Injury in the Elderly and End-of-Life Decisions
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Case presentation

A 65-year-old woman struck by an automobile at 30 miles per hour presented to the emergency department with a systolic blood pressure (BP) of 110 mm Hg, a heart rate of 84, a respiratory rate of 18, and a Glasgow Coma Scale score (GCS) of 15. Her only initial complaint was right upper extremity pain. During the secondary survey, her BP fell to 60/30 mm Hg and her GCS decreased to 12. The initial Focused Abdominal Sonogram for Trauma (FAST) examination was negative, but a repeat FAST examination demonstrated fluid in Morison’s pouch. Other pertinent positive physical findings included pain on palpation of the pelvis and the presence of blood at the introitus. The patient was intubated and a large-bore femoral venous catheter placed for fluid resuscitation. Type-specific blood was transfused when her BP failed to improve after infusion of 2 L of crystalloid and she was transported directly to the operating room for abdominal exploration. A family member reported that the patient’s underlying medical problems included hypertension, diabetes, atrial fibrillation, osteoporosis, and hypothyroidism. Her daily medications included metoprolol and warfarin.

Epidemiology of aging

The population of the United States is aging. Individuals ages 65 and older made up 12% of the population in the year 2000 and are expected...
to be 20% of the population by 2030. The elderly will be the most rapidly growing sector of the population, increasing from 35 million people to 72 million people between 2000 and 2030 [1]. Today’s senior citizens have fewer disabilities and more active lifestyles than those of previous generations, which increase their risk of injury. One study estimates that 40% of all trauma patients will be 65 or older by 2050 [2].

**Definition of geriatric trauma**

Geriatric trauma usually is defined as injury in people ages 65 and older. Some published studies, however, include people older than 55, or even 45, in their analysis of geriatric trauma outcomes. The mortality rate from minor injury (Injury Severity Score [ISS] <9) is increased in people older than 65, and the mortality rate from moderate injury (ISS 9–24) begins to increase at age 45 [3]. The risk of death from major trauma rises sharply after age 45 and doubles by age 75 [4].

Other studies stratify the elderly population into two groups: patients between ages 65 and 80 and the very elderly, who are older than 80. Octogenarian trauma patients have an overall higher mortality rate (10%) compared with those between ages 65 and 80 (6.6%). They also have worse functional outcomes if they survive their injuries and are more likely to lose the ability to walk and transfer independently [5].

**Mechanism of injury**

Falls are the most common mechanism of injury in the elderly population [6] and are responsible for significant morbidity, mortality, and medical cost [7]. Motor vehicle collisions are the second most common mechanism of injury followed by pedestrian–motor vehicle accidents. Pedestrian–motor vehicle injuries affect children and the elderly disproportionately and result in a higher mortality rate in elderly patients compared with other age groups [8].

**Predictors of morbidity and mortality**

**Age**

There may be many reasons why elderly patients have increased morbidity and mortality rates after trauma. They are more likely to have underlying medical conditions that limit their physiologic response to injury. Eighty percent of the population over age 65 has at least one chronic medical condition and 50% has at least two [1]. In addition, elderly patients tend to sustain more severe injuries [9], and ISS is one of the strongest predictors of mortality [10]. Age in and of itself, however, is an independent predictor of poor outcome even when controlled for comorbidities and ISS. In a retrospective analysis of 22,571 patients who had blunt trauma, of whom 7117
were older than 65, elderly patients had almost twice the mortality rate when stratified for ISS and pre-existing medical conditions [11]. Age, injury severity, and pre-existing medical conditions all were independent predictors of death as determined by a logistic regression analysis of 5139 patients, including 448 (9%) patients older than 65. After controlling for ISS and pre-existing medical conditions, trauma patients older than 65 still were 4.6 times more likely to die than younger patients ($P < .001$) [12]. These results indicate that age alone is a powerful predictor of mortality in trauma patients.

**Comorbidities**

Other factors contribute to the morbidity and mortality of elderly trauma patients. Certain pre-existing medical conditions increase the risk of death after trauma significantly. Cirrhosis increases the relative mortality risk by 4.5, coagulopathy by 3.2, ischemic heart disease by 1.8, chronic obstructive pulmonary disease by 1.8, and diabetes by 1.2 [13]. Other conditions found to increase the risk of death significantly include renal disease and malignancy [14,15]. In addition, not only are comorbidities more prevalent in the elderly population, but also cardiovascular disease and diabetes are associated with significantly higher mortality rates in patients over 65 than in younger patients who have these conditions [12].

**Severity of injury**

The severity of injury tends to increase in older patients. In a study of 1039 trauma patients, the average ISS of 45 patients ages 75 and older was 18 compared with an ISS of 11–12 in the remaining 994 patients ($P < .0005$). Less than 20% of the younger patients had an ISS greater than 20 compared with almost 50% of the patients older than 75 [9]. The mortality rate was 40% in patients who had severe injury (ISS > 25) in a study of 852 trauma patients older than 65. The ISS was the variable that correlated most significantly with the risk of death. Other physiologic factors associated with poor prognosis (mortality rate > 80%) were hypoventilation (respiratory rate < 10), hypotension (systolic BP < 90), and GCS less than 3 on admission [10].

**Age as a trauma center triage criterion**

Evidence indicates that many injured elderly patients are undertriaged to trauma centers despite the increased risk of death and complications. The mean age of severely injured patients (ISS > 16) admitted to level I trauma centers was 33 compared with 56 at nontrauma hospitals in Portland, Oregon. Patients over age 65 were 5 times more likely to be undertriaged to a nontrauma hospital ($P < .0001$) [16]. Another study based on statewide data from Maryland demonstrated that significantly fewer elderly patients meeting physiologic and mechanism criteria were transported to trauma
centers than with younger patients [17]. Appropriate triage is important, because very elderly patients who have severe injury have better outcomes when treated at a trauma center. In a study of 455 severely injured octogenarians (ISS 21–45), inhospital survival was 56% in trauma centers but only 8% in hospitals without a trauma program [18].

One possible cause of the undertriage of elderly trauma patients is the late presentation of physical findings indicating hypovolemia. Sixty-three percent of patients 70 years old and older who had severe injuries (ISS >15) did not meet the standard hemodynamic criteria for trauma team activation at one trauma center [19]. There was a trend toward a decreased mortality rate once age greater than 70 was added as a criterion for trauma team activation [20].

**Special physiologic and medical considerations**

*Physiologic reserve*

Why does age in itself increase the risk of morbidity and mortality in trauma patients? The elderly have decreased reserve, limiting the physiologic response to hypovolemia. Cardiac index decreases 1% per year with age whereas systemic vascular resistance rises 1% per year. Maximal heart rate and the effect of adrenergic stimulation are reduced with age [21]. Trauma patients over age 65 demonstrate significantly lower measured cardiac index, oxygen delivery, and oxygen consumption compared with younger trauma patients [22]. Not only are elderly patients less able to compensate for the physiologic demands of hypovolemia, they suffer more adverse consequences from hypoperfusion than do younger patients. In one study of 264 patients, prolonged lactic acidosis was associated with an increased risk of death in patients older than 55 but not in younger patients [23].

*β*-Blockers

In addition to diminished physiologic reserve, many elderly patients take medications that alter their response to stress. Approximately 20% of the elderly who have coronary artery disease and 10% of those who have hypertension take β-blockers [24]. Tachycardia is an important sign of hypovolemia and may be masked in elderly patients taking β-blocker medications. Thus, elderly patients often may not exhibit the hemodynamic indications for trauma team activation despite severe injury [19]. Interpretation of hemodynamic parameters in elderly trauma patients is difficult, especially in the presence of beta-blockade.

*Anticoagulation*

Warfarin is a common anticoagulant used in the management of elderly patients who have a variety of medical conditions, including atrial
fibrillation, deep vein thrombosis, and prosthetic heart valves. Chronic oral anticoagulation carries a 1% per year risk of spontaneous intracranial hemorrhage [25]. Head trauma in elderly patients on oral anticoagulation can be deadly. The mortality rate of 25 elderly patients on warfarin (international normalized ratio [INR] 3.2 ± 1.9) with traumatic intracranial hemorrhage was 48% compared with a mortality rate of 10% in age-matched controls who were not taking warfarin (INR 1.0 ± 0.1) [26]. A more recent study showed even worse outcomes when anticoagulation was supratherapeutic. In 49 anticoagulated patients who had severe brain injury (GCS ≤8) and an average INR of 6.5, the mortality rate was 87.8%. The mortality rate for 77 anticoagulated patients who had minor brain injury (initial GCS 13–15) and an average INR of 4.4 was similarly high at 80.6%. Fifty-four of the 77 patients who had minor brain injury were admitted for observation. Nearly 70% of these patients had an initial normal head CT scan. Eighty percent of the patients deteriorated within 12 hours to a GCS less than or equal to 10 with significant intracranial hemorrhage. The mortality rate was 84% [27]. One large retrospective study did not demonstrate a difference in mortality between head and nonhead injury patients on anticoagulation versus matching controls. The INR data of the study population, however, were not reported and the degree of anticoagulation could not be assessed [28].

Rapid reversal of anticoagulation with fresh frozen plasma (FFP) transfusion is beneficial. Compared with a mortality rate of 48% reported in a previous study [26], the mortality rate was decreased to 10% with FFP reversal in 19 patients on warfarin (average initial INR 2.7) who had documented intracranial hemorrhage and GCS less than or equal to 14. The INR was normalized to an average of 1.5 within 2 hours with up to 4 units of FFP transfusion and intravenous vitamin K [29].

There is increasing evidence that factor VIIa reverses the coagulopathy associated with prolonged shock and massive transfusion in selected trauma patients [30,31]. Factor VIIa also is effective in reversing the anticoagulation effects of warfarin in patients who have intracranial hemorrhage [32]. The precise indications for factor VIIa administration remain to be determined.

Antiplatelet agents, aspirin and clopidogrel, frequently are used for treatment and prophylaxis of cardiovascular disease. In a study of 110 elderly head injury patients (ages 60 and older), there was no significant difference in the frequency of intracranial hemorrhage between the patients who had and who did not have preinjury low-dose aspirin therapy [33]. Two other studies, however, indicated that antiplatelet drugs increased mortality in elderly patients who had head trauma. Forty-seven percent of elderly intracranial hemorrhage patients receiving aspirin died compared with 8% of case-matched controls not receiving aspirin [34]. A more recent retrospective report studied the effect of aspirin and clopidogrel in elderly patients who had head injury. Fifty of 90 intracranial hemorrhage patients 50 and older were treated with antiplatelet agents before injury; 58 received aspirin;
12 received clopidogrel; and 20 received aspirin and clopidogrel. The mortality rate was 23% in patients taking antiplatelet drugs and 8% in case-matched control patients not taking any antiplatelet drugs ($P = .016$). There was no difference in mortality between patients taking aspirin or clopidogrel as single agents. There also was no difference in mortality between patients taking only one drug compared with those taking aspirin and clopidogrel. Platelet transfusions were given to 24 patients who had received antiplatelet drugs, although the impact of platelet therapy on survival was unclear [35].

Elderly patients on oral anticoagulation with signs of head trauma require closer monitoring even without depressed GCS or overt neurologic symptoms. One retrospective study of 144 asymptomatic elderly patients who had mild head trauma and were taking warfarin showed that 7% had clinically important intracranial injury [36]. Given the high mortality rate and the subtle presentation of significant intracranial hemorrhage in anticoagulated patients, head CT scan and close neurologic monitoring are warranted on all head trauma patients receiving oral anticoagulation.

An intracranial bolt was placed during surgery because of a decline in GCS to 12 during resuscitation. The initial intracranial pressure was 15 mm Hg. Exploratory laparotomy revealed a grade II splenic laceration and a large retroperitoneal hematoma. She was resuscitated aggressively with 14 units of packed red blood cells. Her coagulopathy was corrected with 13 units of FFP, two units of cryoglobulin, and two six-packs of platelets. She continued to bleed from the open pelvic fracture, however, which was packed. After surgery, the patient was transferred to the interventional radiology suite for an angiogram, which demonstrated active extravasation from the left and the right internal iliac and the right L4 lumbar arteries. These arteries were embolized, resulting in hemostasis.

After stabilization in an ICU, the patient underwent CT imaging of the head and abdomen in addition to standard roentgenograms of the upper and lower extremities demonstrating the following injuries:

1. Extensive bilateral subarachnoid hemorrhage with blood in the left lateral ventricle
2. A grade II splenic lacerations
3. Bilateral superior and inferior pubic rami fractures
4. A right sacral fracture
5. A comminuted fracture of the right proximal humeral head
6. A right tibial plateau fracture

Head injury

Head injury in the elderly most often is caused by falls and pedestrian–motor vehicle collisions [37]. Subdural hematomas are common in the elderly population because of the fragile bridging veins and increased distance between the dura and brain parenchyma. In contrast, epidural hematomas are relatively uncommon because the dura tends to adhere to the skull.
with increasing age. The initial clinical presentation of an intracranial space-occupying lesion may be subtle in elderly patients because of the presence of cerebral atrophy [6].

The mortality rate and functional outcome is poorer in elderly as compared with younger patients. In a study of 661 patients from the Traumatic Coma Data Bank, the overall mortality rate was 38% compared with 80% for patients older than 55. Age was an independent predictor of death starting at age 45 [37]. There seems to be a linear relationship between age and worsening outcome after severe traumatic brain injury (GCS 3 to 8). The odds of death, vegetative state, or severe disability increases by 50% with every 10-year increase in age [38]. Patients older than 65 demonstrated larger subdural hematoma volumes, greater midline shifts, and a mortality rate 4 times greater than younger patients in a study of traumatic subdural hematomas [39]. Elderly trauma patients who present with a GCS of 8 or lower have an extremely poor prognosis. In an analysis of 136 head injury patients older than 70 who had GCS less than or equal to 8, the mortality rate was nearly 100% for those who had significant space-occupying lesions and 80% for those who had nonsurgical lesions [40]. In another study of 40 patients 65 or older with GCS less than or equal to 8, only 13 patients survived to be discharged from the hospital (survival rate 32%); all patients who had an initial GCS of 3 died. After hospital discharge, 85% had long-term survival up to 3 years. Only three patients who had an initial GCS of 8, however, lived with functional independence; all patients who had GCS between 4 and 7 were in a persistent vegetative state or required intensive supportive care [41].

Some investigators suggest that elderly patients who have head trauma should be re-evaluated after 72 hours of aggressive treatment because the functional outcome is so poor. These investigators suggest that further aggressive therapy is unlikely to benefit these patients if significant improvement is not seen within this period [21].

**Abdominal injury**

Nonoperative management of blunt abdominal solid organ injury in hemodynamically stable patients now is standard care [42]. Nonoperative management of splenic injury in the elderly, however, must be approached with particular caution. Although the spleen tends to be more fragile in elderly patients, their diminished physiologic reserve makes them less tolerant of hypovolemia because of hemorrhage. Some studies report success rates of nonoperative management of splenic trauma in patients over 55 comparable to the results achieved in younger adults (success rates 83%–100%) [43–47]. In a series of 23 hemodynamically stable patients over age 55 who had nonoperative management of splenic trauma, only four required splenectomy because of clinical decompensation [43]. In another series of 18 patients older than 55 who met hemodynamic criteria for nonoperative management,
three patients failed conservative management and required splenectomy or splenorrhaphy; two of these three patients died [44]. All these studies suffer from small sample size and many do not include the grade of splenic injury in the analysis, making comparison between the elderly and younger cohorts impossible.

In a retrospective study of 1485 patients, 1261 patients (85%) were younger than 55, and 224 patients (15%) were 55 or older. The proportion of patients requiring immediate surgical exploration was similar between the two groups (38% and 41%, respectively). The mortality rate in the elderly group was 43%, significantly higher than the 23% mortality rate in the younger group ($P < .05$). Only 24 of the 132 elderly patients who underwent nonoperative management required subsequent surgical exploration. This 80% success rate for nonoperative management in patients older than 55 is comparable to the reported rates of previous studies. The mortality rate was significantly higher in elderly patients, however, for either successful nonoperative management (8% versus 4%, $P < .05$) or failed nonoperative management (29% versus 12%, $P = .054$). There was a trend toward an increased failure rate for nonoperative management in the elderly with increasing grade of splenic injury. The success rates for nonoperative management were comparable, between less than 55 and greater than or equal to 55 age groups for grade I splenic injury (74% versus 84%). Success rates, however, were lower in the elderly patients for grade II injury (73% versus 54%) and grade III injury (52% versus 28%). Although 17% of patients younger than 55 who had grade IV-V splenic injury still were managed successfully without an operation, all patients in the elderly group who had grade IV-V injury either went directly to the operating room or failed nonoperative management [48].

These results highlight the vulnerability of elderly patients who have blunt splenic trauma. The data suggest that nonoperative management of splenic trauma in the elderly should be undertaken with caution because older patients have an increased risk of death after failed nonoperative management compared with younger patients. Age greater than 55 is not an absolute contraindication to nonoperative management; in fact, the majority of elderly patients (approximately 80%) who have blunt splenic trauma can be managed successfully nonoperatively. The success of nonoperative management likely is lower in elderly who have higher grades of splenic injury. A prerequisite for nonoperative management for blunt splenic injury for any patients is hemodynamic stability. Regardless of age, signs of hemodynamic compromise in patients who have splenic injury mandate prompt exploration in the operating room.

**Pelvic and extremity fractures**

Osteoporosis is common in elderly women. Fractures of the spine, hip, and distal forearm frequently are associated with osteoporotic bone, but
all types of fractures are increased in patients who have low bone density [49]. Pelvic fracture is the most serious skeletal injury in the elderly. The overall mortality rate from acute or delayed complications of pelvic fracture is up to 81% in elderly patients who have open pelvic fracture [50]. The pattern of pelvic fracture is different in elderly compared with younger patients. The elderly were 4.6 times more likely to have lateral compression fractures than anterior-posterior compression fractures in a study of 234 patients who had pelvic fracture, 39 of whom were above age 55. Although 98% of the fractures were minor (lateral compression types I and II), elderly patients were nearly 3 times more likely to receive blood transfusions than younger patients. Elderly patients also were more likely to require angiographic intervention. Despite aggressive therapy, the 21% mortality rate for patients 55 or older was significantly higher than the 6% mortality rate in the younger group \( P < .005 \) [51]. Another study of 350 patients, including 57 patients over age 55, corroborated the finding that elderly patients who had pelvic fractures have a higher mortality rate (12.3% versus 2.3%, \( P < .05 \)) [52]. Despite less severe pelvic fractures, blood loss and the risk of death are higher in elderly compared with younger patients.

Elderly patients are more likely to have unsatisfactory functional outcomes regardless of the type of extremity fracture treatment. In a study of 40 patients who had tibial plateau fractures and were 50 or older, 23 (72%) of 32 patients treated operatively and three (38%) of eight patients treated nonoperatively believed that their outcomes were unsatisfactory based on a self-assessment questionnaire [53]. Elderly patients who have periarticular fractures may require primary prosthetic replacement to avoid complications of delayed union, nonunion, loss of fixation, or osteonecrosis. Prosthetic replacement may be a particularly attractive surgical option for displaced or comminuted fractures of the femoral neck, proximal humerus, and elbow. Osteopenic bones in the elderly usually require intramedullary devices for optimal fixation. Other materials, such as polymethylmethacrylate, calcium phosphate, and calcium sulfate cements, are used to enhance hardware fixation in elderly osteoporotic patients [54].

Timing orthopedic surgery in geriatric trauma patients depends on the nature and severity of the visceral, neurologic, and orthopedic injuries and on the physiologic status of patients. In a series of 367 elderly patients who had hip fractures, a delay in surgical treatment for more than 2 days was associated with more than double the risk of death within the first postoperative year [55]. Another study of hip fractures demonstrated that patients who had three or more comorbidities had a poorer survival rate if they had their operation within 24 hours of admission compared with more than 24 hours after admission [56]. Surgical correction of most orthopedic injuries in the elderly should occur as soon as possible after treatment of shock and life-threatening injuries and optimization of comorbid conditions.
The patient was brought to the ICU where resuscitation efforts continued. Her BP remained marginal and required vasopressor support. A pulmonary artery catheter (PAC) was placed to help guide fluid resuscitation. Although the initial chest radiograph did not show any evidence of chest trauma, the following day the patient developed bilateral pulmonary infiltrates consistent with the acute respiratory distress syndrome. She became increasingly difficult to oxygenate, requiring a high inspired oxygen concentration and positive end-expiratory pressure. A repeat head CT scan 48 hours later demonstrated increasing subarachnoid hemorrhage and massive cerebral edema. Further aggressive therapy was deemed futile. After discussion with the patient’s family, aggressive support was withdrawn and the patient expired.

Intensive care of geriatric trauma patients

A study of 26,237 trauma patients, of whom 7117 (27%) were 65 or older, demonstrated that age was an independent risk factor for morbidity and mortality. Elderly patients have longer hospital lengths of stay (mean 9.2 ± 9.6 days) compared with younger patients between ages 18 and 65 (mean 8.3 ± 10.0 days, \( P < .001 \)). Although elderly patients have a lower ICU admission rate (36.7%) compared with younger patients (45.5%), presumably because of death of more elderly patients before ICU admission, once admitted they have a longer period of ICU stay compared with younger patients (mean 6.7 ± 9.2 versus 5.4 ± 8.7, \( P < .001 \)) [11].

Not surprisingly, preventable complications are associated with 32% of all deaths and 62% of deaths caused by multiple organ failure or sepsis in patients 65 or older [57]. The risk of death increases significantly with the number of complications [58].

Elderly patients are at particular risk for nosocomial infections. Thirty-nine percent of patients 65 or older, compared with 17% of younger patients (\( P < .005 \)), developed nosocomial infection in a study of 3254 patients. The mortality rate for elderly patients who had nosocomial infection in this study was 28% compared with 5% for younger patients (\( P < .005 \)). The presence of chronic obstructive pulmonary disease was an independent risk factor for nosocomial infection [59]. Prevention and early aggressive treatment of nosocomial infection is essential to improve outcome of geriatric trauma patients requiring intensive care [21].

The optimal method of hemodynamic monitoring in ICUs is unclear. Arterial and central venous pressure (CVP) catheters are routine monitors for critically injured patients. A prospective randomized study of 70 elderly hip fracture patients in 1985 suggested that the mortality rate could be significantly reduced by use of PACs [60]. PAC monitoring has been recommended for optimal management of critically ill geriatric trauma patients [21]. No clinical benefit, however, from PAC monitoring was demonstrated in large prospective studies of either ICU patients or high-risk geriatric surgical patients. PAC monitoring was associated with an increase in risk of
death in the ICU study [61] and pulmonary embolism in the geriatric surgery study [62]. CVP and PAC have risks of technical complications and nosocomial infection.

Transthoracic echocardiography (TTE) and transesophageal echocardiography (TEE) can provide information on cardiac anatomy, ventricular wall motion and filling, and ejection fraction. They can be used to supplement or replace the information derived from the CVP and PAC as a guide to hemodynamic management of geriatric trauma patients. TTE and TEE have the disadvantages of requiring interval examinations to answer volume status and cardiac function questions at different points in time. Both require extensive training for the technical examination and correct interpretation of images [63–65].

**Long-term functional outcome**

Long-term functional outcomes of elderly trauma patients who survive their injuries can be good. In a large-scale retrospective study of 38,707 patients, ages 65 and older, 50% of the survivors were discharged to home and 25% of the survivors were transferred to a skilled nursing facility [66]. In another study, 48 of 495 geriatric trauma patients (9.7%) survived for 3 years after injury. Eight of the 48 survivors (16.6%) returned to their preinjury level of function and 32 survivors (67%) were able to live independently [67]. In another study of 279 patients, ages 75 and older, 77 of 93 patients (83%) who survived for 4 years after injury were living in an independent setting [68]. The available data indicate that age alone is not an indication to withhold aggressive therapy [21].

**Advance directives and health care proxies**

There are two basic types of advance directives: the living will and the health care proxy. Elderly patients should have the opportunity to execute a living will to guide physicians and family members in the event of devastating injury. A living will is a legal document in which a mentally competent person expresses wishes regarding continued medical care in the event of incompetence resulting from injury or illness. Unfortunately, living wills require patients to predict specific circumstances of future injury accurately. Trauma surgeons, who usually have not met the patients before a severe injury, therefore must be guided by a document sometimes written years before an injury instead of by an in-depth discussion with the patients.

A heath care proxy is an individual appointed by a mentally competent adult to make health care decisions in the event of catastrophic injury or illness resulting in incompetence. Patients and the general public desire advance directives [69,70]. The lack of physician initiative in raising the issue is the barrier to advance directives perceived most frequently by patients.
Withholding and withdrawing life support

Withholding and withdrawing life support is a common occurrence in ICUs in the United States. Support was withheld or withdrawn in 57% of the ICU patients who died in a prospective study of two ICUs at the University of California, San Francisco (UCSF). The reasons cited by health care providers for limiting care in the UCSF study included brain death, futility, patient suffering, and anticipated poor quality of life [71].

The concept of brain death was introduced to meet the challenges and requirements of organ transplantation. The initial diagnostic criteria for brain death were published by Beecher in 1968 [72] and since have been modified to include complete cessation of brain and brainstem function as evidenced by (1) irreversible coma, (2) absent brainstem reflexes, (3) apnea, (4) serial observations separated by 6 hours in adults over age 18, and (5) confirmatory tests documenting absence of cerebral blood flow if the diagnosis is in doubt [73].

Physicians, nurses, and medical ethicists use the word futile to describe continued intensive care without hope of survival. Unfortunately, the futility of continued care not always is obvious. Opinions about the futility of care can be influenced by the skill and experience of surgeons, the discipline of clinicians, and personal and cultural values [74]. The key is to focus on the principles of beneficence and autonomy for individual patients [75].

Perceived suffering of geriatric trauma patients is a frequent cause of emotional distress for ICU staff [76]. Nurses frequently are the first members of the team to raise the question of limiting care because of futility and patient suffering. The routine use of continuous analgesics and sedatives in ventilated patients is an essential part of management, but the science of analgesia and sedation remains imperfect [77]. Most surgical ICU patients who survive, however, indicate that they would repeat the experience again if necessary [78]. Withdrawal of support based solely on the criterion of patient suffering is not indicated.

The use of poor anticipated quality of life as a sole indication for withdrawal of support in incompetent patients is dangerous. Members of a health care team may substitute their own concept of poor quality of life for a patient’s and deny a patient a chance for survival. All trauma patients may struggle with psychologic and physical challenges after injury [79,80]. Most ICU survivors studied indicate, however, that they have an “acceptable” quality of life and would undergo treatment again [81]. Data related specifically to quality of life in geriatric trauma survivors are sparse.

Competition for ICU beds is a fact of life. Appropriate allocation of limited health care resources often is an unarticulated influence on these fateful decisions. Balancing the interests of society and patients can be a challenging experience for trauma surgeons [82]. The authors believe firmly that poor clinical decisions are made by surgeons acting as health economists at the bedside. In the absence of a mass casualty event, individual patients’ best interests always
must guide clinicians’ actions. The body politic must set the rules after open public debate and the medical profession must provide the best possible care given those rules. Poorly understood personal, professional, and cultural values no doubt influence these decisions. Surgeons are shown to be less likely than other intensivists to be influenced by factors, such as scarcity of resources and anticipated quality of life, when considering limiting care [83].

Withholding and withdrawing life support in hopelessly ill geriatric trauma patients is a necessity. The challenge is identification of the hopelessly ill patients. Decisions to limit ICU care should be based on the following principles [84]:

1. Every patient deserves a precise diagnosis.
2. The prognosis often is uncertain.
3. Each decision should be based on a risk-benefit analysis for patients.
4. Patient autonomy is paramount.
5. Due deliberation prior to decision.
6. Communicating with patients, families, and professional colleagues.
7. Framing the discussion within families’ cultural context.
8. Achieving consensus before a final decision.

Summary

Geriatric trauma is an important challenge facing trauma surgeons and trauma systems. This problem will assume increasing importance over the next several decades as the population of the United States ages. Training programs should prepare the next generation of surgeons to recognize the unique patterns of injury and meet the physiologic, rehabilitation, and ethical challenges of injury to senior citizens.

References


