The management of Pericarditis

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Case

A 43 year old male presents with central chest pain, which came on during sleep and was relieved on sitting up and getting out of bed. He was not breathless when he woke, described the pain as sharp, worse on taking a deep breath and coughing. The nature of the pain is making him breathe shallow, but otherwise he is not breathless. He reports having had non-specific viral symptoms in the preceding days but has been otherwise well.

The Problem

Pericarditis is a syndrome associated with inflammation of the pericardial sac with or without pericardial effusion. Pericarditis is sub-classified as acute, incessant, recurrent or chronic based on the time, course and recurrence of symptoms. It is a common but benign clinical syndrome. However, ST elevation Myocardial Infarction (STEMI) is amongst the most important differential diagnosis. Hence confident differentiation is required to ensure appropriate reassurance and management.

Type of Pericarditis	Cause	
Orthopnoea	**Viral:** Coxsackieviruses A and B, echovirus, mumps, adenovirus, EBV, HIV, influenza **Bacterial:** *Pneumococcus, Streptococcus, Staphylococcus, Legionella* **Mycobacterial:** *M tuberculosis, M avium-intracellulare* **Fungal:** histoplasmosis, coccidioidomycosis, candidiasis, blastomycosis **Other:** syphilis, parasites, Q fever	
Noninfectious	Idiopathic Neoplasm Metastatic disease Hypothyroidism Aortic dissection with hemopericardium Pneumonia	Mesothelioma Renal failure Myocardial infarction
Autoimmune-related	Connective-tissue disease: SLE, RA, scleroderma, mixed Arteritis: polyarteritis nodosa, temporal arteritis Inflammatory bowel disease Post-MI syndrome	
Drug-induced	Procainamide Hydralazine Isoniazid	Cyclosporine Phenytoin
Trauma-related	Thoracic-duct injury Mediastinal irridation	

EBV: Epstein-Barr Virus; M: Mycobacterium; MI: Myocardial Infarction; RA: Rheumatoid Arthritis; SLE: Systemic Lupus Erythematosus.

Table 1 – Etiology of Pericarditis

Aetiology

Pericarditis has a broad range of aetiologies, the main being idiopathic. It has infectious like bacterial (notably the staphylococcus and streptococcus) but viral being the most common.

Other causes include neoplastic, trauma and auto-immune. Table 1 (below left) depicts the aetiology of Pericarditis. [1]

Clinical Features and Diagnosis

Pericarditis is diagnosed by the presence of at least two of the following criteria:

i) Chest pain: (>85%) classically pleuritic, improved on leaning forward and made worse on lying flat
ii) Pericardial friction rub: (<33%), best heard at the left sternal edge, and may be transient
iii) ECG changes: (~60%) new widespread concave ST elevation or PR depression (Fig 1)
iv) Pericardial effusion: (60%) (Fig 2 and Fig 3)

Red flag features requiring referral to secondary care are clinical features suggestive of predominant myocarditis with pericardial involvement, i.e.:

- Orthopnoea
- Hypoxia
- Exertional breathlessness
- Pulsus Paradoxus
- Kussmaul's sign

Pulsus Paradoxus: This is an exaggeration of the normal pattern whereby the systolic pressure and the pulse pressure fall during inspiration. Normally the decrease in systolic pressure as measured by a sphygmomanometer is less than 10 mmHg.

Pulsus paradoxus is occasionally observed in patients with pericardial tamponade and obstructive airways disease.

Kussmaul's sign: Kussmaul's sign is a rise in JVP on inspiration. It is seen in conditions in which right ventricular filling is limited by pericardial fluid, non-compliant pericardium or myocardium.

Kussmaul's sign is occasionally observed in patients with cardiac tamponade, constrictive pericarditis or restrictive cardiomyopathy.

Routine Investigations:

Routine investigations (Table 2) for suspected acute pericarditis: [2]

Other ECG abnormalities that may be observed during the acute stage of pericarditis are: Sinus tachycardia, Atrial fibrillation, Electrical alternans (QRS alternans or rarely T wave alternans) or Low voltage, both suggesting pericardial effusion.

Management of Pericarditis:

The task force suggests that the term 'acute' should be adopted for new-onset pericarditis, 'incessant' for pericarditis with symptoms

Table 2: Recommended investigations for diagnosis of acute pericarditis as per ESC guidelines		
	Positive identifying features	**Class of recommendation & level of evidence**
ECG (Fig 1)	Global concave ST elevation	Ic
Transthoracic Echo (Fig 2)	Pericardial effusion	Ic
Chest X-Ray (Fig 3)	Globular cardiac silhouette	Ic
CPR and Troponin	Significant rises in troponin are suggestive of myocardial involvement	Ic
Table adapted from 2015 ESC Guidelines for the diagnosis and management of pericardial diseases.		

Above: Table 2 – Routine investigations or suspected acute pericarditis

persisting for four to six weeks, and 'chronic' for pericarditis lasting more than three months[8]. Recurrent pericarditis is diagnosed with a documented first episode of acute pericarditis, a symptom-free interval of four to six weeks or longer and evidence of subsequent recurrence of pericarditis.

Acute Pericarditis:

Acute pericarditis is a self-limiting disease without significant complications or recurrences in 70% to 90% of patients. Initial management of acute pericarditis should be focused on screening for specific causes which will determine the choice of therapy. If history and initial investigations support the clinical diagnosis, symptomatic treatment with aspirin or non-steroidal anti-inflammatory drugs (NSAIDs) with gastroprotection should be initiated. Colchicine (2 to 3mg oral loading dose followed by 1 mg daily for three months is recommended first-line therapy as an adjunct to aspirin/NSAIDs. It improves the response to medical therapy and halves the recurrence rate.

Incessant and Recurrent Pericarditis:

Low-dose corticosteroids should be considered in cases of contra-indications / failure of aspirin / NSAIDs and colchicine, and when an infectious cause has been excluded, or when there is a specific indication such as autoimmune disease. Serum CRP guides the treatment length and response to therapy. While initially effective, the use of steroids may promote recurrence and may attenuate the efficacy of colchicine if used first-line.[4]

For patients failing this approach and/or dependent on corticosteroids, the interleukin-1β antagonist Anakinra (2 mg/kg/day up to 100 mg) in patients with >3 recurrences, raised inflammatory markers, colchicine-resistance and steroid-dependence is showing some promising results in pericarditis treatment. [7]

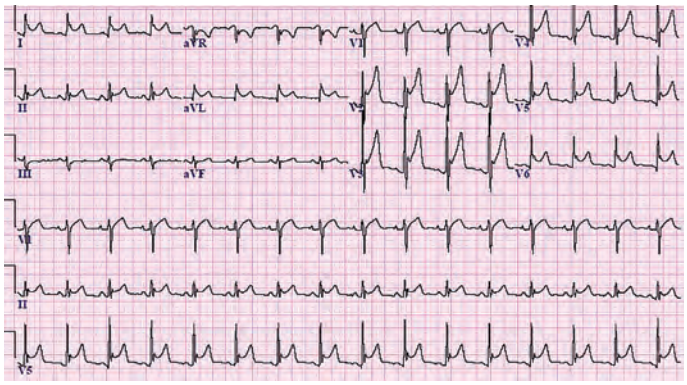


Fig 1: ECG: Global concave ST elevation

Other therapeutic options include azathioprine or intravenous immunoglobulin.[3] Azathioprine is best used as a steroid-sparing agent (typically at 1–3 mg/kg/day) and can take up to 3 months to be effective.[5] The effect of intravenous immunoglobulin is more immediate, but its availability is restricted and the evidence base for its use is limited to isolated case reports and small case-series.

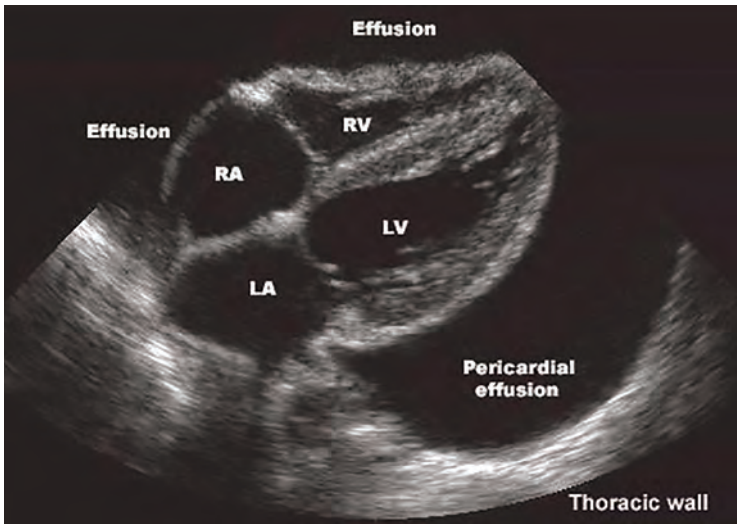
Other treatment modalities

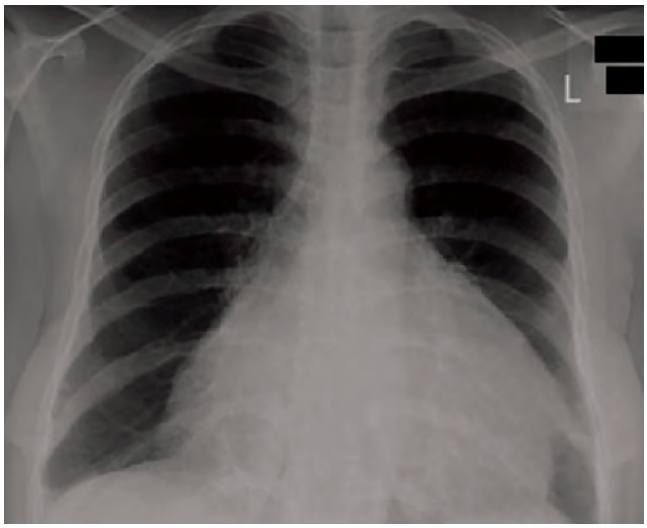
Large pericardial effusions complicated by hypotension need to be aspirated. Rarely aspiration of a pericardial effusion may also be required for diagnostic purposes.

Treatment failure after first and second line treatments warrants referral to specialist services for consideration of immunosuppressant options or surgical intervention (pericardiectomy).

Exercise restriction: This should be until symptoms have been resolved and the diagnostic tests normalised (i.e. CRP, ECG and echo-

Below left: Fig 2: Transthoracic echo showing pericardial effusion
Below right: Fig 3: Chest X-Ray showing globular cardiac silhouette





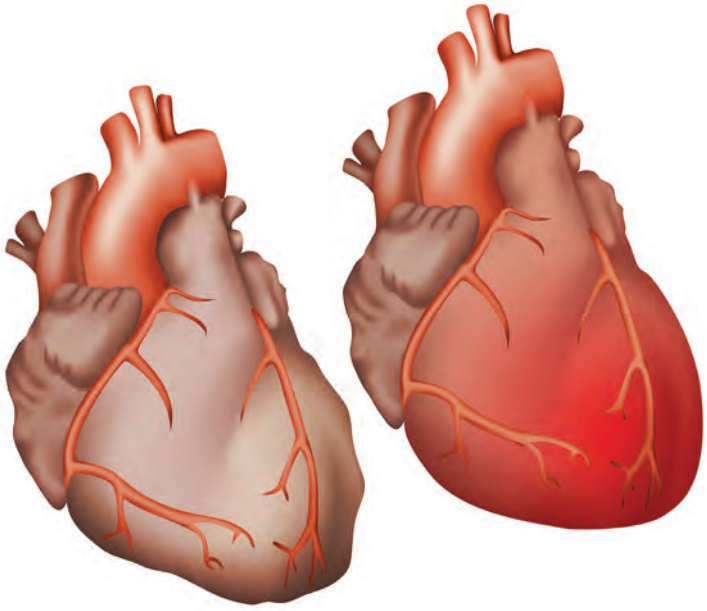
cardiogram). A minimal restriction of three months (after the initial onset of the attack) is suggested for athletes.

Conclusion

Acute pericarditis is a self-limiting disease without significant complications or recurrences in 70% to 90% of patients. Initial management of acute pericarditis should focus on screening for specific causes which will determine the choice of therapy.

Colchicine should be considered as a first-line therapy for acute pericarditis as an adjunct to aspirin/NSAIDs therapy for three months. Corticosteroids are not recommended as first-line therapy for acute pericarditis as they appear to encourage recurrences. Serum CRP should be considered to guide the treatment length and assess the response to therapy.

Most patients with acute pericarditis (generally those with presumed viral or idiopathic pericarditis) have a good long-term prognosis. Cardiac tamponade rarely occurs in patients with acute idiopathic pericarditis. Hospital admission is recommended for high-risk patients (red flag features) with acute pericarditis.



Illustrations of a normal heart (left), and a heart showing Pericarditis (right)

References:

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3. Ismail TF. Acute pericarditis: Update on diagnosis and management. Clin Med (Lond). 2020;20(1):48-51. doi:10.7861/clinmed.cme.20.1.4
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5. Adler Y, Charron P, Imazio M, et al. 2015 ESC guidelines on the diagnosis and management of pericardial diseases. Eur Heart J 2015;36:2873–4.
6. Imazio M, Lazaros G, Picardi E, et al. Intravenous human immunoglobulins for refractory recurrent pericarditis: a systematic review of all published cases. J Cardiovasc Med 2016;17:263–9.
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8. Imazio M., Brucato A., Trinchero R., Spodick D., & Adler Y. Individualized therapy for pericarditis. Expert Rev Cardiovasc Ther. 2009 Aug. 7 (8): 965-75.

Did you know..?

How do bees make honey?

It begins when a honeybee stops at a flower and sucks out the sweet liquid nectar. They store the nectar in a special sac called a honey crop, where enzymes break it down into simple sugars. Back at the hive, other bees move the nectar into honeycombs. They hover above the cells, creating a breeze that dries out the nectar until it becomes honey, and then seal the cells with wax. Bees visit 2 million flowers to make a pound of honey.

Honey vs. Sugar

In this debate, honey may have an edge. It has healthy anti-oxidants, amino acids, and vitamins. But some experts say honey's benefits are too small to matter. Besides, a teaspoon of honey has 21 calories, compared with 16 for sugar. Don't give honey to children under 1 year of age. It may have trace amounts of botulism that will make them sick.