

Pericardial effusion and cardiac tamponade: case study of ICU patients at the Hospital de Curry Cabral

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Abstract

Cardiac tamponade is a serious and potentially fatal condition, if not promptly addressed. Our contact with the severity of these conditions prompted us to carry out a case study of ICU patients

at the Hospital Curry Cabral between 1983 and 1993, comparing the results with the literature on the subject.

Key words: pericardial effusion, cardiac tamponade.

Introduction

The pericardium is a sac-like structure surrounding the heart, which has tubular extensions attached to the aortic root, its junction with the aortic arch, the pulmonary arteries, the proximal pulmonary veins, and the vena cava. This structure has strong ligament connections with the sternum in front of it, the spine behind it, and the diaphragm below it, enabling the heart to be anatomically attached, preventing it from moving excessively with changes in body position.^{1,2} The pericardium consists of an inner serous membrane - the visceral pericardium, and a fibrous external membrane - the parietal pericardium, separated by a small quantity (<50ml) of fluid with characteristics of plasma ultrafiltrate - the pericardial fluid.² This fluid also contains phospholipids that act as lubricants, reducing friction between the two pericardial membranes.¹

There is evidence that the pericardium is capable of producing prostaglandins in response to physiological stimuli, which enable modulation of efferent cardiac sympathetic stimulation, by altering its electrophysiological properties.¹

The visceral pericardium seems to be the origin of the normal pericardial fluid, and of excess quantities of this fluid in pathological situations.¹

The existence of excessive fluid between the visceral and parietal pericardium is called pericardial effusion.³ Both the volume and the speed of its formation can lead to significant hemodynamic effects which, in extreme situations of large and/or sudden increase in intra-pericardial pressure, lead to progressive limitation of ventricular diastolic filling, elevated intra-cardiac pressure, and a reduction in cardiac output, i.e. cardiac tamponade.^{3,4}

The volume of fluid capable of causing tamponade varies considerably (250 ml to 2000 ml), depending mainly on how quickly the effusion progresses.²

The most common clinical signs of cardiac tamponade are as follows (Table 1):^{1,5}

Of those listed here, *pulsus paradoxus* appears to be the classically the most important one, and most characteristic sign in the diagnosis of cardiac tamponade.³

Often, there are no electrocardiographic diagnostic signs; electrical alternans of the P wave, QRS and T wave, although virtually specific for cardiac tamponade, is rare^{2,3,6} (Fig. 1)

Isolated alternans of the QRS, although more frequent, is less specific. Excessive pericardial fluid causes low QRS voltage and can be associated with changes in T wave.³

Characteristically, the chest telerradiograph showed an increased cardiothoracic ratio, according to the

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TABLE I

Clinical signs of cardiac tamponade

Jugular ingurgitation	100%
Tachypnoea	80%
Tachycardia	77%
Pulsus Paradoxus	77%
Hepatomegaly	55%
Hypotension	36%
Muffled heart sounds	34%
Friction	29%
Total pulsus paradoxus	23%

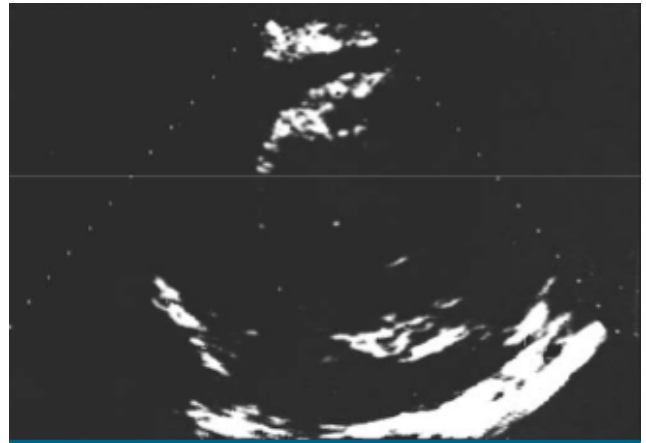


Echocardiogram.

FIG. 1

effusion volume.⁶

Since the acoustic properties of fluids differ significantly from those of the cardiac muscle, the presence of pericardial effusion is less echogenic in the ultrasound than the myocardium itself. For this reason, detection of pericardial effusion was the earliest clinical sign, and it continues to be one of the most useful and safe applications of echocardiography. Therefore, the diagnosis of cardiac tamponade should always reserve, in the absence of echocardiographic demonstration of effusion.^{1,6} Also in terms of therapy, echocardiography is of extreme importance in the decision to carry out pericardial drainage. The most important two-dimensional echocardiographic criteria are compression of the right atrium, and diastolic collapse of the right ventricle (Fig. 2); a more specific although less frequent criterion is pendular motion of



ECG.

FIG. 2

the heart within the pericardial fluid, which is usually associated with electrical alternans.³

The treatment of cardiac tamponade requires a two-step approach:

- Emergency treatment, i.e. pericardiocentesis,⁶ since if this is not quickly treated, the situation can be fatal within minutes.
- Treatment of the underlying disease.

The most common known causes of cardiac tamponade are as follows:¹

Malignant disease 58%, idiopathic pericarditis 14%, uremia 14%, bacterial disease 5%, tuberculosis 1%, systemic erythematosus lupus 2%, cardiomyopathy (anticoagulants) 6%.

Given the relative frequency of patients with pericardial effusion which, in more critical cases, leads to hospitalization in an intensive care unit, the authors sought to carry out a retrospective study of all such cases admitted to the ICU of the Hospital de Curry Cabral during its 11 years of activity.

Materials and methods

The study population consists of patients with pericardial effusion and cardiac tamponade admitted to the polyvalent ICU of the Hospital de Curry Cabral from 1983 to 1993.

The selection was made by diagnosis based on the admission and discharge records.

All the patients diagnosed with pericardial effusion and cardiac tamponade were selected, totaling 47 patients out of a total of 3,652 admissions. The

TABLE IV

Etiologies of pericardial effusion

Neoplasia	13	27.6%
Acute myocardial infarction	11	23%
Chronic renal insufficiency	2	4.2%
Sepsis	2	4.2%
Tuberculous pericarditis	2	4.2%
AIDS	2	4.2%
Pneumonia	1	2.1%
Aortic dissection	1	2.1%
Hypothyroidism	1	2.1%
Autoimmune disease	1	2.1%
Post-traumatic	1	2.1%
Unknown	10	21%

TABLE V

Etiologies of cardiac tamponade

Neoplasia	11	50%
Acute myocardial infarction	7	31.9%
Aortic dissection	1	4.45%
Chronic renal insufficiency	1	4.45%
Sepsis	1	4.45%
Unknown	1	4.45%

TABLE VI

Causes of death in patients with cardiac tamponade

Acute myocardial infarction with rupture of the ventricular wall	7
Aortic dissection	1
Sepsis	1
Neoplasia	1
Total	10

3 (5.4%) electrical alternans.

Table 5 shows the verified etiologies of cardiac tamponade:

The pathology responsible for the greatest highest of deaths due to cardiac tamponade was acute myocardial infarction with rupture of the ventricular wall (Table 6):

Discussion and conclusions

Forty-seven pericardial effusions were analyzed, 22 of which had cardiac tamponade.

The most frequent etiologies were neoplasm (lung cancer metastasis) and acute myocardial infarction (with rupture of the ventricular wall); for the latter, the percentage was higher than that described in the literature.

The low percentage of cardiac tamponade secondary to cardiac effusion of bacterial etiology is emphasized, as well as chronic renal failure and the absence of idiopathic pericarditis tamponade.

Also worth mentioning is the absence of cardiac tamponade in patients with AIDS, which some authors believe to be its most frequent etiology today.⁷

The explanation for the low number of echocardiograms (28), in relation to the total number of patients with pericardial effusion, relates to the fact the ICU unit only obtained this important supplementary means of diagnosis in 1992, therefore up until that time, diagnoses were based primarily on clinical examination, examination of chest x-rays, and in rare cases, electrocardiographic signals. ■

References

1. Lorell BH, Braunwald E. Pericardial Disease. In Braunwald's: Heart Disease. Philadelphia. WB Saunders 1992;45:1465-1516.
2. Braunwald E. Pericardial Disease. In Harrison's: Principles of Internal Medicine. New York McGraw-Hill, 1994; 206:1094-1101.
3. Shabetai R. Diseases of the Pericardium. In Hurst J Willis: The Heart. New York McGraw-Hill 1990;66:1348-1374.
4. Okamoto et al. Cardiac Tamponade Caused by Primary Lung Cancer and management of Pericardial Effusion. Cancer 1993;71:93-98
5. Zashin SJ, Lipsky PE. Pericardial Tamponade Complicating Systemic Lupus Erythematosus. J Rheumatol 1989;16:374-377.
5. Spodick, DH Critical Care of Pericardial Disease. In Rippe's: Intensive Care Medicine. Boston: Little Brown and Company 34;282-294
6. Cegielski JP et al. Pericardial disease and human immunodeficiency virus in Dar-es-Salaam, Tanzania, Lancet 1990;335:209-212