Blunt Cardiac Contusions

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KEYWORDS

• Cardiac injury • Blunt cardiac trauma • Commotio cordis • Sudden collapse
• Chest wall protectors

KEY POINTS

- Nonpenetrating cardiac injury can include hemothorax, pneumothorax, pulmonary contusion, and rib or sternal fractures.
- Spectrum of injury varies from contused myocardium to cardiac rupture.
- It becomes worrisome if chest is struck at a vulnerable point in the cardiac cycle just before the peak of the T wave.
- Watch for brief periods of consciousness followed by sudden collapse and ventricular fibrillation.
- Prevention theories include softer balls used in sports, such as baseball, and chest wall protectors in contact sports that cover the left chest wall and precordium.
- Return-to-play guidelines are most often left to a clinician's best judgment.

INTRODUCTION

The term, *blunt cardiac contusion* (BCC), formerly known as myocardial contusion, has acquired its name from its description as a nonpenetrating cardiac injury. The spectrum of injury varies from contused myocardium, showing muscle necrosis, edema, and hemorrhagic infiltrate, to cardiac rupture.

Physicians are concerned about the spectrum of outcomes, which vary from asymptomatic changes on an ECG to cardiogenic shock and sudden death. With no standard diagnostic criteria, the true incidence remains unclear. There is no current gold standard in diagnosis; however, all patients who have a clinical history and an altered cardiac function must be considered as patients with BCC. Unlike adults, children with blunt cardiac injuries (BCIs) have few presenting signs and symptoms. Children are believed more susceptible because of the elasticity and compressibility of their chest walls.[1] Monitoring is crucial because problems often evolve over time.

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One of the more common cardiac contusion fears in the sports world is the development of commotio cordis. It was first distinguished from bruising of the heart, or contusio cordis, in 1763. Commotio cordis is differentiated from cardiac contusion (contusio cordis), a situation in which blunt chest trauma causes structural cardiac damage, such as that observed in motor vehicular accidents.[2] First described in 1857, the term, *commotio cordis*, translates as *disturbance of the heart* and refers to cardiac concussion in the absence of injury.[1]

BCI is typically found in patients who are struck in the pericardium at a vulnerable point in the cardiac cycle just before the peak of the T wave. The impact usually results in ventricular fibrillation; however, there are several other rhythms that have been found to occur as a result of BCI, including ventricular tachycardia, bradyarrythmias, idioventricular arrythmias, complete heart block, and asystole.[1] There is usually no underlying cardiac disease found in these patients. This is common in sports that have projectile objects that can hit the chest, such as baseball, lacrosse, ice hockey, shadow boxing, and martial arts.

Estimates of the impact velocity of baseballs causing commotio cordis range from 20 to 50 miles per hour.[3] There has been some evidence that softer objects can help prevent this type of injury and further research should be done to evaluate.[4]

ANATOMY/PATHOPHYSIOLOGY

The right ventricle is the most common site of BCC, most likely secondary to the anterior location of the right atrium and ventricle within the mediastinum. There has been concurrent injury to more than 1 chamber in more than 50% of BCC patients.[5] Additional chest injuries that can occur with myocardial contusion include hemothorax, pneumothorax, pulmonary contusion, and rib or sternal fractures. Physicians should remember to evaluate for these types of injuries when presented with patients who have a history consistent with BCC.

MECHANISM OF INJURY

BCC arises from a variety of mechanisms, including

1. Direct precordial impact
2. Crush injury resulting from compression between the sternum and spine
3. Deceleration or torsion causing a tear in the heart at a point of fixation

PATIENT PRESENTATION

When viewing from the sideline, physicians must have a focused eye to know which player to watch when there is more than one player on the field. Remember that a player who is hit in the chest by either a ball or a person is at highest risk. This is true even if the blow is innocent in appearance. Brief periods of consciousness are followed by sudden collapse and ventricular fibrillation. When covering a sporting event that has a projectile object, it is crucial to prepare for worst-case scenarios that cause life-threatening injuries. If a blunt chest injury is witnessed and a player has a brief period of consciousness followed by sudden collapse, one attempt at defibrillation should be followed by immediate cardiopulmonary resuscitation.[6]

Patients who are hit in the chest but do not collapse often present with chest pain or discomfort. Pain may or may not be anginal in nature. There may be associated dyspnea, flail chest, ecchymosis, and sternal fractures seen on clinical examination. In blunt thoracic trauma, cardiac arrythmias, a new murmur, heart failure, or hypotension