

# Cardiac tamponade

## What is cardiac tamponade?

Cardiac tamponade is caused by the accumulation of blood, fluid, pus, clots, or gas in the pericardial space, resulting in reduced ventricular filling and subsequent haemodynamic compromise. Cardiac tamponade is a medical emergency.

## How common is cardiac tamponade? (Epidemiology)

- Cardiac tamponade is rare. The incidence is 2 cases per 10,000 population in the USA. <sup>[1]</sup>
- Cardiac tamponade related to trauma or HIV is more common in young adults. <sup>[2]</sup>
- Tamponade due to malignancy and/or chronic kidney injury occurs more frequently in elderly individuals.

## Causes

- Often associated with pericarditis:
  - Malignancy, especially [breast cancer](#) or [lung cancer](#).
  - Acute myocardial infarction and post-infarction (including [Dressler's syndrome](#)).<sup>[3]</sup>
  - Infective: viral (including [HIV](#)), bacterial (eg, [tuberculosis](#)), fungal.
  - Connective tissue diseases: eg, [systemic lupus erythematosus](#)<sup>[4]</sup>. Also, [rheumatoid arthritis](#), [dermatomyositis](#), [systemic sclerosis](#).<sup>[5]</sup>
  - Radiation therapy.
  - [Hypothyroidism](#).
  - [Chronic kidney disease](#).
  - Postoperative (cardiovascular surgery): [haemorrhagic pericarditis](#).
  - Idiopathic.
- Drugs: eg, hydralazine, isoniazid, minoxidil.
- Diagnostic procedures with cardiac perforation.
- Trauma (incidence of 2% in penetrating trauma, rare in blunt trauma) and surgery.
- Pneumopericardium (mechanical ventilation or gastropericardial fistula).
- [Aortic dissection](#).

## Symptoms of cardiac tamponade (presentation)

- It may present subacutely with anxiety, fatigue, altered mental status, oedema or waxing/waning if intermittently decompressing.<sup>[3]</sup>
- Dyspnoea, tachycardia, and tachypnoea. Cold and clammy extremities from hypoperfusion.

- It is often accompanied by features of pericarditis.
- Symptoms vary with the underlying cause and how acutely the tamponade has developed.

## Signs

- Distended neck veins, hypotension, tachycardia, tachypnoea and hepatomegaly.
- Muffled heart sounds.
- Pericardial friction rub – present in 50% but may be transient.
- Acute tamponade leads to increased jugular venous pressure (JVP) – Beck's triad: jugular venous distension, hypotension and diminished heart sounds – rarely seen.
- Pulsus paradoxus: exaggeration of the normal decrease in systemic blood pressure during inspiration; a pulsus paradoxus greater than 10 mm Hg helps distinguish patients with or without cardiac tamponade in patients with a pericardial effusion.<sup>[3]</sup> This sign is more reliable in patients with high-pressure rather than low-pressure tamponade.<sup>[6]</sup>
- JVP: the y descent is abolished due to an increase in intrapericardial pressure, preventing diastolic filling of the ventricles (cardiac tamponade causes an increase in both central venous pressure and pulmonary artery occlusion pressure).
- Cyanosis and pulmonary oedema may occur.

## Differential diagnosis

- [Aortic dissection.](#)
- [Cardiogenic shock.](#)
- [Constrictive pericarditis.](#)
- [Pulmonary embolism.](#)
- Right ventricular infarction and other causes of right ventricular failure.
- [Acute severe asthma.](#)

- Tension pneumothorax.
- Large pleural effusion.
- Tension pneumopericardium: usually seen in infants with mechanical ventilation but also may follow sternal bone marrow aspiration, penetrating chest wall injury, oesophageal rupture, and bronchopericardial fistula.

## Diagnosing cardiac tamponade (investigations)

- Creatine kinase and isoenzymes: elevated in myocardial infarction and cardiac trauma.
- Renal function: diagnosis of uraemia.
- FBC: infection.
- Antinuclear antibody assay, ESR, and rheumatoid factor: assessment of possible connective tissue disease aetiology.
- HIV testing: approximately 24% of all pericardial effusions are associated with HIV infection.
- Testing for tuberculosis: an important and not uncommon cause.
- ECG: features may include sinus tachycardia, low-voltage QRS complexes, alternation of QRS complexes (usually in a 2:1 ratio), PR segment depression.<sup>[7]</sup>
- CXR: cardiomegaly, water bottle-shaped heart, pericardial calcifications, or evidence of chest wall trauma.
- Echocardiography: transthoracic echocardiogram is the investigation of choice.
- MRI or CT scanning: the advantages being improved field of view, and ability to detect calcifications.
- Swan-Ganz cardiac catheterisation.
- Pericardiocentesis; aspirate sent for culture and cytology.
- Pericardial biopsy: may occasionally be required.

# Management of cardiac tamponade

Patients should be monitored in an intensive care unit. Pericardiocentesis (echocardiography-guided being the procedure of choice) is the definitive treatment but may be hazardous and not relieve symptoms in cases of small effusions associated with constrictive pericarditis – eg, malignancy, autoimmune conditions and viral infection.

- Oxygen.
- Volume expansion to maintain adequate intravascular volume – small boluses work best.<sup>[8]</sup>
- Improve venous return: bed rest with leg elevation.
- Positive inotropic drugs: eg, dobutamine.
- Positive-pressure mechanical ventilation should be avoided because it may decrease venous return.
- Further medical care includes:
  - Echocardiogram-guided pericardiocentesis: removal of pericardial fluid is the definitive therapy for tamponade.<sup>[2] [3]</sup>
  - Emergency subxiphoid percutaneous drainage: is the safest method for emergency pericardiocentesis. It is most safely performed under guidance by echocardiography. Echocardiography reduces the risk of complications such as perforation of the right atrium.<sup>[9]</sup>
  - Percutaneous balloon pericardiotomy.
- Treatment of the underlying cause.

## Surgical

- Pericardiodesis: for recurrent pericardial effusion or tamponade. Corticosteroids, tetracycline, or antineoplastic drugs can be instilled via intrapericardial catheter into the pericardial space.
- Pericardio-peritoneal shunt: may help prevent recurrent tamponade in patients with malignant pericardial effusions.
- Pericardiectomy: resection of the pericardium is rarely required.

## Prognosis

- The risk of death depends on the speed of diagnosis, the treatment provided and the underlying cause of the tamponade.
- Early diagnosis and treatment are crucial to reduce morbidity and mortality.

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## Further reading

- [Stashko E, Meer JM](#); Cardiac Tamponade. StatPearls, Aug 2023.
- [Romagano MP et al](#); Evaluation and Treatment of Cardiac Tamponade in a Pregnant Patient. Case Rep Obstet Gynecol. 2020;2020:8703980. Published 2020 Jan 15. doi:10.1155/2020/8703980

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Originally Published: 20/11/2023	Next review date: 16/09/2020	Document ID: doc_1910

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