

# Imaging of Pericardial Diseases



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Given the widespread use of cross-sectional imaging modalities, specifically multidetector computed tomography and magnetic resonance, to evaluate thoracic disease, the pericardium is frequently imaged. Knowledge of the normal appearance and anatomical boundaries is vital for radiologists to avoid confusion with more sinister pathology. A variety of disorders and diseases of the pericardium can bring a patient to clinical attention from inflammatory conditions, resulting in pericarditis and pericardial effusion, to malignancy. This article discusses the anatomy and conditions that affect the pericardium, emphasizing the role imaging plays in diagnosis and management.

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## Introduction

The pericardium plays many key roles: it anchors the heart in the anteromedial thorax; provides a frictionless environment for myocardial contraction; prevents overdistention of the cardiac chambers, particularly the lower pressure right chambers; serves as a barrier to spread of adjacent disease; and likely even plays a neurohormonal role in cardiovascular regulation.<sup>1</sup> Given the widespread use of cross-sectional imaging modalities, particularly multidetector computed tomography (MDCT), to evaluate thoracic disease, the pericardium is frequently imaged. Knowledge of the normal appearance and anatomical boundaries is vital for radiologists to avoid confusion with more sinister pathology. A variety of disorders and diseases of the pericardium can bring a patient to clinical attention from inflammatory conditions, resulting in pericarditis and pericardial effusion, to malignancy. This article discusses the anatomy and conditions that affect the pericardium, emphasizing the role imaging plays in diagnosis and management.

## Pericardial Anatomy

The pericardium is composed of a double-folded serous envelope forming an inner visceral layer, adherent to the myocardium and epicardial fat, and an outer parietal layer between which is a potential space that typically contains up to 50 mL of serous fluid.<sup>2</sup> The parietal layer in turn has an outer fibrous component composed of collagen and elastin, which interdigitates with ligaments anchoring the pericardium and the heart to the sternum anteriorly, the spine posteriorly, the diaphragmatic tendon inferiorly, and the pleural reflections laterally. By virtue of these connections, the heart is anchored in the mediastinum, preventing excessive rotation that could compromise function, and its chambers are mildly constrained, preventing overdistention of, particularly, the low-pressure right atrium and ventricle.

The pericardium reflects several centimeters superiorly to envelope the proximal aspects of the ascending aorta, pulmonary arteries, and superior vena cava. Inferiorly, the pericardium surrounds the proximal pulmonary veins and the inferior vena cava. The following 2 sinuses are formed by the pericardial reflections: the transverse sinus and the oblique sinus (Fig. 1). The transverse sinus lies posterior to the aorta and the main pulmonary artery and gives rise to a superior recess with anterior, posterior, and lateral extensions. The anterior superior recess extends along the right lateral aspect of the ascending aorta as well as crosses anterior to the aorta into the notch between the aorta and the main pulmonary artery. Occasionally, the anterior recess can extend high into the right paratracheal space or into the aorticopulmonary window, where it can be confused for more sinister pathology. The

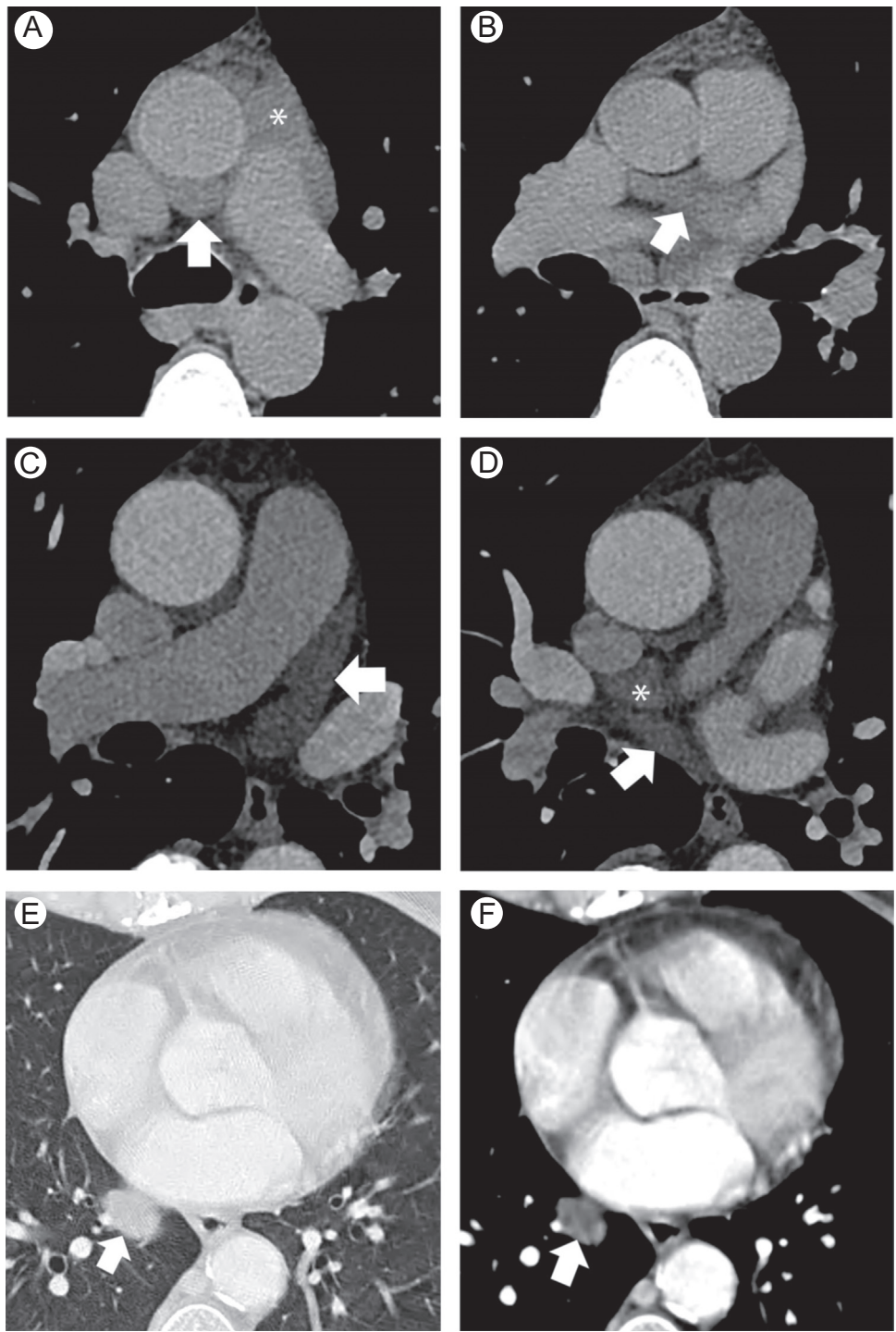
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**Figure 1** Pericardial anatomy. The pericardium is divided into 2 sinuses and multiple recesses. The transverse sinus (arrow, B) gives rise to the superior pericardial recess, which has posterior (arrow, A) and anterior (\*, A) extensions. The posterior superior recess can be confused with lymphadenopathy, and the anterior recess with mediastinal masses. The left (arrow, C) and right (\*, D) pulmonary recesses extend inferior to their respective pulmonary arteries and communicate with the transverse sinus. The oblique sinus (arrow, D) lies posterior to the superior portion of the left atrium and usually contains less fluid. The inferior pulmonary vein recess, especially on the right (arrows, E and F) is often confused for lymphadenopathy or pulmonary nodules.

posterior superior recess is usually concave along the posterior wall of the ascending aorta. The inferior recess separates the proximal ascending aorta from the right atrium.<sup>3</sup> The right and the left pulmonary recesses are also extensions from the

transverse sinus that lie inferior to their respective proximal pulmonary arteries.

The oblique sinus lies posterior to the superior aspect of the left atrium and anterior to the esophagus. It is separated from

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