NOTES
PERICARDIAL DISEASE

GENERALLY, WHAT IS IT?

PATHOLOGY & CAUSES

- Disorders affecting pericardium
- *Pericardial cavity*: space between visceral, parietal layer, normally filled with 15–50ml of plasma filtrate

CAUSES

- *Infections*: mostly viral; bacterial, fungal rare
- Malignancy, mediastinal radiation
- Dressler's syndrome
- Trauma
- Drugs, toxins
- Metabolic disease (e.g. uremic syndrome, myxedema, ovarian hyperstimulation syndrome), connective tissue disease
- Immune-mediated disorders

COMPLICATIONS

- Heart failure, circulatory problems, problems breathing

SIGNS & SYMPTOMS

- See individual diseases

DIAGNOSIS

DIAGNOSTIC IMAGING

- Echocardiogram
- X-ray

OTHER DIAGNOSTICS

- ECG

TREATMENT

- Pericardiocentesis, pericardiectomy

MNEMONIC: CARDIAC RIND

Causes of Pericarditis

Collagen vascular disease
Aortic aneurysm
Radiation
Drugs
Infections
Acute renal failure
Cardiac infarction
Rheumatic fever
Injury
Neoplasms
Dressler's syndrome

SYMPTOMS SIMILAR TO PERICARDITIS

	CONSTRICTIVE PERICARDITIS	CARDIAC TAMPONADE	LIVER CIRRHOSIS
PULSUS PARADOXUS	Absent	Present	Absent
BRAIN NATRIURETIC PEPTIDE	↑	↓	↑
BLOOD PRESSURE	Normal	↓	↑
PERICARDIAL KNOCK	Audible	Absent	Absent
ASCITES	Present	Absent	Present
JUGULAR VENOUS PRESSURE	↑	↑	Normal
KUSSMAUL'S SIGN	Present	Absent	Absent

ACUTE PERICARDITIS

osms.it/acute-pericarditis

PATHOLOGY & CAUSES

- Pericardial inflammation, myopericarditis
- Most common pericardial disorder

CAUSES

- Idiopathic, viral (e.g. Coxsackie B), uremic syndrome (toxic to pericardium), Dressler's syndrome, autoimmune (e.g. rheumatoid arthritis, scleroderma, systemic lupus erythematosus), cancer, radiation, medications (e.g. penicillin, anticonvulsants)

RISK FACTORS

- Surgery, cancer, autoimmune disease, connective tissue disorders, immunosuppression

COMPLICATIONS

- Constrictive pericarditis, pericardial effusion, cardiac tamponade

SIGNS & SYMPTOMS

- Fever, sharp chest pain worsened with deep breathing, symptoms improve with sitting up and leaning forward
- Pericardial friction rub heard on auscultation, like two pieces of leather rubbing together, loudest on left sternal border

DIAGNOSIS

DIAGNOSTIC IMAGING

X-ray

- "Water bottle sign," liquid collects at the bottom if effusion present

Echocardiography

- Performed to exclude pericardial effusion

OTHER INTERVENTIONS

- Clinical presentation suggestive of pericardial effusion

ECG

- ST elevation, PR depression, voltage changes, flattened, inverted T wave

MNEMONIC: PSPPS

Acute pericarditis ECG

Pericarditi**S**

PR depression in **P**recordial leads

ST elevation

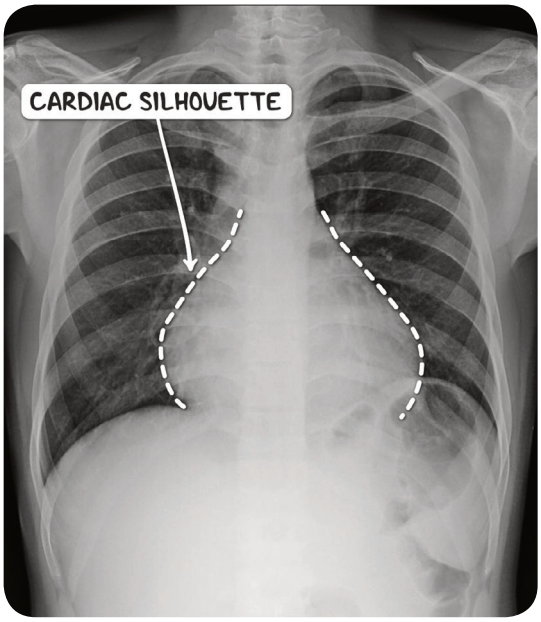

Figure 14.1 A chest radiograph demonstrating the globular cardiac silhouette seen in a case of pericardial effusions secondary to acute pericarditis. This is also known as the water bottle sign.

TREATMENT

- Targeted at etiology

MEDICATIONS

- Treat pain, inflammation
  - Non-steroidal anti-inflammatory drug (NSAID) + colchicine
  - Glucocorticoids if NSAID contraindicated
  - Colchicine important if rheumatoid arthritis, Dressler syndrome involved

SURGERY

- Pericardiotomy if high recurrence

OTHER INTERVENTIONS

- Rest

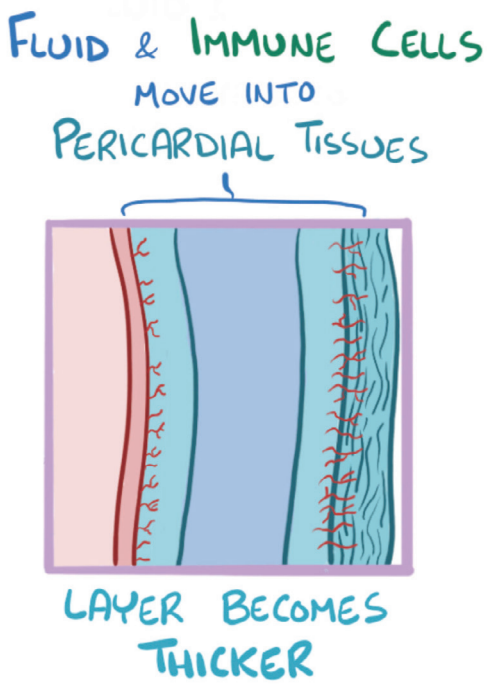

Figure 14.2 Illustration depicting sclerosing of pericardial tissues in cross-section of heart wall.

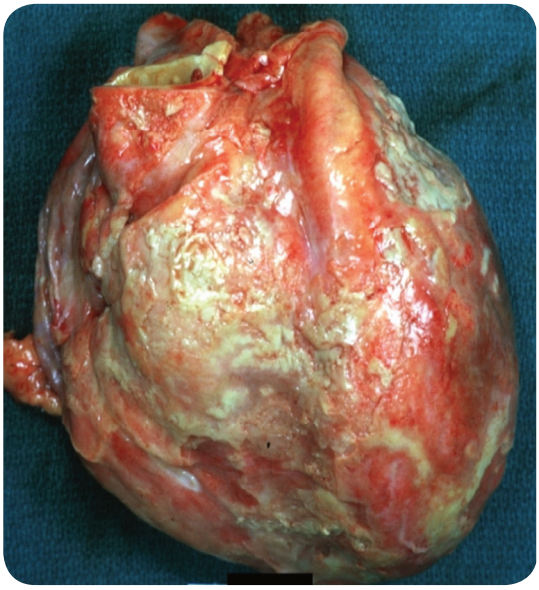

Figure 14.3 Gross pathology of acute fibrinous pericarditis. The yellow fibrinous exudate is clearly visible on the external surface of the heart.

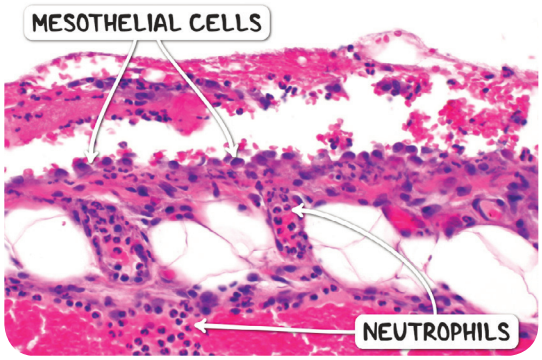

Figure 14.4 Histology photomicrograph demonstrating acute pericarditis. The mesothelial cells of the pericardium are surrounded by neutrophils and there is no fibrosis, indicating an acute inflammatory reponse.

CARDIAC TAMPONADE

osms.it/cardiac-tamponade

PATHOLOGY & CAUSES

- Buildup of fluid in pericardium, constricts heart
- Tamponade = pressure obstructing flow
- Heart unable to pump normally → blood flow through chambers obstructed → cardiac output decreases → hypotension → lower tissue perfusion → heart rate increases

CAUSES

- *Acute onset:* trauma, myocardial infarction, aortic dissection, pericardial effusion
- *Slow onset:* cancer, chronic inflammation, uremic pericarditis, hypothyroidism, connective tissue disease

RISK FACTORS

- Individuals with malignancy, tuberculous, purulent pericarditis ≥ those with idiopathic pericarditis
- Individuals with fibrinolytic therapy, myocardial infarction

SIGNS & SYMPTOMS

- Pulsus paradoxus due to ventricular interdependence
- Beck's triad (see mnemonic)
- Tachycardia, coughing, dyspnea, weakness, myocardial ischemia

MNEMONIC: 3Ds

Beck's triad (Signs & Symptoms)

Distant heart sounds
Distended jugular veins
Decreased arterial pressure

DIAGNOSIS

DIAGNOSTIC IMAGING

Echocardiography

- Excess pericardial fluid, heart "swinging" inside pericardial cavity

SURGERY

- Cardiac catheterization → pressure in all four chambers equal

OTHER INTERVENTIONS

- Clinical presentation

ECG

- Tachycardia, low QRS complex voltage, electrical alternans (QRS complexes have different heights)

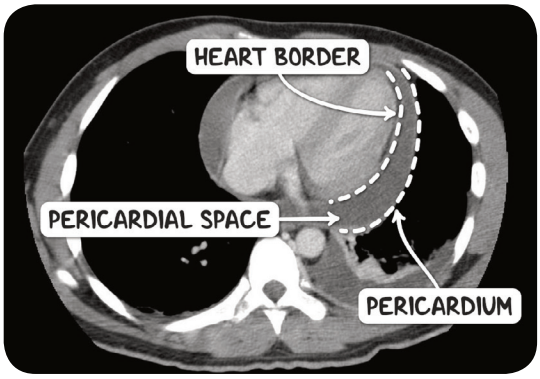

Figure 14.5 A CT scan in the axial plane demonstrating a large pericardial effusion, separating the pericardium from the heart itself and increasing the intrapericardial pressure, leading to cardiac tamponade.

TREATMENT

MEDICATIONS

- IV fluids

OTHER INTERVENTIONS

Pericardiocentesis

- Needle inserted into pericardium to drain excess fluid

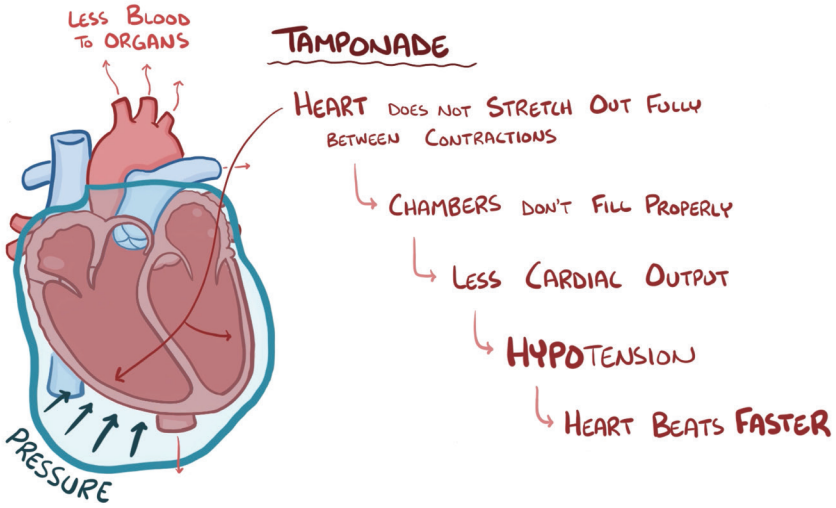

Figure 14.6 Illustration depicting fluid build up around pericardium, putting pressure on the heart walls and decreasing stroke volume.

CONSTRICTIVE PERICARDITIS

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PATHOLOGY & CAUSES

- Formation of thick, fibrotic pericardium → compresses heart
- Fibroblasts accumulate between pericardial layers → collagen deposits → creates scars → layers become adherent, lose elasticity
- Heart filling difficult due to stiffness of pericardium
  - Ventricular interdependence: lowered heart wall compliance, decreased transpulmonary venous pressure → left ventricular filling decreases → lower volume in left heart → right bends septum towards left to increase volume
  - Maximal volume diminished, continues to decrease with disease progression
- Volume overload, hepatopathy, decreased cardiac output

CAUSES

- Idiopathic, viral, radiation, myocardial infarction, collagen disorders, tuberculosis

RISK FACTORS

- Acute pericarditis
- Cardiac surgery, radiation, connective tissue disorders, bacterial (purulent) infections

COMPLICATIONS

- Heart failure, arrhythmias, cardiac tamponade

SIGNS & SYMPTOMS

- Elevated jugular venous pressure (JVP)
- *Kussmaul's sign:* paradoxical inspiratory JVP
- *Pericardial knock:* heard before S3 on auscultation
- *Edema:* part of fluid overload; ascites, hepatosplenomegaly (HSM), cachexia (signs of hepatopathy); dyspnea (consequence of low cardiac output)
- Clinical manifestations of pleural effusion

DIAGNOSIS

DIAGNOSTIC IMAGING

X-ray

- Pericardial calcifications

Echocardiogram

- Stiff serous pericardium restricts heart's movement

CT scan

- Anatomical variations, thickness, distribution of scarring

LAB RESULTS

Plasma brain natriuretic peptide (BNP)

- Differentiate between tamponade, cirrhosis, restrictive cardiomyopathy

OTHER INTERVENTIONS

Invasive hemodynamic monitoring

- Increased pressure in right atrium, Kussmaul's sign

TREATMENT

MEDICATIONS

- Diuretics, NSAIDs, corticosteroids

SURGERY

- Pericardiectomy (for progressive disease)

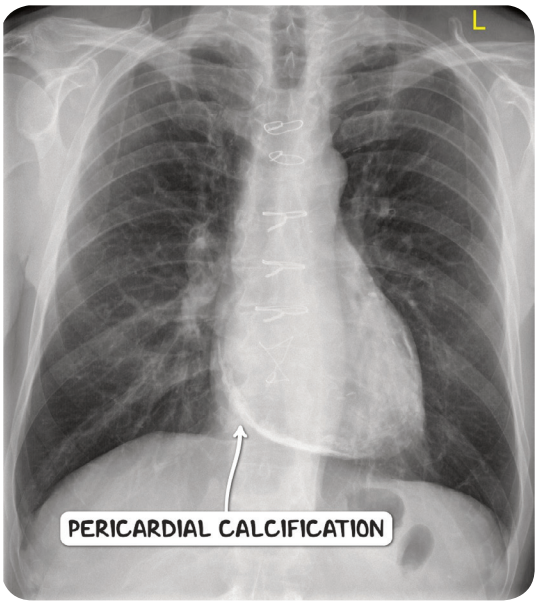

Figure 14.7 A chest radiograph demonstrating pericardial calcification secondary to a chronic pericarditis.

DRESSLER'S SYNDROME

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PATHOLOGY & CAUSES

- Secondary pericarditis, rare
- AKA postmyocardial infarction syndrome
- May or may not involve pericardial effusion
- ≥ two weeks after myocardial infarction (MI), immune-mediated response to injury → antimyocardial antibodies respond to cardiac antigens → immune complex deposits in pericardium, pleura

SIGNS & SYMPTOMS

- Unusual fatigue after cardiac surgery/MI
- Persistent fever, tachycardia, pulsus paradoxus
- *Manifestations of pericarditis:* friction rub, symptoms improve in sitting position
- *Pleural effusion signs:* pleuritic pain

DIAGNOSIS

DIAGNOSTIC IMAGING

Echocardiogram

- Evaluate ventricular contractility; effusion, signs of tamponade

Chest X-ray

- Cardiac effusion

LAB RESULTS

- Complete blood count (CBC), CRP, erythrocyte sedimentation rate (ESR); troponin studies show leukocytosis, ↑ CRP, ↑ ESR; anti-heart antibody titer

OTHER INTERVENTIONS

ECG

- Changes same as acute pericarditis
- ST segment elevation, PR depression

TREATMENT

MEDICATIONS

- Colchicine recommended after cardiac surgery as preventative measure
- High dose aspirin, NSAIDs, corticosteroids

PERICARDIAL EFFUSION

osms.it/pericardial-effusion

PATHOLOGY & CAUSES

- Abnormal accumulation of inflammatory fluid, immune cells → diffuse into interstitium → fluid pools in pericardial space → pericardial dilation → pressure on heart, vena cava → decreased cardiac filling → cardiac tamponade → decreased cardiac output
- *Types of effusion:* serous, serosanguinous, chylous

CAUSES

- Aortic dissection, heart failure, hypoalbuminemia, lymphatic obstruction, malignancy, radiation, renal failure, trauma, autoimmune disease, acute pericarditis (viral, bacterial, tuberculous, idiopathic in origin), myxedema, some drugs, iatrogenic, idiopathic

COMPLICATIONS

- Cardiac tamponade
- Constrictive pericarditis

SIGNS & SYMPTOMS

- Clinical presentation nonspecific, related to underlying cause, reflecting impaired cardiac function
- Diminished heart sounds
- Jugular vein distention
- Tachycardia, dyspnea, decreased blood pressure, lightheadedness

DIAGNOSIS

DIAGNOSTIC IMAGING

X-ray

- Silhouette pools to bottom of heart, gives classic "water bottle" sign

Echocardiogram

- Pericardial effusion makes heart looks like it's dancing within pericardium, "swinging heart"

LAB RESULTS

- *Elevated markers of inflammation:* C-reactive protein (CRP)

OTHER INTERVENTIONS

ECG

- Low QRS complex voltage, electrical alternans, sinus tachycardia

TREATMENT

MEDICATIONS

- Relieve pain, treat underlying cause of inflammation

SURGERY

- Pericardiocentesis