

# Acute Myopericardial Syndromes



Ali Farzad, MD<sup>a,b,\*</sup>, Jeffrey M. Schussler, MD<sup>c,d</sup>

## KEYWORDS

- Pericarditis • Myocarditis • Myopericarditis • Perimyocarditis • Pericardium • Pericardial effusion
- Tamponade

## KEY POINTS

- Myocarditis and pericarditis often present with symptoms and findings that overlap with or mimic acute coronary syndromes.
- Because the treatment of myocarditis and pericarditis is different from that of acute coronary syndromes or myocardial infarction, identification of these and differentiation of them from acute coronary syndromes or myocardial infarction is important.
- Cardiac tamponade, which may occur as a sequela of pericarditis, is a potential emergency. Although it can often quickly be treated, this is predicated on early and accurate diagnosis.



Video content accompanies this article at <http://www.cardiology.theclinics.com>.

## INTRODUCTION

Acute myopericardial diseases may present as isolated disease or as a manifestation of a systemic disease. Their clinical presentation varies but is often associated with chest pain and electrocardiogram (ECG) changes, and can often be mistaken for acute coronary syndrome (ACS).<sup>1</sup> Acute myopericardial syndromes, because of their unclear presentation and mimicry of other life-threatening conditions, can be challenging to manage and, in some cases, can be life-threatening.

This article reviews the acute myopericardial syndromes that necessitate emergent evaluation and treatment, including pericarditis (with or without myocardial involvement) and its complications (pericardial effusion, with or without

tamponade, and pericardial constriction). The goal is to help clinicians develop an evidence-based approach to the evaluation and management of these common and complex clinical syndromes.

## ANATOMY AND FUNCTION OF THE PERICARDIUM

The pericardium is a flask-shaped avascular sac that surrounds the heart and the roots of the great vessels. It consists of an outer sac, which is made of thick and fibrous collagenous connective tissue (fibrous pericardium), and a double-layered inner sac (serous pericardium) with visceral and parietal layers. The visceral layer is thin, adheres to the surface of the myocardium, and reflects over the origins of the great vessels. The parietal layer has a

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<sup>a</sup> Department of Emergency Medicine, Baylor University Medical Center, 3500 Gaston Avenue, Dallas, TX 75246, USA; <sup>b</sup> Department of Emergency Medicine, Texas A&M College of Medicine, 3302 Gaston Avenue, Dallas, TX 75246, USA; <sup>c</sup> Department of Cardiology, Baylor University Medical Center, Baylor Jack and Jane Hamilton Heart and Vascular Hospital, 621 Hall Street, Dallas, TX 75226, USA; <sup>d</sup> Division of Cardiology, Department of Medicine, Texas A&M College of Medicine, 3302 Gaston Avenue, Dallas, TX 75246, USA

\* Corresponding author. Department of Emergency Medicine, Baylor University Medical Center, 3500 Gaston Avenue, Dallas, TX 75246.

E-mail address: [Ali.Farzad@BSWHealth.org](mailto:Ali.Farzad@BSWHealth.org)

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serosal surface that contacts pericardial fluid in the pericardial cavity and an opposite surface, which lines the fibrous pericardium (Fig. 1).

The pericardium separates the epicardium from other mediastinal structures and attaches to the diaphragm, sternum, and other structures to limit displacement of the heart within the chest during respiration or movement.<sup>2</sup> The pericardium also protects the heart by serving as a physical barrier to prevent the spread of infection or malignancy.<sup>3</sup>

The normal pericardial space contains a small amount of fluid (~25–50 mL of plasma ultrafiltrate), which lubricates the serosal surface of the parietal and visceral layers to reduce friction during cardiac activity. This fluid equalizes gravitational, hydrostatic, and inertial forces over the heart to maintain transmural cardiac pressures.<sup>2</sup> The pericardium is also metabolically active and known to produce hormonal modulators of neurotransmission and myocardial contractility. The pericardium fixes the heart to the mediastinum and maintains ventricular compliance to limit dilatation of cardiac chambers. Moreover, the pressure in the pericardial cavity is subatmospheric, facilitating atrial filling and maintenance of cardiac pressure.<sup>2</sup>

Nevertheless, the pericardium is not essential for life and few adverse consequences follow congenital absence or surgical removal of the pericardium.<sup>2</sup> Presence of an intact pericardium results in a potential space that can accommodate only a small reserve volume. The pressure-volume relation of the pericardium is nonlinear; hence, small acute pericardial effusions may cause cardiac tamponade, whereas slow chronic effusions may stretch the pericardium and not produce tamponade physiology (Fig. 2). The pericardium has limited elasticity and, once its limit is reached, the heart must compete with the intrapericardial fluid for a fixed intrapericardial volume.<sup>2</sup> The mechanical, membranous, and

metabolic functions of the pericardium are summarized in Box 1.

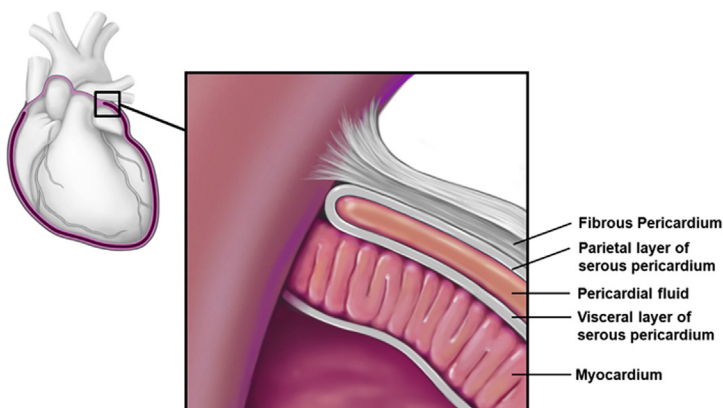
## PATHOPHYSIOLOGY OF THE PERICARDIUM

Pericardial heart disease comprises mainly pericarditis, which may be an acute, subacute, or chronic fibrinous, noneffusive, or exudative process.<sup>2</sup> Response to injury is limited to exudation of fluid, fibrin, or inflammatory cells. Adhesions may result during healing that may cause obliteration of the pericardial space, and later calcification.<sup>2</sup> Complications include tamponade and its variants, and constriction, which may be acute, subacute, or chronic fibrinous.<sup>2</sup> Despite a limited number of clinical syndromes, the pericardium is affected by virtually every category of disease, including infectious, neoplastic, immune-inflammatory, metabolic, iatrogenic, traumatic, and congenital causes.

## BACKGROUND/DEFINITIONS/CRITERIA

Clinically, acute pericarditis and myocarditis commonly coexist. The degree of their respective involvement in disease is variable, giving rise to terminology that attempts to accurately describe clinical presentations. Myopericarditis is defined as a primarily pericarditic syndrome with concomitant myocardial involvement and inflammation.<sup>4</sup> Perimyocarditis specifies a primarily myocarditic syndrome with pericardial involvement.<sup>4</sup> In practice, the two terms are often used interchangeably and a precise and uniformly adopted definition is lacking. Typically, inflammation of the pericardium without involvement of the myocardium or depressed ejection fraction is referred to as pericarditis.

Acute pericarditis refers to pericardial inflammation with acute onset of symptoms. Without treatment, these symptoms can last for 4 to 6 weeks



**Fig. 1.** Anatomy of the normal pericardium. (Reproduced with permission of the Cleveland Clinic Center for Continuing Education. Phelan D, Collier P, Grimm R. Pericardial Disease. Disease management project (<http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/pericardial-disease/>). ©2000-2015 The Cleveland Clinic Foundation. All rights reserved.)

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