Prevalence of pericardial effusion in systemic diseases

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Abstract

Introduction: *The presence of 50 ml of fluid or more in the pericardial sac is known as pericardial effusion.* **Objective:** *To determine the prevalence of pericardial effusion in patients with systemic diseases.* **Method:** *Echocardiographic studies performed at the National Medical Center Siglo XXI Specialty Hospital Cardiology Department between 2006 and 2016 were reviewed. According to Weitzman's criteria, pericardial effusion was classified as mild, < 10 mm, moderate, 10 to 20 mm and severe, > 20 mm.* **Results:** *In total, 10,653 studies were reviewed; the prevalence of pericardial effusion was 3.5 % (380), in 209 women (55 %, 45.9 ± 19.0 years) and 171 men (45 %, 41.9 ± 18.5 years). Etiology was uremic in 227 (59.7 %), lymphatic drainage reduction in 73 (15.8 %), autoimmune diseases in 30 (7.9 %), neoplastic in 26 (6.8 %), infectious in 19 (5 %), idiopathic in 14 (3.7 %), hypothyroidism in two (0.5 %), iatrogenic in one (0.3 %) and post-infarction in one (0.3 %). Severity was mild in 87 (22.9 %), moderate in 147 (38.7 %) and severe in 146 (38.4 %).* **Conclusions:** *The prevalence of pericardial effusion was 3.5% in patients with systemic diseases.*

KEY WORDS: *Pericardial effusion. Prevalence. Systemic diseases.*

Introduction

The pericardium is a sac that contains the heart and proximal large vessels and maintains the heart in the mediastinum, provides lubrication and acts as a mechanical barrier against infections and acute distension of the chambers.[1]

The pericardium is composed of two layers, one parietal and the other visceral, which contains 50 mL of fluid or less.[2]

Pericardial effusion (PE) is considered to exist when the volume of fluid exceeds the normal amount. The causes can be divided into inflammatory and non-inflammatory. Inflammatory causes include viral, bacterial, mycotic and parasitic infections,[3-5] as well as cardiac injury syndromes after pericardiectomy, infarction or electrophysiological study,[3] autoimmune of the type systemic lupus erythematosus,[6] Sjögren's syndrome, rheumatoid arthritis[7] or metabolic diseases, such as uremic pericarditis.[8,9] Non-inflammatory causes include neoplastic,[10] metabolic[11] and traumatic[12] etiologies, as well as lymphatic drainage reduction.[12]

The purpose of this study was to know the prevalence of PE associated with systemic diseases.

Method

A review of all the echocardiographic studies carried out in the Servicio de Cardiologia del Hospital de Especialidades del Centro Medico Nacional Siglo XXI del Instituto Mexicano del Seguro Social, Mexico City.

Studies conducted in patients who had been echocardiographically diagnosed with PE with quantification and with the referral diagnosis being specified were included. The exclusion criteria were: patients in whom PE was not quantified or who did not have the referral diagnosis.

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Table 1. Pericardial effusion etiology in 380 patients of the Specialty Hospital, National Medical Center *Siglo XXI*

Origin	n	%
Uremic	227	59.7
Lymphatic drainage reduction (heart failure, liver cirrhosis)	73	15.8
Collagenopathy	30	7.9
Neoplastic	26	6.8
Infectious	19	5.0
Idiopathic	14	3.7
Hypothyroidism	2	0.5
Post-infarction	1	0.3
Iatrogenic	1	0.3
Total	380	100

Table 2. Patient age and pericardial effusion amount according to etiology

Pericardial effusion origin	Age (years)	Amount (mL)
Uremic	42.31 ± 18.53	454.00 ± 349.00
Lymphatic drainage reduction (heart failure, liver cirrhosis)	53.06 ± 20.19	340.68 ± 197.30
Collagenopathy	56.96 ± 27.57	371.10 ± 221.28
Neoplastic	59.28 ± 20.39	642.54 ± 839.18
Infectious	50.81 ± 27.14	259.42 ± 150.35
Idiopathic	54.72 ± 23.28	252.79 ± 124.88
Hypothyroidism	77.00 ± 4.24	216.00 ± 118.79
Post-infarction	*36	400.00
Iatrogenic	*23	110

*Only one patient.

Echocardiogram

Echocardiographic examinations were performed with a commercially-available echocardiography equipment (iE33®, Philips Medical System, Andover, MA, USA).

2D and M-mode images were obtained from parasternal and apical approaches with the patient in left side decubitus position. For the measurements, the American Society of Echocardiography recommendations were followed.[13]

The diagnostic criterion for PE according to Weitzman criteria is based on the finding of an echo-free space between the visceral pericardium and the parietal pericardium. By means of 2D echocardiography, a semi-quantitative evaluation was performed, the echo-free space between the two pericardium layers was measured at end diastole: the effusion was considered mild if it was less than 10 mm; the effusion was considered moderate if it was 10 to 20 mm and severe effusion was diagnosed when it was greater than 20 mm.[14,15]

Echocardiographic criteria to determine PE with hemodynamic repercussion were the following: right atrium systolic collapse, right ventricle diastolic collapse, transmitral flow variability > 25 % and transaortic flow variability > 10 %.

Descriptive statistics were used for demographic variables, with means and standard deviation being calculated for quantitative variables, as well as percentages for dichotomous variables; prevalence was calculated considering the total number of studies among the studies with PE. Version 22.0 of the SPSS Statistics program was used.

Results

A total of 10,653 studies of patients who attendant the Cardiology Department of the Specialty Hospital, Nacional Medical Center Siglo XXI, to the Mexican Social Security Institute, from 2006 to 2016 we reviewed.

Three hundred and eighty patients met the inclusion criteria for echocardiographic PE diagnosis. The prevalence of PE in our population was 3.5 %. There were 209 women (55 %) and 171 men (45 %). As for age, a statistically significant difference was observed between men and women: 46.0 ± 19.15 versus 41.9 ± 18.5 years (p = 0.035).

The causes of PE were: uremic 228 (60 %), lymphatic drainage reduction (heart failure, liver cirrhosis, etc.) 73 (19.2 %), collagenopathy 30 (7.9 %), neoplastic 25 (6.6 %), infectious 16 (4.2 %), idiopathic four (1.1 %), hypothyroidism two (0.5 %), iatrogenic one (0.3 %) and post-infarction one (0.3 %) (Table 1).

The amount of PE was different depending on its etiology, with higher volumes being observed in patients in whom the etiology was neoplastic (593.68 ± 816.70 mL) in comparison with those with different etiologies (Table 2).

According to the degree of severity based on Weitzman criteria, 87 PEs (22.9%) were mild, 147 (38.7%) were moderate and 146 (38.4%) were severe (Figures 1 and 2).

Only 17 patients (4.4 %) with severe PE had data consistent with plugging, with an average volume 951.9 ± 356.0 ml, which required the performance of pericardiocentesis.

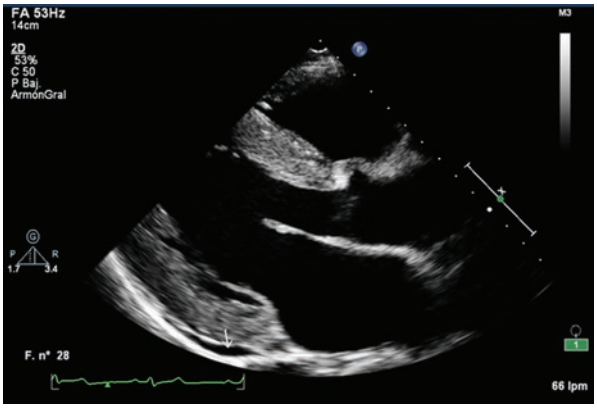

Figure 1. *Mild pericardial effusion with less than 10 mm separation between both pericardial layers (arrow).*

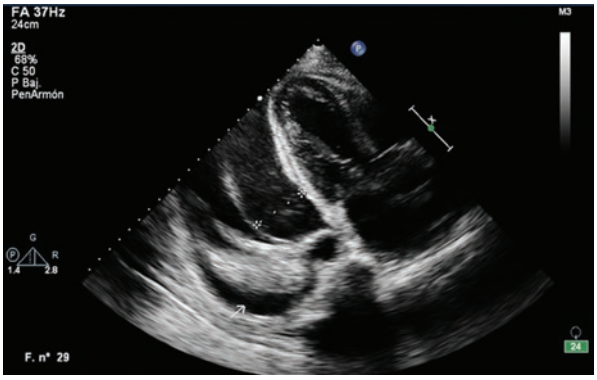

Figure 2. *Severe pericardial effusion associated with neoplasm. A 39-mm separation between both pericardium layers the (dotted line) and the pleural effusion are observed (arrow).*

Discussion

In our study, we found a prevalence of PE of 3.5 %, with the most common etiology being uremic, followed in order of frequency by lymphatic drainage reduction (associated with heart failure, liver cirrhosis) and collagenopathy.

Given that the hospital where the study was carried out only treats patients with systemic diseases, a considerable percentage of effusion was found to be associated with heart failure and liver cirrhosis.

The literature reports that PE etiology depends on the geographical area and on the published series.

Serhan et al.[16] reported a series of 80 patients with PE, where in 36 % of cases it was idiopathic, in 31.4 % it was due to neoplastic cause, in 16.3 % due to ischemic heart disease, in 4.6% due to renal failure and, finally, in 1.2 % it was due to hypothyroidism. In comparison with our population, the most common etiology was chronic kidney disease in 60 %, possibly because the incidence in Mexico of patients with chronic kidney is 377 cases per million population and prevalence is 1,142; there are around 52,000 patients on renal function replacement therapies, out of which 80 % are treated at the Mexican Institute of Social Security.[17]

In other published series, the most commonly reported etiology prevalence was malignant or infectious, between 15 and 50%.[18] When contrasted with our series, the etiology of malignant origin is found in four places and infectious etiology followed in frequency. It should be emphasized that, in our hospital, the care of malignant diseases is not common, except for onco-hematological conditions. In the patients with PE of oncological etiology, only three were not due to onco-hematologic pathology (one right atrium rhabdomyosarcoma, one case of ovarian cancer metastasis and one of breast cancer metastasis), the rest of the patients had effusion associated with different types of leukemia. We identified 16 patients (4.6 %) with infectious causes, which is a much smaller number than that reported in the literature, and the infectious agents were predominantly bacteria.

The incidence of pericarditis with PE in patients with systemic lupus erythematosus ranged from 9 to 54 % and its prevalence was 12 to 48 %.[6,19] We found that the cause of PE was any collagenopathy in 30 patients (7.9 %) and the most common was systemic lupus erythematosus Prevalence was low compared to that reported in the literature; however, it should be considered that the total number of patients with PE was taken into account and not only patients with rheumatologic diseases.

Pleural and pericardial effusions are common in patients with heart failure. The prevalence was 87 % and from 12 to 20 %, respectively.[12] In Mexico, we found them as the second cause of PE in 73 patients (19.2 %), which is similar to reports in the literature. In patients with heart failure, the causes of PE included the reabsorption ability of the lymphatic system and lymphatic drainage obstruction.[12-20]

Thyroid hormone dysfunction was associated with cardiovascular manifestations,[11] including subclinical hypothyroidism-related PE; in our study, only two patients with this pathology were identified.[21]

In our series, only one case of PE due to iatrogenesis was recorded: one patient scheduled for surgery in whom a subclavian catheter was placed and had perforation of the right atrium, which caused PE and tamponade, thus requiring pericardiocentesis and catheter removal; the perforation closed spontaneously and

no surgical treatment was necessary. In the literature there are only reports of isolated cases.[22]

The presence of PE and pericardial hemorrhage after a myocardial infarction is rare, less than 1 % in patients with ST-segment elevation myocardial infarction thrombolized after 24 hours.[23] We reported a patient hospitalized for cholecystectomy surgical treatment who had an acute myocardial infarction complicated with PE and who evolved successfully.

The most important complication was cardiac tamponade, in 17 patients (4.4 %), who required pericardiocentesis, with the percentage being lower than that reported by Eisenberg (9 %).[24]

One of the strengths of our study was that it allowed determining the prevalence of PE over a 10-year period in a hospital where patients with systemic diseases that are manifested as or complicated with PE are referred to. On the other hand, our study has also limitations for being a cross-sectional study, since the evolution this entity could not be assessed.

Conclusion

The prevalence of PE was 3.5 % at the hospital where the study was carried out, where only non-cardiac systemic diseases are cared for.

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