



## Cardiac Tamponade

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Up2Date

### What is it?

Cardiac tamponade occurs when blood or fluid collects in the intrapericardial space, causing compression of the heart to the point where cardiac filling is altered (1). Normally the pericardial space will hold 15-50ml of fluid, if fluid accumulates slowly the pericardium will stretch and pericardial pressure will rise. A marked rise in intrapericardial pressure will accompany rapid accumulation of 150-200ml of fluid (2), although the volume of most nonhemorrhagic effusions that cause tamponade is approximately 300-600ml (3). Less fluid is required to raise intrapericardial pressure when the pericardium is stiff related to fibrosis or malignant infiltration (2).

### What are the signs and symptoms?

#### Rapid Cardiac Tamponade

- Shock-Poor peripheral circulation, hypotension, unresponsiveness
- Jugular venous distension
- Distant muffled heart tones
- Pulses paradoxus- inspiratory systolic fall in arterial pressure of 10mmHg or more during normal breaths.
- Narrowing pulse pressure (3)

## Chronic Cardiac Tamponade-More insidious and difficult to diagnose

- Vague symptoms such as: anorexia, cough, low grade fever, atrial arrhythmia, leucocytosis (3)
- Dysphoria-fear of “impending doom”(1)

## Beck’s Triad (4)

1. Decrease in arterial blood pressure as a result of pericardial fluid accumulation which impairs ventricular stretch, reducing stroke volume and cardiac output.
2. JVD as a result of increased central venous pressure due to reduced diastolic filling of the right ventricle.
3. Distant/muffled heart tones- try the following website to listen to a variety of abnormal heart tones <http://depts.washington.edu/physdx/heart/demo.html>

## Why does it happen?

Cardiac tamponade can occur for a variety of reasons, one Spanish study (5) listed the following causes; Neoplasm (52.1%), Pericarditis (14.6%), Renal failure (12.5%), Iatrogenic (7.3%), Mechanical/Trauma (4.2%), Other (9.5%). This is by no means a definitive study but the most important point is that cardiac effusions and tamponade occur for many reasons other than trauma. In the hospital setting, cardiac tamponade is most commonly seen in the cardiothoracic intensive care setting (6). It is also important to remember that as the majority of cardiac effusions and subsequent cardiac tamponade are from chronic conditions, it may take time for a caregiver to notice something is wrong. In one study an average of 6.6 days passed from the time of symptoms until a cardiology consult was obtained (1).

## How is it diagnosed?

1. Transthoracic Echocardiogram is the most definitive tool for diagnosing cardiac tamponade. The effusion causes compression of the chambers and a “swinging” of the heart (3).
2. ECG may show signs of pericarditis, but the only quasispecific sign of tamponade is electrical alternation with smaller voltage of the QRS complex often with reversed polarity (electrical alternans)(3).
3. Chest xray studies are typically not helpful in acute settings as at least 200ml of fluid must accumulate before the cardiac silhouette is affected. CT/MRI has similar limitations (3).

## What is the treatment?

1. Pericardiocentesis is the most effective treatment for cardiac tamponade.
2. Balloon pericardiotomy uses special catheters that create “windows” between the pericardium and the absorbing surface of the pleura or peritoneum.
3. Thoracotomy with mediastinal chest tubes is another surgical option.
4. The use of Dobutamine is controversial, it may support compensatory mechanisms to reduce the elevated vascular resistance (3).
5. Of course, once the tamponade is relieved the cause must be diagnosed and treated, if possible.

## Other resources:

In addition to the references listed, for more information check out:

<http://www.uthsc.edu/cardiology/articles/cardiac%20tamponade.pdf>

## References

1. Ikematsu, Y., and Kloos, J.A. *Patients' Descriptions of Dysphoria Associated with Cardiac Tamponade*. Heart and Lung. 2012; 41(3): 264-270.
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5. Navarrette, C. et al. *Should We Try to Determine the Specific Cause of Cardiac Tamponade?* Rev Esp Cardiol. 2002; 55(5): 493-98.
6. Sahjian, M. *Post Cardiac Surgery Tamponade*. Air Medical Journal. 2006; 26(4): 188-190.