

myocardium. In uncomplicated acute pericarditis, the chest radiograph and echocardiographic findings are normal. Although not essential for the diagnosis of pericarditis, echocardiography is the diagnostic imaging modality of choice for the detection and determination of the hemodynamic significance of a pericardial effusion.

Treatment

Patients with uncomplicated idiopathic or viral pericarditis can be managed as outpatients. For patients with fever, large pericardial effusions, or elevated levels of cardiac biomarkers and for those with possible secondary causes or immunocompromised status, hospitalization for further investigation and treatment should be considered. Treatment consisting of high-dose nonsteroidal anti-inflammatory drugs (NSAIDs) is usually effective. Colchicine with NSAIDs or as monotherapy provides prompt resolution of symptoms and decreases the recurrence rate. The use of glucocorticoids results in rapid symptomatic improvement. However, it is associated with higher rates of symptomatic recurrence.

Prognosis

Most patients with idiopathic or viral pericarditis have an uneventful clinical course with complete recovery. Possible complications include recurrent pericarditis, cardiac tamponade, and constrictive pericarditis.

Pericardial Effusion and Cardiac Tamponade

Definition and Epidemiology

Pericardial effusion, an abnormal collection of fluid in the pericardial space, is a relatively common and incidental echocardiographic finding that is encountered in approximately 10% of studies. Cardiac tamponade occurs when fluid accumulation results in increased intrapericardial pressure, leading to cardiac compression, impaired ventricular filling, and reduced cardiac output. Accumulation of pericardial fluid can be caused by virtually any type of acute pericarditis. Pericardial effusions due to bacterial pericarditis (including tuberculosis), neoplastic involvement, uremic pericarditis, and trauma have a high incidence of progression to tamponade.

Pathology

The hemodynamic consequences of a pericardial effusion depend on the rate of accumulation. The normal pericardium has relatively limited reserve volume. The mechanical properties of the parietal pericardium are such that when stretched, it becomes rapidly inelastic and resistant to further expansion. As a result of these physical characteristics, rapidly accumulating effusions may result in significant hemodynamic compromise with only 100 to 200 mL of fluid. Conversely, when the accumulation of fluid is slow, the pericardium undergoes adaptive changes and can accommodate large (>1500 mL) effusions without the development of tamponade.

Clinical Presentation

The clinical manifestations of a pericardial effusion depend on the size and rate of fluid accumulation and may range from

dyspnea, chest discomfort, and orthopnea to circulatory collapse, pulseless electrical activity, and death. Compression of adjacent structures such as the phrenic nerve and the recurrent laryngeal nerve can result in cough or hiccups and hoarseness, respectively. A complaint of dysphasia may indicate compression of the esophagus.

A normal cardiac examination is not uncommon in patients with small effusions. With larger effusions, the apical impulse can be decreased or absent, and the cardiac sound may be muffled. In patients with acute pericarditis, disappearance of the pericardial friction rub may indicate development of an effusion. Compression of the base of the left lung can result in dullness to percussion, egophony, and bronchial breath sounds under the left scapula (i.e., Ewart's sign).

Patients with tamponade usually appear to be in distress with tachypnea and tachycardia. The classic physical findings are hypotension, jugular venous distention with absent *y* descent, and muffled or absent heart sounds. Pulsus paradoxus, defined as a greater than 10 mm Hg of inspiratory decline of the systolic blood pressure, is a characteristic physical finding. It is the result of the inspiratory decrease of the left ventricular stroke volume and systemic blood pressure. Under normal conditions, the intrathoracic pressure decreases during inspiration, resulting in enhanced right ventricular filling and enlargement. In cases of cardiac tamponade, the total heart volume is fixed, and the right ventricular expansion displaces the interventricular septum toward the left ventricle, with consequent reduction of the left ventricular stroke volume and systemic hypotension. Pulsus paradoxus is not pathognomonic of cardiac tamponade and can be detected in severe chronic obstructive airway disease, pulmonary embolism, bronchial asthma, constrictive pericarditis, and hypovolemic shock.

Diagnosis

The ECG findings of moderate to large pericardial effusions include low-voltage QRS complexes and occasionally include electrical (QRS) alternans caused by the heart's swinging motion within the fluid-filled pericardium. The chest radiograph demonstrates an enlarged cardiac silhouette. Transthoracic echocardiography, the imaging modality of choice, provides information regarding the size, location (circumferential vs. loculated), and most importantly, the hemodynamic consequences of the pericardial effusion suggesting tamponade.

The two-dimensional findings of tamponade include right atrial and right ventricular collapse, distention of the inferior vena cava, and evidence of increased ventricular interdependence (Fig. 10-1). Doppler quantification of the mitral and tricuspid inflow velocity respiratory variation is more sensitive than two-dimensional echocardiography for determining the hemodynamic significance of pericardial effusions. Right heart catheterization demonstrates decreased cardiac output, elevated right atrial pressure with diminished or absent *y* descent, and equalization of the cardiac filling pressures (i.e., right atrial, pulmonary wedge, and diastolic pulmonary artery pressures).

Computed tomography (CT) and magnetic resonance imaging (MRI) can accurately identify pericardial effusions and may be used with echocardiography in the assessment of loculated effusions, pericardial thickening, and extracardiac

