When Anatomy Complicates Access: A Case of Tuberculous Pericardial Effusion Managed by Surgical Pericardiostomy

Introduction

Pericardial effusion refers to the accumulation of fluid within the pericardial space between the visceral and parietal pericardium. While small amounts of fluid (15–50 ml) are normal, larger collections can impair cardiac filling and potentially lead to cardiac tamponade, a life-threatening condition.

Management depends on the severity of symptoms, hemodynamic status, and underlying cause. In many cases, pericardiocentesis is the first-line intervention. However, anatomical abnormalities may complicate the procedure and necessitate surgical pericardiostomy.

This case illustrates the challenges encountered during pericardial drainage in a patient with chest wall deformity and suspected congenital syndrome, requiring conversion from bedside pericardiocentesis to open surgical drainage.

Case Presentation

Patient Information

An 18-year-old female was referred from the medical ward for cardiothoracic surgical evaluation due to moderate pericardial effusion associated with severe chest wall deformity and short stature.

To maintain patient confidentiality, personal identifiers have been removed.

History of Present Illness

The patient presented with:

- Shortness of breath
- Chest tightness
- Dyspnea on exertion
- Progressive dyspnea at rest

These symptoms had been present for approximately 9 days prior to referral.

She had been admitted to the medical ward earlier with a provisional diagnosis of severe pneumonia with underlying kyphoscoliosis.

Past Medical History

The patient had a history of:

- Intermittent dyspnea on exertion

- Previous hospitalization for chest infection with multifocal lung consolidation
- Drug-induced liver injury

There was no relevant surgical history and no known drug allergies.

Physical Examination

General Examination

The patient appeared dyspneic but conscious and oriented.

Notable findings included:

- Short stature
- Chest wall deformity (pectus carinatum)

Anthropometric Measurements

Parameter	Value
Weight	29.2 kg
Height	130 cm
BMI	17.27 kg/m²

Vital Signs

Parameter	Value
Pulse Rate	113/min
Blood Pressure	100/60 mmHg
Respiratory Rate	30/min
Oxygen Saturation	92% on oxygen via nasal prong

Systemic Examination

Respiratory System

- Pectus carinatum present
- Symmetrical chest movement
- Clear breath sounds

Cardiovascular System

- Apex beat visible and displaced
- Heaving apex
- Normal heart sounds

Abdomen

- Soft, non-tender
- Normal bowel sounds

Investigations

Chest X-ray

Chest radiography showed multifocal lung consolidation.

Echocardiography

A bedside echocardiogram revealed:

- Moderate pericardial effusion
- Maximum fluid thickness: **3.56 cm**
- Thickened pericardium
- Right ventricular systolic pressure: **57 mmHg**

No significant valvular abnormalities were noted.

Laboratory Investigations

Initial laboratory tests showed:

Test	Result
Hemoglobin	9.7 g/dL
WBC	10.62
Platelets	411
Urea	Elevated
NT-proBNP	Markedly elevated

Inflammatory markers and infection screening were performed, including anti-tuberculosis antibody testing.

Initial Management

The patient received medical treatment including:

- Intravenous antibiotics
- Diuretics
- Corticosteroids
- Anti-tuberculosis therapy

However, due to the presence of significant pericardial effusion and worsening symptoms, a pericardial drainage procedure was planned.

Bedside Pericardiocentesis

After obtaining informed consent, echo-guided pericardiocentesis was attempted under aseptic conditions.

A pigtail catheter was inserted using the Seldinger technique, and straw-colored fluid was initially aspirated.

However, the procedure encountered difficulties due to:

- Severe chest wall deformity
- Thickened pericardium
- Kinking of the catheter

Multiple attempts were unsuccessful in achieving adequate drainage.

Pericardiocentesis 1

Surgical Management

Subxiphoid Pericardiostomy

Because of the high risk of myocardial injury with further attempts at closed drainage, the patient was transferred to the operating theatre for surgical pericardiostomy.

A subxiphoid vertical incision was made to access the pericardial space.

Operative Findings

Approximately 200 ml of blood-stained pericardial fluid was drained.

A pericardial drain was placed for continued drainage.

Postoperative Progress

The patient showed gradual improvement following surgery.

Date	Clinical Status	Drain Output
Day 1	Dyspnea present	345 ml blood-stained
Day 2	Improving	287 ml blood-stained
Day 3	Improved	18 ml straw-colored
Day 4	Stable	No further drainage

Follow-up echocardiography showed only a thin residual rim of pericardial fluid.

The patient was discharged in stable condition.

Final Diagnosis

1. **Tuberculous pericardial effusion with impending cardiac tamponade**
2. **Pulmonary tuberculosis (Koch's lungs)**
3. **Suspected underlying congenital syndrome (possible Noonan syndrome)**

Discussion

Pericardial effusion can arise from various causes including:

- Infection (especially tuberculosis in endemic regions)

- Autoimmune disease
- Malignancy
- Trauma
- Idiopathic conditions

Echocardiography remains the gold standard diagnostic modality for detecting pericardial effusion and assessing cardiac function.

Pericardiocentesis

Pericardiocentesis is the preferred emergency procedure for draining pericardial fluid.

Common approaches include:

- Subxiphoid approach
- Parasternal approach
- Apical approach

However, certain anatomical conditions such as chest wall deformities or thickened pericardium may make the procedure technically challenging.

Pericardiostomy

When pericardiocentesis is unsuccessful or contraindicated, surgical pericardiostomy provides a definitive method for drainage and prevents recurrence of effusion.

The subxiphoid approach is commonly used as it allows direct visualization and safe decompression of the pericardial cavity.

Learning Points

- Pericardial effusion can rapidly progress to **life-threatening cardiac tamponade**.
- **Echocardiography is essential** for diagnosis and procedural guidance.
- **Anatomical abnormalities** such as chest wall deformity can complicate pericardiocentesis.
- In such situations, **surgical pericardiostomy may be the safest and most effective treatment**.

Conclusion

This case highlights the importance of **individualized management of pericardial effusion**, particularly when anatomical factors complicate standard procedures.

Early recognition of procedural difficulty and timely conversion to **surgical pericardiostomy** can prevent complications and lead to favorable patient outcomes.