

Blunt Cardiac Injury

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My experience with cardiac injuries prior to my trauma rotation consisted of patients coming to the ED with acute exacerbations of chronic heart conditions, leading to arrhythmias or evidence of ischemia. Further evaluation of these patients consisted of an EKG, but can also include bedside or formal echocardiograms. As I began my trauma rotation, a number of patients suffering blunt chest trauma were admitted for “cardiac monitoring” on telemetry for 24 hours due to their injuries. I was curious as to the reasoning behind this and the clinical significance of cardiac dysfunction that develops after blunt trauma to the heart.

A brief literature search on blunt cardiac injuries and arrhythmias initially led me to a review article in *Heart* that examined a number of diagnostic modalities and their effectiveness in detecting blunt cardiac injury. In considering EKGs, the authors comment on the greater amount of tissue in the left ventricle versus the right, and how the **right ventricle** may be more commonly injured in blunt cardiac injury due to its positioning in the anterior chest. These factors make detection of right ventricle injury with an EKG more difficult. Transient right bundle branch blocks have been detected with severe right ventricle injury. Left ventricle injuries can cause changes in the ST-T segment or potentially even Q wave development. It is important to recognize that arrhythmias that develop may manifest as a result of secondary issues relating to trauma, such as hemorrhage and/or hypotension.

Where the EKG falls short, an **echocardiogram** can provide a wealth of information relating to cardiac environment and function. Specifically, the use of the focused assessment with sonography for trauma (FAST) examination starts with a subxiphoid view of the heart and surrounding tissues to evaluate for tamponade. Wall rupture would likely lead to significant exsanguination and visible pericardial effusion on the subxiphoid view. Beyond this basic assessment, a skilled physician could assess ventricular function by examining cardiac contractility and wall motion. For a more formal sonographic evaluation, a transthoracic or transesophageal echocardiogram may be employed to further identify and characterize any motion abnormalities that could not be detected by less sensitive ultrasound techniques. The resource requirements of this specific imaging modality may limit its effectiveness in an emergent setting.

Finally, the **utility of cardiac enzyme serologic testing is still up for debate**. Testing for troponin T enzymes in the blood after cardiac injury may help characterize cardiac injury, but there is no consensus on ideal timing. Additionally, troponin release from cardiac membrane damage cannot always be attributed to blunt cardiac injury in traumas, especially if there is a component of increased cardiac demand as a result of the trauma (as in the case of reflex tachycardia as a result of hypovolemia due to hemorrhage or shock). However, the authors of the review in *Heart* note that well-timed cardiac biomarker measurements both soon after the insult and 4-6 hours later can, if negative, reliably exclude cardiac injury. This has not been independently validated, and other authors note that cardiac biomarkers are not part of the routine evaluation in blunt cardiac injury.

In considering the process for evaluating trauma patients for blunt cardiac injury, one must remember that the predominant cause of cardiac dysfunction in a traumatic setting is almost always directly related to hemorrhage, as opposed to arrhythmia due to physical myocardial injury. In a stable patient without any evidence of acute hemorrhage, a more thorough evaluation may be necessary and can include EKGs, echocardiograms, and cardiac biomarkers.

If these initial tests are negative, **observation with telemetry for 24 hours** is a commonly accepted standard to evaluate for the later development of arrhythmias related to the trauma.

Resources:

- Sybrandy KC, Cramer MJM, and C Burgersdijk. Diagnosing cardiac contusion: Old wisdom and new insights. *Heart*. 2000; 89: 485-489.
- Legome E, and H Kadish. Cardiac injury from blunt trauma. UpToDate. 2014.
- <http://www.ncbi.nlm.nih.gov/pubmed/17826213>