EMN 26 September 2006

Minor Head Trauma in the Anticoagulated Patient

By James R. Robert, MD

Author Credentials and Financial Disclosure: James R. Roberts, MD, is the Chairman of the Department of Emergency Medicine and the Director of the Division of Toxicology at Mercy Health Systems, and a Professor of Emergency Medicine and Toxicology at the Drexel University College of Medicine, both in Philadelphia. Dr. Roberts has disclosed that he is the recipient of a speaker honorarium from Elan and the recipient of grant/research funding from T-System. Lippincott CME Institute, Inc. has identified and resolved all faculty conflicts of interest regarding this educational activity.

Learning Objectives: After reading this article, the physician should be able to:
1. Discuss the clinical issues of intracranial hemorrhage.
2. Describe the risks for intracranial hemorrhage and morbidity following minor head trauma.
3. Summarize the use of head CT scanning in the anticoagulated patient who suffers minor head trauma.

Release Date: September 2006

Emergency physicians frequently evaluate patients with seemingly minor head trauma, and the issues are generally relatively straightforward. The history, circumstances of the injury, and the exam and clinical gestalt all have their respective roles. CT scans are used liberally, although minor lumps and bumps rarely require scanning. Recently, excessive radiation to children’s brains has become an issue that may limit scans that previously had little indication except fear of litigation or misguided parental demands. It is possible that the significant radiation delivered to a developing brain by a head CT scan may predispose children to cancer many years later. This month’s column begins a series on the evaluation of minor head trauma in the ED, commencing with the approach to the anticoagulated patient. The anticoagulated patient is often an elderly patient, so the cohorts overlap. There is no standard that requires that every patient who bangs his head gets a CT scan, but even in the presence of seemingly minor trauma, the anticoagulated patient may require a different set of rules and certainly more cautious cогitation. The elderly present additional caveats.

Minor Head Trauma in Anticoagulated Patients
Garra G, et al
Acad Emerg Med
1999;6(2):121

The authors agree with the general (and obvious) concept that all head-injured patients with neurological compromise require a head CT scan. This radiologic issue has not been settled for patients with normal findings (Glasgow Coma Scale of 15) and a normal neurologic examination after minor head injury. Loss of consciousness (LOC), amnesia, or any neurologic finding seems to be generally acceptable criteria for CT scanning after even minor head trauma. Although it is rare, seemingly normal patients without LOC or hard neurologic findings can deteriorate quite rapidly. Minor head trauma in anticoagulation with warfarin is a clinical conundrum that is not currently settled, and these authors attempted to determine the incidence of intracranial hemorrhage (ICH) in patients taking warfarin under the following scenario: minor head trauma, normal vital signs, no loss of consciousness, and no neurologic abnormality in the ED.

The authors present a retrospective study (always problematic) of ED records of anticoagulated patients with minor head trauma evaluated in a busy community hospital (Level I trauma center) over a two-year period. Follow-up contact was by telephone in most cases. The chart used during this time period was template-based, and all the records were kept electronically. There was a specific template for head trauma that included the presence or absence of LOC and the use of anticoagulants. The only anticoagulant mentioned was warfarin.

The authors identified 65 patients who met their criteria, ranging in age from 28 to 91 years. The mean age was 71. Mechanism of injury included simple falls, minor vehicle crashes, and unspecified bumps to the head. About two-thirds of the patients (46 of 65) had lacerations, contusions, or abrasions of the face or scalp. Only 58 percent of the patients had a CT scan performed. Only 58 percent of the patients had a CT scan of the head, and none had an intracranial hemorrhage, brain contusion, or skull fracture. CT scans were performed in some of these anticoagulated patients whether or not they had external signs of injury. The authors also reported why scans were performed, and concluded that no patients would have had a clinically significant intracranial injury if they lacked all of the following criteria: loss of consciousness, amnesia for the event, and a new neurologic abnormality on exam.

The authors believe that anticoagulated patients should be assessed differently from those who have other similar head trauma and normal coagulation parameters. The specifics of the “different” clinical approach is not totally apparent to my reading of the paper. The main issue is that the risk of intracranial bleeding in prior studies appears to be proportionally increased as the level of anticoagulation rises.

Anticoagulation with warfarin has been associated with a seven- to 10-fold increase in the risk of spontaneous brain hemorrhage. Some studies have found an exceedingly high incidence of intracranial hemorrhage in hemophiliacs with a history of trauma. Many bleeders admitted for trauma...
occur after a simple fall at play, generally considered to be a minor mechanism of injury. On the other hand, other authors have demonstrated a lack of head bleeding in hemophilic patients with minor head trauma who had a scalp abscess who had a scalp abscess that was already draining and did not respond to dicloxacillin or cefalexin. While on medication, he developed another abscess that I drained. I’m sure he cleared up because they drained. He was not immunocompromised. Shortly thereafter your article appeared in EMN. It was an “ah ha” moment for me, and reminds me that “it’s never a spider bite”, and now you have a reason for most cases of dermatologic arachnophobia. Of course, prisoners have many reasons for exaggerating symptoms, person-to-person contact, and even self-inoculations, so it’s not surprising that you would see this condition in an inmate. I agree that this aggressive bug causes more rapid and more painful symptoms than run-of-the-mill staph infections, often developing over what seems to be just a few hours, replete with impressive cellulitis surrounding a small abscess. For cocktail party trivia, virulence is the mceA gene and Panton Valentine leukocidin at work. If you are 20 years older than me and still practicing, God bless you. I am currently trying to figure out how to go fishing, and leave the abscesses to the housestaff. My definition of a guru is anyone who reasons like you do. Dr. Roberts responds: Thanks for your comments, Dr. Thompson. I have always said, “It’s never a spider bite”, and now you have a reason for most cases of dermatologic arachnophobia. Of course, prisoners have many reasons for exaggerating symptoms, person-to-person contact, and even self-inoculations, so it’s not surprising that you would see this condition in an inmate. I agree that this aggressive bug causes more rapid and more painful symptoms than run-of-the-mill staph infections, often developing over what seems to be just a few hours, replete with impressive cellulitis surrounding a small abscess. For cocktail party trivia, virulence is the mceA gene and Panton Valentine leukocidin at work. If you are 20 years older than me and still practicing, God bless you. I am currently trying to figure out how to go fishing, and leave the abscesses to the housestaff. My definition of a guru is anyone who reasons like you do. Dr. Marshall Thompson, MD, Spokane, WA.
and at least a reasonable period of observation. Elderly patients with baseline confusion and dementia pose a problem with regard to normal mental status, and often that variable tips the scale in the favor of a CT scan. If an anticoagulated patient banged his head at noon, came to my ED shortly after, and was asymptomatic and otherwise pristine, I would not always order a CT scan. I would, however, always order an INR, and I would watch him for at least four to six hours, and repeat, and carefully document, my best neurological exam, an exam that I could be proud of if it were later scrutinized.

Additionally, discharge instructions are paramount. Significant bleeding from minor head injuries in anticoagulated patients may not occur during the first few hours post-trauma. One probably should be more concerned about the patient’s condition and possibly the CT consults in 24 to 48 hours. I don’t think you can discharge an anticoagulated 80-year-old with minor head trauma home alone with general instructions to return if there is a change in mental status. I would follow that caveat even if the CT was normal immediately after the injury. These patients require a friend or relative to check on them and physician contact ideally again in 24 to 48 hours. It is prudent to advise any coagulated patient with head trauma to check with his doctor at least by phone one to two days following the event, even if the CT scan was normal when I saw him. A repeat CT scan is certainly not necessary with a normal exam and normal mental status, but a slowly developing subdural hematoma can be very subtle. Headaches, dizziness, or minor cognitive abnormalities that occur one to two weeks following head trauma in the anti-coagulated patient should be assumed to be related to the initial trauma until proven otherwise.

Most individuals taking warfarin are elderly with a plethora of medical problems, and they will be well plugged into a bevy of follow-up physicians. In the young, healthy, and reliable patient who does not get a CT scan, routine follow-up is likewise required. It’s a bit problematic and foreign to many EPs, but the ED is a perfect place for short-term follow-up. There is no reason you can’t give that patient the department secretary’s phone number or at least the ED’s phone number to call back with some report to be well documented in the chart of its status the next day. You will hear from very few of them, but at least you gave the concept proper credence. When you think about it, this issue only applies to a few patients each year in most practices. Everyone wants an individualized and personal evaluation so I often have them call me directly for follow-up.

Everyone agrees that a careful, conscientious, and proactive approach to anticoagulated patients who suffer minor head trauma should be the norm. Exactly how this is accomplished is still up for debate. In the long run, no one cares about individual studies, statistics, or evidence-based practice. All they care about is their head-injured relative who takes a medication that makes him bleed and the perception of a physician who doesn’t give the injured patient a personalized, detailed, and concerned evaluation. Such an evaluation doesn’t always have to include a CT scan, but you have to show that you are aware of the issues, cognizant of the dangers of warfarin, and adhering to the concept of close follow-up. At a minimum, these patients require a pristine neurologic examination, a detailed history of the event, your best charting ever, and a few hours of observation, with another stellar evaluation carefully documented prior to discharge.

**Time to Deterioration of the Elderly, Anticoagulated, Minor Head Injury Patient Who Presents Without Evidence of Neurologic Abnormality**


This article attempts to determine how long after minor head injury it will take the anticoagulated elderly patient to deteriorate. The executive summary is that they can decompensate rapidly. Strict guidelines regarding care of anticoagulated patients with minor head trauma do not exist. Because most patients on warfarin will be elderly, the older patient with head injury presents an additional challenge to even the most sagacious clinician. The type of patient discussed in this article is somewhat different from the prior report. Subjects were included regardless of a history of LOC or post-traumatic amnesia. A retrospective chart review was performed, which identified patients 65 or older who presented to a Level II trauma center and subsequently determined to be on warfarin therapy.

Over a seven-year period, 308 elderly patients with documented head trauma were identified. Of these, 32 (10.4%) were on chronic oral anticoagulation therapy for longer than six months. About three-quarters of the patients were discharged home directly from the ED after evaluation, and the remaining 25 percent were admitted for treatment of associated injuries, observation, or intracranial bleeding. There was no difference between the groups in average age (about 82 years), sex, preexisting conditions, or concurrent medication use. The primary indication for warfarin was atrial fibrillation, but some had heart valve replacements or were undergoing DVT treatment. Most had a history of hypertension.

**Group 1: Discharged from ED**

The major mechanism of injury for those sent home was a fall at ground level. All patients in the discharged group had a GCS of 15, and were “acting normally.” Most patients were seen within two hours of injury. Surprisingly, only eight of 24 patients underwent coagulation testing, with a mean INR of 2.45 (range 1.6-3.6). Only three of these 24 patients received a CT scan, the remaining 21 patients were not imaged. All were discharged home after an average of 148 minutes of ED presentation. None of the patients developed intracranial bleeding on follow-up. It is possible that some of the patients who were not scanned had a minor bleed that was never detected.

**Group 2: Admitted Patients**

In the second group of admitted patients, four of eight remained neurologically intact from the time of injury until hospital discharge. All had an initial GCS of 15, but three of four had documented LOC, and two of four had amnesia for the event. Although the four patients were neurologically stable and had a persistent GCS of 15, all had some degree of intracranial hemorrhage. The mean INR was 2.0 (range 1.5-2.6). Treatment included intravenous vitamin K and fresh frozen plasma. No patients required operative intervention, and all returned to their location of origin.

The other four patients who were admitted deteriorated secondary to their head injury. One had LOC and amnesia and appeared to be acting normally, and all initially had a GCS of 15. Treatment consisted of fresh frozen plasma and vitamin K. Three of the four patients had an emergency craniotomy for decompression. Two died despite operative intervention, and the other died because of a DNR order.

Although no standard of care exists, most authors advocate a heightened sense of vigilance and a lower threshold for aggressive evaluation and management of the anticoagulated patient with minor head injury. In this study, there was minimal time of observation between LOC, amnesia, and subsequent neurologic decompensation. All four patients who suffered disastrous complications in this case were comatose within six hours of injury.

Although this was a very small series, the authors demonstrated a 25% probability (8 of 32) of intracranial hemorrhage in the elderly anticoagulated patient with a head injury who were initially classified as having a normal GCS after minor trauma. The mortality rate of patients in study : 32

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluated and discharged</strong></td>
<td><strong>Evaluated and admitted</strong></td>
</tr>
<tr>
<td>(GCS=15, “acting normally”)</td>
<td>All patients were “normal” per prehospital evaluation</td>
</tr>
<tr>
<td>CT scan performed</td>
<td>CT scan performed</td>
</tr>
<tr>
<td>(All were normal)</td>
<td>(All showed intracranial hemorrhage)</td>
</tr>
<tr>
<td>Delayed intracranial bleeding</td>
<td>Neurologic deterioration</td>
</tr>
<tr>
<td>Mean INR</td>
<td>Mean INR</td>
</tr>
<tr>
<td>2.45 (1.6-3.6)</td>
<td>2.0 (1.5-2.6)</td>
</tr>
<tr>
<td>Deterioration by 6h</td>
<td>Deterioration by 6h</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>(Two of four deteriorated en route to ED)</td>
<td>Died</td>
</tr>
<tr>
<td>3 (38%)</td>
<td>3 (38%)</td>
</tr>
</tbody>
</table>

The authors concluded: “Elderly anticoagulated patients with minor head trauma are at risk for neurologic deterioration within six hours of injury, despite an initially normal neurologic examination. Early cranial computed tomographic scanning and close observation within a minimum of six hours are indicated.”

Source: Adapted from J Trauma 2003;54:492.
In Brief

Frequent ED Users Often in Poor Health

Frequent users of the emergency department are not necessarily inappropriate users, reported a study published online March 29 by the Annals of Emergency Medicine. Most adults who use the ED frequently have insurance and a usual source of care, but they are more likely than less frequent users to be in poor health and need frequent medical attention.

The authors of the study, led by Kelly A. Hunt, MPP, research officer in Research & Evaluation at The Robert Wood Johnson Foundation in Princeton, NJ, used the 2000 to 2001 population-based, nationally representative Community Tracking Study Household Survey. Of the frequent users of the emergency department, defined as those who had four or more visits, 84 percent had health insurance, and 81 percent had a usual source of care. Individuals without a usual source of care were actually less likely to be frequent users. Frequent users were also more likely to have a family income below the poverty threshold and to be dissatisfied with their health care.

Ms. Hunt and colleagues reported that an estimated 45.2 million adults visited the ED at least once between 2000 and 2001. Overall, 92 percent of adult users made three or fewer visits, accounting for 72 percent of all adult emergency department visits. The eight percent of users with four or more visits were responsible for 28 percent of adults’ ED visits.

Daily Bed Stats Indicate Surge Capacity

Annual bed statistics do not give a complete picture of a hospital’s surge capacity because they mask the day-to-day fluctuations in bed availability, according to a study published online Feb. 27 by Annals of Emergency Medicine. Surge capacity, according to the authors, should account for daily differences in patient volume and changes in the number of empty beds during the year, the study concluded.

Derek DeLeo, PhD, of the Center for State Health Policy at the Institute for Health, Health Care Policy, and Aging Research at Rutgers, The State University of New Jersey, in New Brunswick, used administrative records to calculate daily occupancy rates for the 78 acute care hospitals in New Jersey with complete capacity data and compared them with annual rates.

New Jersey distinguishes between “maintained” beds and “licensed” beds. As the terms suggest, licensed beds are those licensed for inpatient care by the New Jersey Department of Health and Senior Services, while maintained beds are licensed beds that are also “set up and staffed.” The bed statistics were calculated using both types of beds.

Dr. DeLeo found that although annual bed occupancy in New Jersey was well below 80 percent — indicating significant surge capacity — the picture looked very different when daily bed capacity was analyzed. Examining daily bed statistics showed that there were long periods in 2003 when regional and statewide surge capacity was severely strained.

Statewide occupancy of maintained beds met or exceeded 85 percent, indicating high occupancy, on 212 days, 90 percent, indicating very high capacity, on 88 days, and 95 percent, indicating extremely high capacity, on four days. On 288 days, the number of available maintained beds in the state fell below the federal planning benchmark. Surge capacity was most likely to be strained Tuesdays through Fridays and least likely on weekends.

Candida Increases Risk of Death from Nosocomial Peritonitis

Candida appeared to be an independent risk factor for mortality in nosocomial peritonitis, but not community-acquired peritonitis, according to a study published in the March issue of Critical Care Medicine.

The clinical significance of Candida cultured from peritoneal fluid has been debated, and previous studies have not clearly differentiated between community-acquired peritonitis and nosocomial peritonitis, wrote the authors, led by Philip Montravers, MD, PhD, of Université Paris VII.

The researchers conducted a multicenter, retrospective, case-control study in patients from 17 hospital intensive care units. Cases were patients operated on for peritonitis with Candida cultured from the peritoneal fluid while controls did not have Candida. The 91 cases and 168 controls were matched for type of infection, Simplified Acute Physiology Score II, age, and time period of hospitalization.

After observing a significant interaction between mortality rates and type of infection, the researchers conducted a separate analysis of patients with community-acquired peritonitis and nosocomial peritonitis. In this analysis, only patients with nosocomial peritonitis showed an increase in mortality rate with Candida infection. Upper gastrointestinal tract site and isolation of Candida species were independent risk factors of mortality in nosocomial peritonitis patients.

Treatment Preferences Change as Time Passes for the Seriously Ill

Patients with advanced illnesses changed their willingness to accept treatments that would significantly alter their functional status as their health status changed, according to a study published in the April 24 issue of Archives of Internal Medicine.

Terri R. Fried, MD, of the clinical epidemiology research center of the VA Connecticut Healthcare System and the department of medicine at Yale University School of Medicine in New Haven, CT, and colleagues interviewed 226 older community-dwelling persons with advanced cancer, congestive heart failure, or chronic obstructive pulmonary disease in their homes at least every four months for up to two years.

They asked them to rate whether treatment for their illness would be acceptable if it resulted in one of four health states: mild physical disability, severe physical disability, cognitive impairment, and pain. Rating the treatment as acceptable meant that they would want to have it, and rating the treatment as unacceptable meant that they would rather die than have it.

With each month of participation, the likelihood of choosing an acceptable rating for a treatment resulting in mild or severe functional disability increased, Dr. Fried and colleagues wrote. While only six percent of patients changed their ratings from acceptable to unacceptable for mild or severe physical impairment, 19 percent changed their rating from unacceptable to acceptable for mild or severe functional disability and 20 percent for severe physical disability. Patients who had less of an ability to perform instrumental activities of daily living were 23 percent more likely to say a treatment leading to mild or severe disability was acceptable.

The likelihood of rating a treatment resulting in cognitive impairment as acceptable significantly decreased over time, and 75 percent of patients rated it as unacceptable at all times. Patients with moderate or severe pain were more likely to rate pain as acceptable, and 37 percent of those interviewed rated it as unacceptable at all times.

The findings could have serious ramifications for the instructional form for advance care planning, according to the authors, because they showed that patients cannot accurately predict their future feelings about treatments that will significantly affect their ability to function. They recommended that advance care planning be a process over time.
Minor Head Trauma  
Continued from previous page

authors were unable to find any useful clinical parameters to guide CT scanning in elderly patients with minor head trauma. Mack et al recommend a CT scan on all elderly patients with minor head trauma, even in the absence of anticoagulation. That is certainly not standard of care in my mind.

Although the patients in these studies appeared to have fallen and sustained an ICH, it is not unreasonable that spontaneous ICH precipitated the fall. I don’t know how these patients can be ferreted out, which is another reason to be liberal with the use of head CT scanning. In most of the reports, a minor degree of bleeding in the head was not necessarily an immediate indication for neurosurgical intervention. Bleeding was, however, an indication for reversal of the coagulopathy (a future column in itself).

In a study by Karni (Amer Surg 2001; 67(11):1098), five patients meeting this profile were determined to have a spontaneous bleed leading to the fall rather than the fall causing a traumatic bleed. Because the elderly are frequently confused, can’t remember what happened, are afraid to tell the truth for fear of hospitalization, surgery, or nursing home placement, any history must be viewed with some reasonable degree of skepticism. LOC issues seem straightforward to me, but laypeople have a different view of this symptom. I am continually amused by patients who say, “I was unconscious for a few seconds” or “unconscious for five minutes” by the patient’s own timing. For some reason, older patients can’t seem to get the basic concept of whether they fell from a mechanical reason or a neurological or cardiovascular event. You can ask them 20 different ways, and you will get as many answers, so it’s prudent to assume that an older person who falls may have had syncope, a seizure, or an arrhythmia rather than trying to talk them into poor eyesight, arthritis, or a crack in the pavement. Of course, many elderly patients who otherwise benefit from warfarin are not put on this medication because of a propensity to fall.

I don’t think the issue of when to order a CT scan in the elderly anticoagulated patient will ever be settled with firm scientific data. I could not find a single prospective study. Any seasoned clinician can tell you that a patient can have a significant mass lesion in the brain, a lot of cerebral edema, or even a remarkably large subdural hematoma, yet can talk to you and appear pristine by all parameters. By the time a true focal neurological finding manifests itself, that patient is probably herniating. I’m not smart enough to be able to tell which patient has an asymptomatic bleed or a condition that will subsequently deteriorate. Likewise, I find the definition of minor head trauma troubling. I am very leery of the octogenarian’s description of “minor” so I am liberal with the CT scanner for the elderly, especially those patients who hang their heads when they are taking warfarin.

I have decided to treat (many would say overtreat) head trauma in the elderly anticoagulated patients the same way I approach chest pain. When I was a resident, I could tell who had cardiac chest pain in about 30 seconds. Now, I haven’t the faintest idea who has GI versus cardiac versus musculoskeletal versus PE chest pain, so I am liberal with prolonged observation times, a lot of tests, and even hospital admissions for those I can’t readily figure out. This group gets larger as I gain more experience. Bottom line: Use the technology liberally.

I would advocate INR testing in all patients with any degree of head trauma who take warfarin. To be fair, however, there is no standard of care, more likely just a level of paranoia and the admission that you may not be as smart as you think you are. There are data and literature to support the selective use of CT scans, so there is latitude for observation and discharge in this subset of patients. I will not budge, however, on at least obtaining an INR.


CME Participation Instructions

To earn CME credit, you must read the article in Emergency Medicine News, and complete the quiz, answering at least 80 percent of the questions correctly. Mail the completed quiz with your check for $10 payable to Lippincott Continuing Medical Education Institute, Inc., 770 Township Line Road, Suite 300, Yardley, PA 19067. Only the first entry will be considered for credit and must be received by Lippincott Continuing Medical Education Institute, Inc. by September 30, 2007. Acknowledgment will be sent to you within six to eight weeks of participation.

Lippincott Continuing Medical Education Institute, Inc. is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians. Lippincott Continuing Medical Education Institute, Inc. designates this educational activity for a maximum of 1 AMA PRA Category 1 Credit™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

September 2006

Questions:

1. In the literature, the definition of minor head trauma usually includes the lack of loss of consciousness, amnesia for the event, and a normal neurologic examination.

   True  False

2. There is a standard of care for the use of INR testing and head CT scanning in the anticoagulated patient with minor head trauma.

   True  False

3. Patients taking warfarin can have a spontaneous intracranial hemorrhage that precipitates a fall.

   True  False

4. The elderly are at higher risk for intracranial hemorrhage and morbidity following minor head trauma.

   True  False

5. A careful examination, attention to mechanism of injury, a period of observation, and close follow-up are indicated for head-injured anticoagulated patients.

   True  False

Your evaluation of this CME activity will help guide future planning. Please respond to the following questions:

1. Did the content of this activity meet the stated learning objectives?

   Yes  No

2. On a scale of 1 to 5, with 5 being the highest, how do you rank the overall quality of this educational activity?

   1  2  3  4  5

3. As a result of meeting the learning objectives of this educational activity, will you be changing your practice behavior in a manner that improves your patient care? If yes, please explain.

   Yes  No

4. Did you perceive any evidence of bias for or against any commercial products? If yes, please explain.

   Yes  No

5. How long did it take you to complete this CME activity? _______ hour(s) _______ minutes

6. Please state one or two topics that you would like to see addressed in future issues.

__________________________________________________________________________________________________________________________________________________

__________________________________________________________________________________________________________________________________________________

Please print.

Name ________________________________

Street Address ________________________________

City, State, ZIP Code ________________________________

Telephone ________________________________ E-mail ________________________________