will allow you to focus on finding and treating other non-compressible sources of hemorrhage.
3. FAST exam: This study can also be done almost immediately on casualty arrival and allows assessment of the abdominal, pericardial, and with proper training, the thoracic cavity. Usually, the FAST can be done directly after a quick evaluation of the airway and auscultation of the chest. Unstable casualties with positive findings on FAST exam need rapid transfer to the OR. For equivocal FAST images, a diagnostic peritoneal aspiration (DPA) with a 20-gauge needle can be performed in unstable patients if the source of hemorrhage is not yet clear. DPA can help rule out major hemorrhage into the abdomen.
4. Portable chest x-ray: This study can be done within minutes of arrival and the film brought to bedside directly after development. With auscultation of the chest cavity, life-threat from either tension pneumothorax or massive hemothorax is easily ruled out. Add the evaluation of the chest by portable chest x-ray and potentially life-threatening problems like simple pneumothorax and hemothorax are identified. If your unstable patient has a clear chest x-ray – they are NOT dying from intra-thoracic hemorrhage. Look elsewhere.
5. Portable pelvic x-ray: The portable pelvis film can usually be taken at the same time as the portable chest x-ray, but is of lower priority. It can provide valuable data about the status of the bony pelvis and sometimes about the location of projectiles. Performance of these films can occur without significantly interrupting other assessments and therapies, such as FAST exam and placement of central lines. However, pelvic fractures severe enough to cause instability from hemorrhage are usually obvious on physical exam and you do not need to wait for your x-ray to begin intervention.

6. The extremities can be assessed quickly for long bone deformities. The only location in the extremities for substantial hidden blood loss is in the thighs. Obvious amputations, mangled extremities, active bleeding extremities, and expanding hematomas should prompt direct pressure and/or tourniquet placement if not already done.
7. Establishment of large bore intravenous access: Two large (14–16 gauge) antecubital lines will suffice to start. Usually, surgeons can rapidly place an internal jugular, subclavian, or femoral line 8.5 French short introducer catheter for rapid infusion of fluids and products. Emergency release blood products (PRBC and thawed plasma) should be given in favor of crystalloid to unstable patients with obvious injuries. Remember that unlike civilian trauma, you are often dealing with patients with three or even four severely injured limbs. Do not waste time trying to establish a peripheral IV in these cases and get a reliable large bore central venous catheter in place as soon as possible.

Tension Pneumothorax

Unfortunately, soldiers are still dying in the field or in the Emergency Department from untreated tension pneumothorax. It is critical that surgeons rule out this entity early in the work-up of the combat casualty. There is little downside to empiric placement of bilateral decompression needle thoracenteses or chest tubes in the dying patient. Surgeons must also remember to assess, by auscultation, the chest cavity. Remember, most of the wounds are from penetrating mechanisms, so there will often be holes in the chest – but casualties can get in motor vehicle crashes or falls after the initial penetrating mechanism, or suffer primary blast injury and barotrauma. Learn how to do the rapid ultrasound scan for pneumothorax (see Chap. 6) – it is reliable and faster than x-ray.

Open Pneumothorax

Open pneumothorax or the “sucking chest wound” can easily frustrate surgeons on their first deployment. It is, quite simply, seldom seen in civilian trauma. It is usually not much of a diagnostic challenge. There will be a big hole in the chest with audible air movement and/or gurgling from the wound. Patients can present in a well-compensated state, in which case their problem is primary to irrigate the wounds and figure out how to established surgical chest wall coverage or reconstruction. Keep in mind that patients with open pneumothorax usually had something big tumble through their chest cavity, and massive intra-thoracic injuries may make these patients present in extremis. Patients can also present with impending asphyxia from the open pneumothorax physiology. Simply occluding the hole may not rescue these patients – they usually require establishment of an airway and

positive pressure ventilation, as well as immediate chest tube placement. This topic is covered in more detail in Chap. 16.

Airway

Relative adherence to the ATLS algorithm is certainly not discouraged. As a framework for evaluating trauma patients, it is validated and thorough. The reality of combat, however, dictates that casualties who lose airways from gunshot wounds or fragments from explosions rarely make it to surgical care alive. Many casualties with head injuries will get endotracheal intubation or cricothyroidotomy in the field and will arrive to the surgeon with an airway in place. Casualties that do arrive with impending airway loss from a penetrating neck injury are usually quite dramatic and it becomes rapidly obvious that airway control needs to be attained.

Hence, for the vast majority of combat casualties, the airway is an all or nothing phenomenon. The casualties with "nothing" are usually beyond help by the time they reach the hospital; casualties with impending airway loss are usually quite obvious, and either endotracheal intubation or cricothyroidotomy can be rapidly performed; and casualties with an intact airway do not need any emergent airway intervention. In fact, rapid sequence intubation in the unstable combat casualty who otherwise has an intact airway may precipitate loss of abdominal muscle tone, loss of tamponade effects on abdominal hemorrhage, and cardiovascular collapse. The urge to intubate patients for no other reason than they are going to the OR soon anyway should be resisted. Give them muscle relaxants and vasodilatory drugs in a location where you can operate rapidly if need be. Avoid turning a non-issue into a life-threatening distraction from the casualty's real problem.

So, that begs the question: who *should* have airway control established? There are a few special situations that should be discussed. The first is the patient who sustained severe mandible or maxillo-facial trauma. These casualties, when awake, may present in seated or leaning positions and may be maintaining their own airway by allowing injured tissues to be pulled away from the airway by gravity. For the short term, let them. Attempts to sedate them or lay them supine may be met with aspiration of blood and/or rapid loss of the airway. These casualties can usually have an awake, well-controlled naso-tracheal intubation or a surgical airway done under local. Worst case scenario, you have all the instrumentation and support you need to perform a rapid surgical airway if endotracheal intubation cannot be gained.

The second special situation to get early airway control is the casualty with suspected inhalation injury. Incendiary and chlorine-containing bombs have been used in the current wars, and casualties can be trapped in burning vehicles or buildings. These casualties may have facial burns, singed facial hair, soot in their throat and nares, and an unexplained tachycardia. They may have rapid deterioration over the first 12 h after injury due to airway swelling and edema or lung injury. Based on the patient history and these physical findings, surgeons should have a low threshold to electively intubate these casualties and perform an immediate bronchoscopic

examination to assess the presence and degree of injury to the trachea and distal airways. This will greatly assist in determining treatment as well as the timing of future extubation.

Finally, the head-injured patient with deteriorating mental status or presenting GCS <10, and patients with direct but non-obstructing penetrating airway injury should be considered for establishment of early airway control, as they are at risk of suddenly airway loss or aspiration, as well as hypoxic episodes which should be avoided at all costs in the head injured casualty. Secure the airway as soon as possible, but again the principle applies that if they need to go immediately to the OR and their current airway is intact, put them on oxygen and secure the airway in the OR.

A final note on airway management: You will benefit more patients by becoming adept at performing adequate bag-valve mask (BVM) ventilation then you will by performing emergent surgical airways. This maneuver is woefully under-utilized in the initial trauma setting, and you will often observe the assigned "airway" personnel focused on preparing intubation drugs and equipment while no one is performing simple BVM ventilation. You should be able to indefinitely temporize most inadequate airway and breathing situations with good BVM technique, turning a panicked emergency procedure into a calm and controlled maneuver. The only real exception to this is the true mechanical airway obstruction, usually due to foreign body or severe facial fractures. The key technical aspect is to always lift the patients face into the mask rather than push the mask into the face. Hook your fingers under the mandible of the jaw and lift anteriorly, sealing the mask around the mouth and nose. This is preferably done with both hands (two person BVM), and then deliver adequate breaths with high flow oxygen. You should immediately see improved oxygen saturation and auscultate adequate breath sounds.

Massive Extremity Injuries

No matter what your specialty, the most common scenario you will encounter in combat trauma is the patient with a severely injured, mangled, or amputated extremity. You will usually not have an Orthopedist immediately available during your initial evaluation, so you must understand the basics of the early evaluation and management. Unlike most civilian trauma, the injured extremity is often the source of life-threatening hemorrhage in these patients and should be immediately controlled as described above. It is also usually obvious that these wound will require emergent management in the operating room, and there is very little that you absolutely have to do with them in the Emergency Department. Perform a basic assessment of the sensation and motor function of the extremity. Vascular status should also be assessed but may be compromised if there is a proximal tourniquet. Do not take the tourniquet down unless you are immediately prepared and able to re-establish complete proximal control. If you have time, obtain an AP and lateral x-ray which will help delineate bony injury as well as identify the presence and degree of foreign body contamination. **Do not delay movement to the OR for**

extensive extremity x-rays; most of these injuries do not require an x-ray for the initial operative management or they can be assessed with C-arm in the operating room. Irrigate the wounds with betadine, wrap them, and splint the extremity to help minimize additional motion injury and pain. Administer antibiotics as soon as possible with both gram positive and gram negative coverage.

Unexploded Ordinance

Your next patient arrives, another extremity wound with a big piece of metal embedded in the soft tissue. **No big deal – until you realize that it is actually an unexploded rocket propelled grenade** (Fig. 3.2). It doesn't matter how good your residency or fellowship training was, this will be something you have not seen before or been prepared for. Check your pulse, take a deep breath, and then take care of your patient. Your efforts know should focus on (1) protect yourself and your unit, (2) avoid inadvertent detonation, and (3) remove and dispose. Immediately isolate this casualty, preferably by moving other patients out of the area. Notify your local explosives and ordinance personnel who may be invaluable in providing assistance and expertise about this particular explosive. If this occurs in a MASCAL situation, then this patient should be moved down on the priority list until you have taken care of the other urgent patients. You can safely x-ray the involved area if necessary, **but do not use ultrasound!** Turn off any cell phones or similar devices in the immediate area. Now prepare your team and OR for removal.

Minimize the personnel involved in the procedure to only those absolutely necessary. All should be wearing full body armor and ballistic goggles. Create a hasty protective barrier (sandbags) around the patient, at least up to waist height.

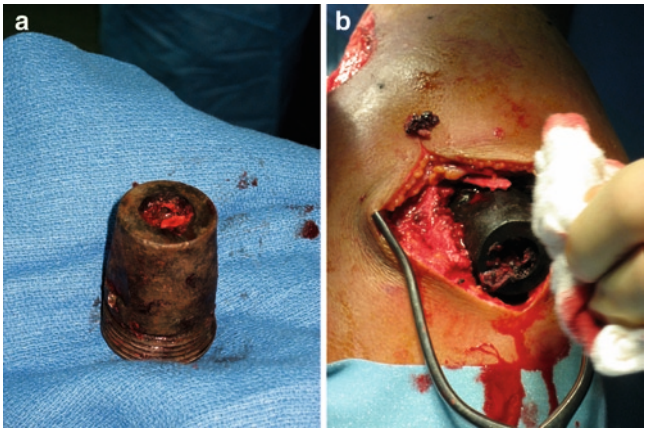

Fig. 3.2 Unexploded rocket propelled grenade (**a**) removed from a soft tissue wound (**b**) by a surgeon with a Forward Surgical Team in Afghanistan

Ensure full chemical paralysis before starting. Do not use any electrocautery devices, and never use a defibrillator until the device is removed. Manual retraction and manipulation should be used as much as possible to avoid touching the device with any metallic instruments. A self-retaining retractor may be used if necessary but avoid any contact with the explosive. Gently encircle the device and remove it from the wound, handing it off to the ordinance personnel for disposal. Now you can control bleeding and proceed as with any other patient.

Operating Room Priorities

Obviously, a complete discussion of what may be necessary in the OR would extend far beyond the confines of this chapter and this book. Nevertheless, several simple strategies can help you prioritize the hemorrhage sources in the multi-system casualty.

1. Get help. Get another surgeon or six more. Get as many as you need to have one or even two surgeons addressing each hemorrhage source. We would routinely have two surgeons working on the abdomen, two surgeons on each lower extremity, and a surgeon working on a casualty's face. Combat trauma surgery is a team sport. The old adage, "You can call for help, but it's a sign of weakness," should be thrown out and replaced with "If you don't call for help, you are doing your patient a disservice."
2. On occasion, multiple extra surgeons won't be available. Have a methodical plan to address each hemorrhage source. Tourniquets can usually keep extremity hemorrhage controlled while you look elsewhere. The abdomen is often the best place to start if signs point to an injury there. Exploration can rapidly tell you if the abdomen is the source of instability. If the abdomen is not full of blood and there is not a massive hematoma in the pelvis, time-consuming exploration of every small, non-expanding retroperitoneal hematoma or even control of bowel contamination can be delayed for several minutes while you look elsewhere for the source of hemorrhage in the unstable patient. Prep and drape all significant injuries, including extremities, into the surgical field. This will avoid the "bleeding under the drapes" phenomenon which has fooled many surgeons before you.
3. Patients that have had chest tubes placed have a readily available way to see if they have ongoing bleeding in the chest. While clotting of chest tubes can occur, it is relatively rare, and if in doubt a second chest tube can be placed. Inspection of the diaphragms during laparotomy can help you identify tension pneumothorax or expanding hemothorax.
4. That leaves two areas – the patient's extremities and posterior wounds. Extremity hemorrhage, unless not controlled with tourniquets or clamps, will usually respond rapidly to resuscitation. The other hidden hemorrhage source in combat casualties is from posterior injuries – gluteal vessels, popliteal vessels, scalp, and posterior holes in the chest that allow drainage of thoracic blood. This fact highlights the importance of the complete inspection of a casualty's body in the

trauma bay. These posterior wounds may be non-bleeding at the time of patient arrival, particularly in patients in shock – as resuscitation commences, these areas may begin to re-bleed. Hence, if minimal intra-abdominal or thoracic findings do not match a patient's deteriorating physiology, the operations should be halted and an additional search for hemorrhage begun (which may involve tearing down sterile drapes and rolling the patient again).

5. Always start with damage control measures as the default – non-definitive control of contamination, temporary closure of the abdomen, shunts in major arterial and venous injuries – and then make the patient prove that you don't need to use damage control measures. Remember, damage control may be necessary not because of the patient's physiology but because other casualties may need the OR table.

The "Blood Vicious Cycle" Revisited

One of the most over-used and poorly understood concepts in trauma is the "bloody vicious cycle" or "the lethal triad" of hemorrhage, acidosis, and coagulopathy. Every medical student can rattle these off as the three priorities to be addressed in trauma, or as the trigger for changing from definitive surgery to a damage control approach. This has become so pervasive that many have forgotten that each element of this triad is a RESULT of some injurious process and not necessarily harmful in and of themselves. In fact, each element of this triad is often used therapeutically in critically injured or ill patients. Hypothermia has multiple beneficial effects on metabolism and physiology, and there is much ongoing research about using hypothermic arrest as an initial intervention to buy time in critically injured trauma patients. Acidosis will improve oxygen delivery and has not been demonstrated to be directly harmful to enzyme or physiologic function until a critical pH is reached (at least 7.2 or lower). Finally, coagulopathy in the trauma patient is actually a complex mix of hyper and hypo-coagulable states, and in many cases decreasing clot formation may be beneficial at the micro and macro vascular levels.

If your patient has any or all elements of this lethal triad, you should focus on addressing the root causes and halting the progression to irreversible shock. Simply attempting to directly correct these three factors will waste time and resources, and may actually worsen the outcome. You can warm your patient all you want – if you haven't controlled bleeding or spillage then it doesn't matter what temperature they die at. In fact, it may actually hasten their death. Push amp after amp of bicarbonate and you may make the pH look better, but you aren't treating the real problem or doing the patient any good. Figure 3.3 shows the elements of the lethal triad as peripheral factors which are driven by several core processes in the trauma patient. Address the core factors, and trend the changes in pH, temperature, and coagulopathy to tell you whether you are winning or losing the battle. Focusing your efforts on addressing these core factors is the only way you will defeat the "bloody vicious cycle."

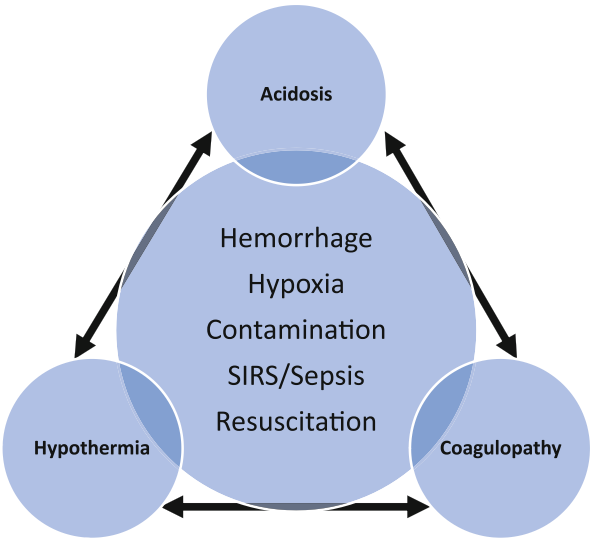

Fig. 3.3 The "lethal triad" revisited. Treatment of the trauma patient should focus on the core causes of acidosis, coagulopathy, and hypothermia shown in the center circle

The Multi-System Combat Casualty: Putting It All Together

You may have noticed that obtaining a CT scan was not listed above in the initial management priorities. The reason for that, quite simply, is that the astute general surgeon can learn what he needs to know about an unstable casualty to make the decision to go to the OR from straight-forward bedside tests. The unstable patient with a head injury is best served by getting the source of his instability treated. That source is usually NOT his head injury. On occasion, this may result in the surgeon taking a patient to the OR for laparotomy only to find that the patient had an unsurvivable brain injury on post-laparotomy CT scan. THIS SHOULD NOT BE CONSIDERED A FAILURE. It was the correct decision based on the data available to the surgeon. A failure would be to take an unstable patient to the CT scanner for head CT scan under the mistaken belief that the patient had an unsurvivable brain injury, only to find that they did not. Surgeons must be prepared to make decisions based on incomplete data. This is triage applied to the individual patient – the sorting and prioritization of injuries to bring maximum resources to bear.

This algorithm of priorities for the surgeon evaluating the multi-system combat trauma patient is summarized below:

1. Focus on the patient in front of you.
2. Determine if they are "sick" or "not sick."
3. If sick: identify and treat sources of hemorrhage.
4. Establish more definitive control of pneumothorax (chest tube).
5. Identify and treat airway problems.

6. In the OR, stick to damage control measures as the default. Make sure operative findings match the patient's physiology – if injuries are minimal but the patient is still sick, you haven't found and treated all the hemorrhage sources yet.
7. Only after all of the above have been treated and the patient deemed stable, elective CT scans and plain x-rays based on physical exam findings may be obtained to rule out non-life threatening injuries.