UTILITY OF THE CARDIAC COMPONENT OF FAST IN BLUNT TRAUMA

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Abstract—Background: Focused assessment with sonography in trauma (FAST) is widely used and endorsed by guidelines, but little evidence exists regarding the utility of the cardiac portion in blunt trauma. The traditional FAST includes the routine performance of cardiac sonography, regardless of risk for hemopericardium. Study Objectives: Our goal was to estimate the prevalence of hemopericardium due to blunt trauma and determine the sensitivity of certain variables for the presence of blunt hemopericardium. Methods: We performed a retrospective chart review of two institutional databases at a large urban Level I trauma center to determine the prevalence of blunt hemopericardium and cardiac rupture and incidental or insignificant effusions. We evaluated the sensitivity of major mechanism of injury, hypotension, and emergent intubation for blunt hemopericardium and cardiac rupture. Results: Eighteen patients had hemopericardium and cardiac rupture (14 and 4, respectively) out of 29,236 blunt trauma patients in the Trauma Registry over an 8.5-year period. The prevalence was 0.06% (95% confidence interval [CI] 0.04–0.09%). The prevalence of incidental or insignificant effusions was 0.13% (95% CI 0.09–0.18%). One case of blunt hemopericardium was identified in the emergency ultrasound database out of 777 cardiac ultrasounds over a 3-year period. No patient with blunt hemopericardium or cardiac rupture presented without a major mechanism of injury, hypotension, or emergent intubation. Conclusion: Blunt hemopericardium is rare. High-acuity variables may help guide the selective use of echocardiography in blunt trauma. © 2013 Elsevier Inc.

Keywords—ultrasound; hemopericardium; echocardiography; pericardial fluid

INTRODUCTION

Ultrasound was first used in the evaluation of trauma more than three decades ago (1). Focused assessment with sonography in trauma (FAST), a goal-directed examination for the diagnosis of blood in the peritoneal and pericardial spaces, has been shown to be accurate in the hands of trauma surgeons and emergency physicians (2,3). FAST’s routine coupling of abdominal and cardiac imaging has been widely taught and accepted almost universally as the standard approach for trauma sonography (4).

The echocardiographic portion of FAST is aimed at identifying pericardial fluid and cardiac activity. This examination has been shown to reduce time to operative care and improve survival for penetrating trauma (5). The utility of the cardiac portion of FAST is not well described for blunt trauma. A few dozen cases of hemopericardium due to blunt trauma diagnosed by echocardiography have been presented in the medical literature (6–14). These cases shed light on the fact that hemopericardium and cardiac rupture are diseases of severe trauma. However, FAST guidelines prescribe routinely coupling cardiac with abdominal sonography regardless of the severity of injury.

We aimed to investigate the prevalence of hemopericardium due to blunt trauma by retrospectively reviewing two institutional databases. We also aimed to determine the prevalence of incidental and insignificant pericardial fluid in these patients. Pre-existing effusions and false-positive findings may present serious diagnostic dilemmas in the management of critical trauma patients.
We expected that cardiac ultrasound would be of most value in patients with the following high-risk features: a major mechanism of injury, hypotension, and emergent intubation. Therefore, we aimed to determine the sensitivity of these variables for hemopericardium and cardiac rupture. We believe understanding the prevalence of hemopericardium and incidental effusions and the sensitivity of high-risk variables will help establish indications for emergent echocardiography in trauma.

MATERIALS AND METHODS

Study Design

We conducted a retrospective chart review of patients identified through two institutional databases. We identified patients with possible hemopericardium and then determined the prevalence of acute hemopericardium, cardiac rupture, incidental or insignificant effusions, and delayed hemopericardium. We reviewed the trauma registry for these patients from January 1, 2001 to June 6, 2007. We also queried the emergency ultrasound database to determine the prevalence of cardiac ultrasounds that were positive for pericardial fluid as a result of blunt trauma from July 1, 2004 to July 1, 2007. Institutional Review Board approval was received for this study.

Setting

The emergency department (ED) is an academic, urban, Level I trauma center with an annual census of approximately 65,000. More than 10,000 trauma patients are evaluated annually in the ED, more than 4000 patients are admitted to the trauma surgery service, and more than 1400 patients arrive by aeromedical transport. Coding of patient severity is based on the American College of Surgeons Committee on Trauma criteria. The trauma surgery service is activated to respond to Code III (most severely injured) patients on arrival. Emergency Physicians manage Code I and II patients primarily, consulting the trauma surgery service if warranted.

Population and Methods

Trauma registry. The trauma registry consists of patients presenting to our ED for whom the trauma surgery service is activated or consulted. A primary search of the trauma registry was conducted to identify all blunt trauma patients with the International Classification of Diseases (ICD-9) codes that we considered might include the diagnosis of hemopericardium or cardiac injury (Table 1). Independent abstractors reviewed all charts with one or more of these ICD-9 codes to identify possible cases of hemopericardium as a result of blunt trauma. Patients with possible hemopericardium were classified into one of four categories: 1) acute hemopericardium, defined as traumatic pericardial fluid identified within 72 h of injury; 2) cardiac rupture without documented hemopericardium, defined as disruption to the cardiac wall with no mention in the medical record of pericardial fluid or blood; the presumption for these cases was that ruptured pericardium did not contain the blood or its mention was simply absent; 3) insignificant or incidental pericardial fluid, defined as clinically insignificant pericardial fluid warranting no intervention, or a pericardial effusion confirmed or presumed by the managing physicians to be of non-traumatic origin; 4) delayed hemopericardium, defined as bloody pericardial fluid identified beyond 72 h after injury. The prevalence of the first two categories, acute hemopericardium and cardiac rupture, defined our primary outcome.

Abstractors determined the presence or absence of major mechanism of injury, hypotension, and emergent intubation for these patients. Major mechanism of injury was defined as high-speed motor vehicle/cycle collision with significant vehicular damage, steering wheel deformity, rollover, or ejection; pedestrian struck by automobile; fall > 20 feet; or severe direct blow (beyond assault) to the chest. Hypotension was defined as a prehospital or ED systolic blood pressure reading of <90 mm Hg. Emergent intubation was defined as intubation in the prehospital or ED setting.

Abstractors consisted of two emergency ultrasound fellowship-trained physicians. Both abstractors independently reviewed 40 of the 480 cases identified by ICD-9 codes, and the results of their category classification and determination of the three predefined variables were used to assess interrater reliability. Disagreement about category classification or the presence of variables was to be resolved by adjudication among a panel of three Emergency Physicians.

Emergency ultrasound database. The emergency ultrasound database was a local Microsoft Access (Microsoft Corporation, Redmond, WA) database created for the

Table 1. ICD-9 Codes and Diagnoses Used to Identify Cases of Possible Hemopericardium and Cardiac Injury from the Trauma Registry

<table>
<thead>
<tr>
<th>ICD-9 Code</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>420</td>
<td>Acute pericarditis</td>
</tr>
<tr>
<td>423</td>
<td>Other diseases of pericardium</td>
</tr>
<tr>
<td>861.0</td>
<td>Heart injury without mention of open wound into thorax</td>
</tr>
<tr>
<td>861.1</td>
<td>Heart injury with open wound into thorax</td>
</tr>
<tr>
<td>862</td>
<td>Injury to other and unspecified intrathoracic organs</td>
</tr>
<tr>
<td>869</td>
<td>Internal injury to unspecified or ill-defined organs</td>
</tr>
<tr>
<td>901</td>
<td>Injury to blood vessels of thorax</td>
</tr>
</tbody>
</table>

ICD-9 = International Classification of Diseases, 9th Revision.
robust archiving of bedside ultrasound studies performed in the ED. All studies were reviewed by one of two emergency ultrasound fellowship-trained physicians. The database was queried for all cardiac studies performed between July 1, 2004 and July 1, 2007 (before 2004, studies were archived on thermal paper). All studies in which the physician sonographer or the reviewer (or both) diagnosed pericardial fluid were used in our analysis. A single abstractor reviewed the medical charts of these patients to determine the mechanism of injury and the presence or absence of pericardial fluid as a result of blunt trauma.

Statistical Analysis

The prevalence of acute hemopericardium and cardiac rupture was calculated for blunt trauma patients in the trauma registry, as was the prevalence of incidental or insignificant pericardial fluid. The sensitivity of major mechanism of injury, hypotension, and emergent intubation for blunt hemopericardium and cardiac rupture was calculated. The prevalence for cases of blunt hemopericardium among all emergency cardiac ultrasound examinations was calculated. Prevalence and sensitivity data are presented with 95% confidence intervals (CI).

RESULTS

The trauma registry contained 37,057 cases evaluated through the ED from January 1, 2000 to July 7, 2007, of which 29,236 were blunt trauma patients. Four hundred eighty of the 37,057 patients were identified as having one of our pre-specified ICD-9 codes. Of these, 401 patients were wounded by blunt mechanism, and 1 patient had an indeterminable mechanism of injury due to insufficient medical records. Eighteen blunt trauma patients were found to have our primary outcome of acute hemopericardium or cardiac rupture (Figure 1). Fourteen patients had acute hemopericardium due to blunt trauma (Table 2), and 6 survived. Four patients had cardiac injury such as chamber rupture or puncture without documentation in the medical chart of pericardial fluid or blood (Table 2), and none survived.

Thirty-eight patients had incidental or insignificant effusions. Four were described definitively as chronic in patients with pre-existing medical conditions such as renal failure and lung cancer; none required intervention. The remaining 32 were deemed to be insignificant, requiring no intervention; these were described as “tiny,” “small,” “minimal,” or “trace,” and may have been pre-existing, due to imaging artifact, or of traumatic origin. Thirteen patients had delayed diagnosis of pericardial fluid or blood, discovered after 72 h in the hospital. Five were deemed definitively iatrogenic, four in patients after coronary stenting or bypass for atherosclerotic heart disease that was coincidentally managed after their trauma admission. The 8 other patients were diagnosed with pericardial blood or fluid at days 11, 12, 15, 18, 18, 18, 19, and 61. Three of these patients had thoracic surgery for aortic injuries before the diagnosis of the effusion, and it was unclear if the etiology was traumatic or post-surgical sequelae. In all 13 patients with delayed

Figure 1. Patients with possible hemopericardium and categorization of pericardial fluid or cardiac injury. ICD-9 = International Classification of Diseases, 9th Revision.
<table>
<thead>
<tr>
<th>Patient</th>
<th>Initial Diagnostic Modality</th>
<th>Described Thoracic Diagnoses</th>
<th>Outcome</th>
<th>Hypotension</th>
<th>Emergent Intubation</th>
<th>Major Mechanism of Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CT</td>
<td>Pericardial effusion with tamponade, rib fractures, pulmonary contusions</td>
<td>Survived</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC ejection</td>
</tr>
<tr>
<td>2</td>
<td>Operative</td>
<td>Minimal pericardial blood with no evidence of myocardial perforation</td>
<td>Died</td>
<td>N/A</td>
<td>Y</td>
<td>Y, MVC ejection</td>
</tr>
<tr>
<td>3</td>
<td>CT scan</td>
<td>Pericardial tamponade, pulmonary ven injury</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, pedestrian struck</td>
</tr>
<tr>
<td>4</td>
<td>Echo</td>
<td>Pericardial tamponade, superior vena cava/right atrial injury</td>
<td>Survived</td>
<td>Y</td>
<td>N</td>
<td>Y, horse kick to chest</td>
</tr>
<tr>
<td>5</td>
<td>Operative</td>
<td>Pericardial tamponade, cardiac contusion, atrial injury</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC rollover</td>
</tr>
<tr>
<td>6</td>
<td>CT</td>
<td>Pericardial rupture, hemothorax, rib fracture, myocardial contusion</td>
<td>Survived</td>
<td>Y</td>
<td>Y</td>
<td>Y, pedestrian struck</td>
</tr>
<tr>
<td>8</td>
<td>Echo</td>
<td>Moderate pericardial effusion, inferior vena cava laceration</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC ejection</td>
</tr>
<tr>
<td>9</td>
<td>CT</td>
<td>Pericardial effusion - venous blood</td>
<td>Survived</td>
<td>N</td>
<td>N</td>
<td>Y, horse kick to chest</td>
</tr>
<tr>
<td>10</td>
<td>Operative</td>
<td>Pericardial blood, cardiac effusion without tear, multiple rib fractures, tricuspid valve injury</td>
<td>Survived</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC high speed</td>
</tr>
<tr>
<td>11</td>
<td>Operative</td>
<td>“Not a large amount of blood in chest or pericardium to explain cardiac arrest”</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MCC ejection</td>
</tr>
<tr>
<td>12</td>
<td>Echo</td>
<td>Pericardial clot, tamponade, laceration of the left ventricle</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC rollover</td>
</tr>
<tr>
<td>13</td>
<td>Operative</td>
<td>Fractured rib with puncture of left ventricle, hemopericardium and cardiac rupture</td>
<td>Died</td>
<td>N/A</td>
<td>N/A</td>
<td>Y, MVC high speed</td>
</tr>
<tr>
<td>14</td>
<td>Operative</td>
<td>Pericardial tamponade, punctuate left ventricle tears</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC high speed</td>
</tr>
</tbody>
</table>

Cardiac or pericardial injury without documented hemopericardium

<table>
<thead>
<tr>
<th>Patient</th>
<th>Initial Diagnostic Modality</th>
<th>Described Thoracic Diagnoses</th>
<th>Outcome</th>
<th>Hypotension</th>
<th>Emergent Intubation</th>
<th>Major Mechanism of Injury</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Operative</td>
<td>Left ventricle laceration</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC ejection</td>
</tr>
<tr>
<td>16</td>
<td>Operative</td>
<td>Thoracic aortic tear, “likely pericardial rupture,” no hemopericardium or cardiac disruption</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC high speed</td>
</tr>
<tr>
<td>17</td>
<td>Operative</td>
<td>Pericardial window “negative,” but hole in left atrium on thoracotomy</td>
<td>Died</td>
<td>Y</td>
<td>Y</td>
<td>Y, MVC rollover</td>
</tr>
<tr>
<td>18</td>
<td>Operative</td>
<td>Left atrial hole, rib fractures</td>
<td>Died</td>
<td>Y</td>
<td>N/A</td>
<td>Y, MVC high speed</td>
</tr>
</tbody>
</table>

CT = computed tomography; Echo = echocardiography; MCC = motorcycle collision; MVC = motor vehicle collision; N/A = not available; N = no; Y = yes.
hemopericardium, either an initial ultrasound or CT scan was negative for pericardial effusion.

The prevalence for our primary outcome of acute hemopericardium and cardiac rupture was 0.06% (95% CI 0.04–0.09%) among all blunt trauma patients. The prevalence of incidental or insignificant pericardial fluid was 0.13% (95% CI 0.09–0.18%).

No patient with blunt hemopericardium or cardiac rupture presented without one of the following findings: major mechanism of injury, hypotension, or emergent intubation; hence, the sensitivity for the presence of at least one of these three variables was 100% (95% CI 78–100%). A major mechanism of injury was present for all patients. Information about hypotension was not available for 2 patients and about emergent intubation for 2 patients. One patient presented without hypotension and emergent intubation, and another presented without emergent intubation alone. Both of these patients suffered the same isolated mechanism, a kick to the chest by a horse.

There was no discrepancy in the classification of patients or determination of variables between the two independent abstractors for the 40-patient sample used to assess interrater reliability.

The emergency ultrasound database contained 777 cardiac ultrasound examinations performed between July 1, 2004 and July 1, 2007. The physician-sonographer and the reviewer agreed on the presence of pericardial fluid in 33 patients. Five patients had pericardial fluid diagnosed by the physician-sonographer but determined to be absent by the reviewer, and in 2 patients pericardial fluid was present according to the reviewer but was undiagnosed by the physician-sonographer. These 40 patients comprised the group of all patients that may have had pericardial fluid diagnosed by emergency ultrasound during the 3-year period. Chart review revealed that 4 of these patients had sustained trauma, only 1 as a result of blunt injury, and in this patient pericardial blood was confirmed by operative findings. The prevalence of blunt hemopericardium among all emergency cardiac ultrasound examinations during this time period was 0.13% (95% CI 0.03–0.7%).

The one patient in the emergency ultrasound database with pericardial fluid was not part of the trauma registry because she was transferred from an outside hospital through the ED to the cardiothoracic surgery service with a known pericardial effusion. Three patients identified in the trauma registry with blunt hemopericardium presented during the 3-year time frame the emergency ultrasound database were assessed, and none received echocardiography performed by emergency physicians. The lack of ultrasound records on these patients may have been due to rapid thoracotomy, oversight in performance, or imaging not being saved for archives.

**DISCUSSION**

For almost two decades, FAST has served as the standard sonographic evaluation for trauma patients (2–4). FAST allows for the early detection of hemoperitoneum and hemopericardium and has revolutionized the initial management of trauma patients (4). Ultrasound is a rapid non-invasive test without the risks of radiation or contrast administration, and its use is steadily increasing. In 2008, the American College of Emergency Physicians and the American Institute of Ultrasound in Medicine jointly published guidelines for the performance of FAST (15). The construct of FAST is simple, pairing abdominal and cardiac scanning for trauma patients. The examination has been augmented by views such as lung and vasculature assessments, but its basic components have been unassailable.

We questioned the necessity of routinely evaluating the pericardial space in blunt trauma, particularly for lower acuity patients, due to the low prevalence of hemopericardium.

The vast majority of patients who sustain cardiac rupture due to blunt traumatic forces die rapidly after the injury (16). A small proportion of these patients survive long enough to present to a hospital for definitive care. Although echocardiography has been shown to expedite operative care and improve mortality in patients suffering penetrating cardiac trauma, its utility in the setting of blunt trauma is less well established (5). Kato et al. reported a Japanese series of eight cases of blunt cardiac rupture out of 1424 ultrasounds performed between 1985 and 1995 (6). In 1991, Schiavone et al. described three cases of ultrasound-diagnosed right atrial rupture and cardiac tamponade due to motor vehicle collisions (12). Symbas et al. reported three cases over a 3-year period of blunt hemopericardium diagnosed by surgeon-performed ultrasound, and concluded that all patients with blunt injury and signs of cardiac tamponade or unexplained hypotension should undergo ultrasonography of the heart during resuscitation efforts (13). To the best of our knowledge, our study is the most extensive description of the largest sample of hemopericardium and incidental effusions in the medical literature.

Our analysis revealed that hemopericardium due to blunt trauma is a rare entity. Of the 29,236 blunt trauma patients evaluated over an 8.5-year period, 18 had acute hemopericardium or cardiac injury. Fourteen patients had a definitive diagnosis of blood in the pericardial space, and 4 others had cardiac injury, such as chamber rupture, that had a high likelihood of coincident blood in the pericardial sac but without hemopericardium described in the medical record. Based on this prevalence, more than 1600 patients would have to undergo echocardiography to diagnose one with blunt hemopericardium or cardiac rupture. All patients with hemopericardium
and cardiac rupture presented due to a major mechanism of injury. Two patients in our sample were kicked by a horse; both were not intubated in the prehospital or ED setting, and one presented without hypotension. These were the only 2 patients that incurred an isolated blow to the chest; all others suffered severe generalized trauma with multiple injuries, and all presented with hypotension and emergent intubation. These findings paint a picture of the patients in whom we may anticipate a positive cardiac ultrasound; those that are very ill after suffering major trauma and those with a severe direct blow to the chest. We made no attempt to evaluate the specificity or positive and negative predictive value of these variables. Further study may reveal these test characteristics; however, we believe the value of these variables is that in their absence the prevalence of an already rare condition becomes practically negligible.

Incidental pericardial effusions present a diagnostic dilemma in managing the acute trauma patient. In our study, the rate of incidental or insignificant effusions was double that of hemopericardium. Prior reports describe a false-positive rate of 19% and 35% due to incidental effusions for cardiac ultrasound in penetrating trauma (17,18). Lukan et al. in 2001 developed a protocol to address the dilemma of false positives and reduce the number of unnecessary pericardial windows at their institution (7). In their study, 6 of 1100 patients who had a surgeon-performed cardiac ultrasound were found to have pericardial fluid; 2 underwent emergent thoracotomy, 2 were determined to have incidental effusions after pericardial window, and 2 were managed expectantly. They recommended a conservative strategy of repeat ultrasound and intensive care unit admission with central venous pressure monitoring for positive cardiac ultrasounds in hemodynamically stable patients older than 65 years or with medical comorbidities. If applied to patients in our study, no patient with hemopericardium or cardiac rupture would have been inappropriately directed to a strategy of conservative management.

Bedside ultrasound has revolutionized acute trauma care, but a reconsideration of the construct of the iconic FAST may be warranted. With applications such as intravascular volume estimation, lung, ocular, and orthopedic assessments, trauma sonography is no longer synonymous with traditional FAST (19–21). Scanning the abdomen should not obligate the physician to perform echocardiography when there is no clinical suspicion for hemopericardium. While the cardiac portion is often performed rapidly and may contribute to the training of the sonographer, neither provides indication for the exam in a low-acuity patient. The identification of hemopericardium and the life-saving measures that follow are undoubtedly dramatic. However, in patients without the risk factors we describe, the benefits of echocardiography are negligible, and the costs of unnecessary testing such as non-therapeutic interventions due to false-positive or incidental findings, delays, and increased health care expenditures should also be considered. Current Procedural Terminology coding classifies the abdominal and cardiac portions of FAST as two discrete billable studies, and hence, medical necessity must be established in each instance when seeking reimbursement (22). Imaging has recently come under great scrutiny as an area to improve resource utilization and reduce unnecessary health care expenditures.

Further prospective investigation is necessary, but we believe selective performance of cardiac ultrasound guided by high-acuity variables is a more reasonable approach than echocardiography for everyone. Suggestions to alter the status quo are frequently met with resistance. If standard practice were to selectively perform cardiac ultrasound, a recommendation to perform it routinely for every trauma evaluation would be met with spirited criticism and a demand for the evidence to do so. The evidence from our study reveals that blunt hemopericardium is rare, the rate of incidental effusions is higher, and patients at risk can be identified by certain high-acuity variables.

**Limitations**

This study was conducted at a single academic center, one that in general treats a greater number of more severely injured patients than other trauma centers, and this poses a threat to external validity. Still, our analysis revealed only a small sample of patients with hemopericardium, and further study at multiple institutions over a longer time span may reveal more definitive findings. It is possible that the ICD-9 codes we used were not inclusive of all possible diagnoses for hemopericardium or cardiac injury, or that the proper code was not used, particularly for patients with numerous injuries. However, <18% of patients with these ICD-9 codes had pericardial fluid, and consequently, we believe our list was adequately expansive. Additionally, it is far more likely that coding for an incidental or insignificant effusion would have been neglected than for one of traumatic etiology. We may have missed patients that presented with blunt hemopericardium and died without diagnostic or operative evaluation. Had cardiac ultrasound been performed in these patients, it may have been life-saving. However, it is extremely unlikely that these patients would have died before diagnostic evaluation without having one of the three risk factors we described. Our definition of major mechanism of injury may have involved subjectivity. All patients in our primary outcome sample had descriptors in chart abstraction that fit our definition, and the very high mortality rate illustrates the severity of the mechanisms of injury for this group.
The trauma service is not consulted for patients that present to the ED without vital signs, which may account for additional missed cases, though clinical significance (survival) for these patients is negligible. Of greater consequence, the trauma registry does not include patients that were treated and discharged by emergency physicians without involvement of the trauma service. These patients make for the majority of blunt trauma patients seen at our institution. These many thousands of patients are less injured and less likely to have hemopericardium, though FAST is frequently performed on them. Including these patients in our analysis would have dramatically increased our denominator (blunt trauma patients) and even further decreased the prevalence of disease.

We did not attempt to assess the accuracy of bedside echocardiography in trauma. A very large trial would be necessary to procure an adequate number of positive studies to assess test characteristics. When comparing the rate of incidental effusions to the rate of hemopericardium, we do not know with what accuracy hemopericardium would be diagnosed.

CONCLUSION

Patients rarely present to the ED with blunt hemopericardium. We found that in our sample, the absence of a major mechanism of injury, hypotension, or emergent intubation excluded this diagnosis. The routine performance of cardiac ultrasound in blunt trauma patients is likely unwarranted due to the very low prevalence of hemopericardium, the higher prevalence of incidental or insignificant effusions, and identifiable risk factors for the condition. Selective use of echocardiography guided by the risk factors we describe may be a more reasonable approach than the routine cardiac imaging of traditional FAST.

REFERENCES

ARTICLE SUMMARY

1. Why is this topic important?
   Ultrasound is used as the initial diagnostic modality for blunt trauma, with the standard protocol of focused assessment with sonography in trauma (FAST) pairing abdominal and cardiac scanning. The utility of the cardiac component in blunt trauma has not been rigorously described.

2. What does this study attempt to show?
   This study investigates the prevalence of blunt hemopericardium and the sensitivity of certain variables for the condition.

3. What are the key findings?
   The prevalence of hemopericardium due to blunt trauma is very low, and less than half that of incidental or insignificant effusions. No patient with blunt hemopericardium presented without a major mechanism of injury, hypotension, or emergent intubation.

4. How is patient care impacted?
   The routine performance of the cardiac component of FAST may be unwarranted. Certain risk factors may help guide the selective performance of echocardiography in blunt trauma.