

Blunt Cardiac Injury



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KEYWORDS

- Blunt cardiac injury • Cardiac contusion • Cardiac concussion • Commotio cordis
- Contusio cordis

KEY POINTS

- Blunt cardiac injury encompasses multiple different injuries, including contusion, chamber rupture, and acute valvular disorders.
- Blunt cardiac injury is common and may cause significant morbidity and mortality; a high index of suspicion is needed for accurate diagnosis.
- Diagnostic work-up should always include electrocardiogram and cardiac enzymes, and may include echocardiography if specific disorders (ie, tamponade or valvular disorders) are suspected.
- Patients with myocardial contusion should be observed for 24 to 48 hours for arrhythmias.
- Many other significant forms of blunt cardiac injury require surgical intervention.

EPIDEMIOLOGY

“And always with a heart contusion arise both doubt and much confusion.”¹

Blunt cardiac injury (BCI) is not a straightforward entity. Because there is no widely accepted gold standard diagnostic test, it is difficult to quantify and there is little consensus on how to establish the diagnosis, even though the complications from BCI can range from asymptomatic ecchymosis to sudden death. A lack of consensus on the definition only limits research and understanding of the disease. The inconsistent nomenclature regarding this disease makes quantifying its incidence difficult at best. The diagnosis can be made clinically from complications, by diagnostic testing or laboratory evidence, or on postmortem examination. Given this lack of uniformity and specificity, well-validated diagnostic and treatment algorithms remain elusive.

Disclosures: None.

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Mattox and colleagues² proposed eliminating the terms cardiac concussion and cardiac contusion, instead describing all cardiac conditions resulting from blunt trauma as BCI, with further delineation of specific injuries such as septal rupture, free wall rupture, coronary artery thrombosis, cardiac failure, minor electrocardiogram (ECG)/enzyme abnormality, or complex arrhythmia.

Motor vehicle crash (MVC) mechanisms account for most cases of BCI and approximately 20% of all MVC deaths involve blunt injury to the heart.³ Some estimates place the incidence of cardiac trauma at slightly less than 1 million cases per year in the United States. Blunt thoracic trauma carries approximately a 20% risk of BCI, but with severe thoracic trauma or multisystem trauma the risk approaches 76%.⁴

In one study, significant chest wall trauma (multiple rib or sternal fractures, lung contusion, scapular fracture, hemothorax, major intrathoracic vascular injury, or seat belt sign) predicted a 13% incidence of BCI.⁵

The clinical significance of this elusive diagnosis lies in its associated complications. The rationale of screening for BCI is to identify cases at high risk for complication that will benefit from intervention; a difficult proposition at best. In traumatic deaths, the cardiac injury is often overlooked, even in the setting of suggestive clinical features such as hypotension and jugular venous distention.^{6,7} One autopsy series of 546 cases of nonpenetrating trauma to the heart found that 65% had a ruptured myocardium; in only 1 case was BCI clinically suspected in the medical documentation.³ BCI is likely overlooked because patients at high risk for BCI commonly have multiple injured organ systems, which in turn overshadow the index of suspicion for BCI. In a series of 24 successfully treated blunt atrial injuries, 16 had a delay to treatment of more than an hour, and 15 had injury to other areas.^{6,8} The same series found 2.3 to 3.4 total injured organ systems in patients with BCI.⁶

The picture is further clouded because manifestations of some cardiac injuries present in a delayed fashion. These injuries include intracardiac shunts or fistulae, valvular lesions, ventricular aneurysms, retained foreign bodies, tamponade from postpericardiotomy syndrome, hemopericardium or constrictive pericarditis, and coronary artery thrombosis. The clinical and diagnostic conundrum for emergency physicians is the differentiation between a benign cardiac insult and a significant episode with strongly associated morbidity and/or mortality. This article clarifies the available diagnostic and screening tools and presents a rational schema for their use. Practical classification schemes define BCI by its resulting complications: cardiac free wall rupture, septal rupture, coronary artery injury, cardiac failure, complex arrhythmias, and minor ECG or cardiac enzyme abnormalities.^{2,9}

Note that there are limited data on BCI in the pediatric population. One registry of 1288 children with blunt thoracic trauma found a 4.6% incidence of BCI. However, most pediatric BCI is associated with nonaccidental trauma and concomitant head trauma.⁶

MECHANISMS AND INJURY PATTERNS

There are multiple potential mechanisms of injury for the blunt forces of BCI: direct, indirect, crush injury, bidirectional or compressive, decelerative, blast, concussive, and combined.³ The most common site of injury is the right heart, because of its proximity to the chest wall, although more than half of patients with BCI experience injury to multiple cardiac chambers.⁴

Cardiac Concussion (Also Called Cardiac Contusion)

Cardiac concussion is histologically defined by myocardial hemorrhage, edema, and localized necrosis. In clinical practice, the term is loosely used to describe a spectrum

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