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Iatrogenic Right Ventricular Perforation with Inadvertent Catheter in the Pulmonary Artery during Emergency Pericardiocentesis in Severe Hypothyroidism: A Case Report

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Running title: Right ventricular perforation during pericardiocentesis

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ABSTRACT
Background
Pericardiocentesis is a lifesaving intervention for cardiac tamponade but can rarely result in serious complications, including cardiac chamber perforation and injury to the great vessels. Inadvertent passage of a pericardial drainage catheter through the right ventricle into the pulmonary artery is an exceptionally rare and potentially fatal complication.
Case Description
A 28-year-old short-statured female with severe hypothyroidism presented with multiple episodes of loose stools and generalized weakness. Her condition deteriorated with a low Glasgow Coma Scale and hemodynamic instability. Echocardiography revealed a large pericardial effusion with cardiac tamponade and significant hemodynamic compromise. Emergency pericardial drainage was performed using a pigtail catheter. During the procedure, the right ventricle was inadvertently perforated, with the pigtail catheter, sheath, and guidewire passing through the right ventricle into the pulmonary artery. She subsequently developed severe hemodynamic instability and was transferred to Udayananda Hospital on high-dose inotropic support with a blood pressure of approximately 63/41 mmHg. Emergency surgery was undertaken; the guidewire, sheath, and pigtail catheter were removed under direct surgical control and the right ventricular perforation was closed using pledgeted 3-0 Prolene sutures. One pint of packed red blood cells was transfused. Laboratory investigations demonstrated profound hypothyroidism, acute kidney injury, leukocytosis, anemia, hypoalbuminemia, and progressive severe thrombocytopenia. Postoperative imaging demonstrated extensive subcutaneous emphysema, pneumomediastinum, bilateral pneumothoraces, pulmonary atelectatic collapse, pleural effusions, and postoperative changes following median sternotomy.
Conclusions
Iatrogenic right ventricular perforation with inadvertent catheter in the pulmonary artery during pericardial drainage is a rare but potentially fatal complication. Prompt echocardiographic recognition, controlled catheter management, aggressive hemodynamic stabilization, and immediate surgical intervention are essential for successful management.
Keywords: Pericardiocentesis; cardiac tamponade; right ventricular perforation; pulmonary artery; pigtail catheter; severe hypothyroidism.

Highlight Box
Key findings
- Emergency pericardial drainage for tamponade was complicated by right ventricular perforation.
- The pigtail catheter and sheath traversed the right ventricle and entered the pulmonary artery.
- Profound hemodynamic instability required emergency cardiothoracic surgical repair.
- Severe hypothyroidism and subsequent multiorgan dysfunction complicated the clinical course.

What is known and what is new?
- Cardiac perforation is a recognized but uncommon complication of pericardiocentesis.
- This case describes an unusual trajectory of a pigtail catheter through the right ventricle into the pulmonary artery in a profoundly unstable patient.

What is the implication, and what should change now?
- Catheter position should be continuously assessed during emergency pericardial drainage.

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- When ventricular perforation is suspected, catheter withdrawal should be controlled and definitive management should involve appropriate interventional or cardiothoracic expertise.

I. INTRODUCTION

Cardiac tamponade is a life-threatening condition in which accumulation of pericardial fluid results in impaired cardiac filling and reduced cardiac output. In patients with hemodynamic compromise, urgent pericardial drainage is indicated.

Pericardiocentesis is generally performed using echocardiographic or fluoroscopic guidance. Although uncommon, myocardial perforation is one of the most serious complications. A particularly unusual complication is inadvertent advancement of a drainage catheter through the right ventricular wall and into the pulmonary artery.

We present a case of inadvertent right ventricular perforation with passage of a pigtail catheter and sheath into the pulmonary artery during emergency pericardial drainage in a young woman with severe hypothyroidism and cardiac tamponade. We present the following case in accordance with the CARE reporting checklist.

II. CASE PRESENTATION

A 28-year-old short-statured female with severe hypothyroidism presented with multiple episodes of loose stools and generalized weakness. Her clinical condition subsequently deteriorated, with a low Glasgow Coma Scale and hemodynamic instability. She was taken to a nearby hospital for emergency evaluation and management.

Two-dimensional echocardiography demonstrated a large pericardial effusion with cardiac tamponade and significant hemodynamic compromise. Because of the unstable clinical condition, emergency pericardial drainage was undertaken using a pigtail catheter.

During the procedure, the right ventricle was inadvertently perforated. The pigtail catheter and sheath passed through the right ventricular cavity and subsequently into the pulmonary artery.

By the evening, the patient developed further hemodynamic deterioration. Repeat echocardiography demonstrated the pigtail catheter and sheath traversing the right ventricle with the catheter extending into the pulmonary artery.

The patient was transferred to Udayananda Hospital, Nandyal District, Andhra Pradesh, under high-dose inotropic support. At transfer, blood pressure was approximately 63/41 mmHg, indicating profound circulatory instability.

Considering the intracardiac catheter position, right ventricular injury, and persistent shock, emergency surgery was undertaken. The guidewire, sheath, and pigtail catheter were removed under direct surgical control. The right ventricular perforation was identified and closed using pledgeted 3-0 Prolene sutures. One pint of packed red blood cells was transfused. Following repair, the patient was transferred to the intensive care unit for continued postoperative management.

Investigations

Hematological and renal parameters

Date	Hb (g/dL)	WBC (×10³/µL)	Platelets (×10³/µL)	Urea (mg/dL)	Creatinine (mg/dL)
06-Jul-2026	8.3	18.82	127	43	1.7
07-Jul-2026	13.0	21.17	161	—	1.9
11-Jul-2026	12.3	23.57	29	115	5.0
12-Jul-2026	10.8	13.36	10	123	4.9
13-Jul-2026	9.2	11.21	13	131	5.1

The patient developed marked acute kidney injury, with creatinine increasing from 1.7 to 5.1 mg/dL and blood urea reaching 131 mg/dL. Severe thrombocytopenia developed, with platelet counts falling to 10–13 ×10³/µL. Leukocytosis with neutrophilia persisted.

Thyroid function

Parameter	Initial result	Reference range
T3	0.11 ng/mL	0.58–1.62
T4	0.52 µg/dL	5.0–14.5
TSH	406.13 µIU/mL	0.35–5.1

A subsequent thyroid profile showed T3 0.27 ng/mL, T4 7.1 µg/dL and TSH 67.99 µIU/mL. The initial values demonstrated profound biochemical hypothyroidism. The patient's short stature and history raised the possibility of longstanding hypothyroidism; however, the available data do not establish congenital hypothyroidism, and the term 'cretinism' should not be used as a confirmed diagnosis.

Other biochemical findings

ALT/SGPT was 97 IU/L, AST/SGOT 214 IU/L, total protein 4.8 g/dL, albumin 2.8 g/dL, and globulin 2.0 g/dL. Electrolytes were relatively preserved. Procalcitonin was 3.2 ng/mL and should be interpreted in the context of critical illness and postoperative inflammation.

Radiological findings

Postoperative CT chest demonstrated extensive subcutaneous emphysema, pneumomediastinum, bilateral pleural effusions and atelectatic collapse, with patchy pulmonary consolidations. CT abdomen demonstrated diffuse subcutaneous emphysema and extensive pneumoperitoneum with minimal free fluid, mild colonic mucosal edema, and a tiny left renal calculus.

Repeat CT chest demonstrated extensive surgical emphysema involving the bilateral chest wall and neck fascial planes, extension into the left anterior abdominal wall, extensive pneumomediastinum, moderate bilateral pneumothoraces with passive compressive lung collapse, leftward mediastinal shift, an endotracheal tube tip within the right main bronchus, right intercostal drainage tube, left pleural pigtail catheter closely abutting the left lateral pericardium, moderate pneumoperitoneum, and postsurgical changes of median sternotomy.

Clinical Timeline

Clinical period	Event
Initial presentation	Loose stools, generalized weakness, low GCS and hemodynamic instability.
Initial evaluation	Large pericardial effusion with cardiac tamponade on echocardiography.
Emergency procedure	Pigtail catheter inserted for pericardial drainage.
Procedural complication	Right ventricular perforation with catheter/sheath passage into pulmonary artery.
Same evening	Worsening hemodynamic instability; echocardiography confirmed catheter position.
Transfer	High-dose inotropes; blood pressure approximately 63/41 mmHg.
Emergency surgery	Guidewire, sheath and pigtail removed; RV perforation closed with pledgeted 3-0 Prolene.
Postoperative period	ICU management.
Subsequent course	Acute kidney injury, severe thrombocytopenia, anemia and leukocytosis.
Postoperative imaging	Pneumothoraces, pneumomediastinum, extensive subcutaneous emphysema, lung collapse and pneumoperitoneum.

III. DISCUSSION

The present case highlights a rare but potentially catastrophic complication of emergency pericardiocentesis: iatrogenic right ventricular perforation with inadvertent advancement of a pigtail catheter into the pulmonary artery.

Published cases have described a similar mechanical complication in which a pigtail catheter passes through the right ventricular wall, across the right ventricular outflow tract and into the pulmonary artery. Recognition of this complication is essential because persistent or worsening hemodynamic instability after drainage may reflect myocardial injury, bleeding, recurrent tamponade, or abnormal catheter position.

Image guidance and continuous awareness of catheter trajectory are important during emergency pericardial drainage. When ventricular perforation is suspected, uncontrolled withdrawal may be hazardous because the catheter can partially tamponade the myocardial defect. Controlled removal with appropriate interventional or surgical expertise is preferable.

In this patient, profound shock persisted despite high-dose inotropic support, with a blood pressure of 63/41 mmHg. Emergency surgery therefore provided definitive control. Direct removal of the guidewire, sheath and pigtail catheter allowed identification and closure of the ventricular defect with pledgeted 3-0 Prolene sutures.

Severe hypothyroidism was an important associated finding. The initial TSH of 406.13 µIU/mL with markedly reduced T3 and T4 confirms severe biochemical hypothyroidism. Hypothyroidism is a recognized cause of pericardial effusion, although a large effusion with tamponade should not automatically be attributed to hypothyroidism without considering other etiologies.

The subsequent course demonstrated multiorgan dysfunction, including acute kidney injury and profound thrombocytopenia, in the setting of shock, major surgery and critical illness. Postoperative imaging demonstrated significant thoracic complications requiring intensive respiratory and hemodynamic support.

IV. CONCLUSIONS

This case describes a rare and life-threatening complication of emergency pericardiocentesis in a young woman with severe hypothyroidism and cardiac tamponade. Inadvertent right ventricular perforation resulted in passage of the pigtail catheter, sheath and guidewire through the right ventricle into the pulmonary artery, followed by profound hemodynamic instability. Emergency surgical intervention enabled controlled removal of the catheter and direct repair of the right ventricular perforation. The case emphasizes image-guided pericardial access, continuous assessment of catheter position, controlled removal when cardiac injury is suspected, and immediate availability of cardiothoracic surgical expertise.

Acknowledgments
The authors acknowledge the intensive care, anesthesia, cardiology, nursing, laboratory and radiology teams involved in the care of the patient.

Footnote
Reporting Checklist: The authors have completed the CARE reporting checklist.
Funding: None.
Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form. The authors have no conflicts of interest to declare.
Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Written informed consent for publication of the case report and relevant clinical images should be obtained from the patient or an appropriate legally authorized representative before submission.

Author Contributions
Dr. Makam Nagaraj contributed to case management, operative management, clinical interpretation, and manuscript preparation. Jampana Naga Kavyasri contributed to data collection and organization of clinical and perioperative data. Bobbili Vijayasri contributed to clinical documentation and literature support. Manuscript review was performed by Dr. Makam Nagaraj and Jampana Naga Kavyasri. All authors reviewed and approved the final manuscript.

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Figure Legends
Figure 1. Echocardiographic image demonstrating the large pericardial effusion with features of cardiac tamponade. [Insert corresponding image.]
Figure 2. Echocardiographic image demonstrating the pigtail catheter/sheath traversing the right ventricle with extension into the pulmonary artery. [Insert corresponding image.]
Figure 3. Intraoperative image demonstrating surgical management of the right ventricular perforation, if available. [Insert corresponding image.]
Figure 4. Postoperative CT chest demonstrating pneumomediastinum, bilateral pneumothoraces, lung collapse and extensive subcutaneous emphysema. [Insert corresponding image.]

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Submission Notes

Target journal: AME Case Reports. Current author instructions specify a maximum of 2,500 words for a standard case report (excluding references, tables and figures), a 200–350-word structured abstract, 3–5 keywords, a highlight box, CARE reporting checklist, author contributions, ethical statement, Vancouver references, and a maximum of 8 combined tables/figures. The corresponding author's full contact details and signed publication consent should be added before submission.

ECHOCARDIOGRAPHIC IMAGES AND REPORTS

Supplementary clinical imaging documentation

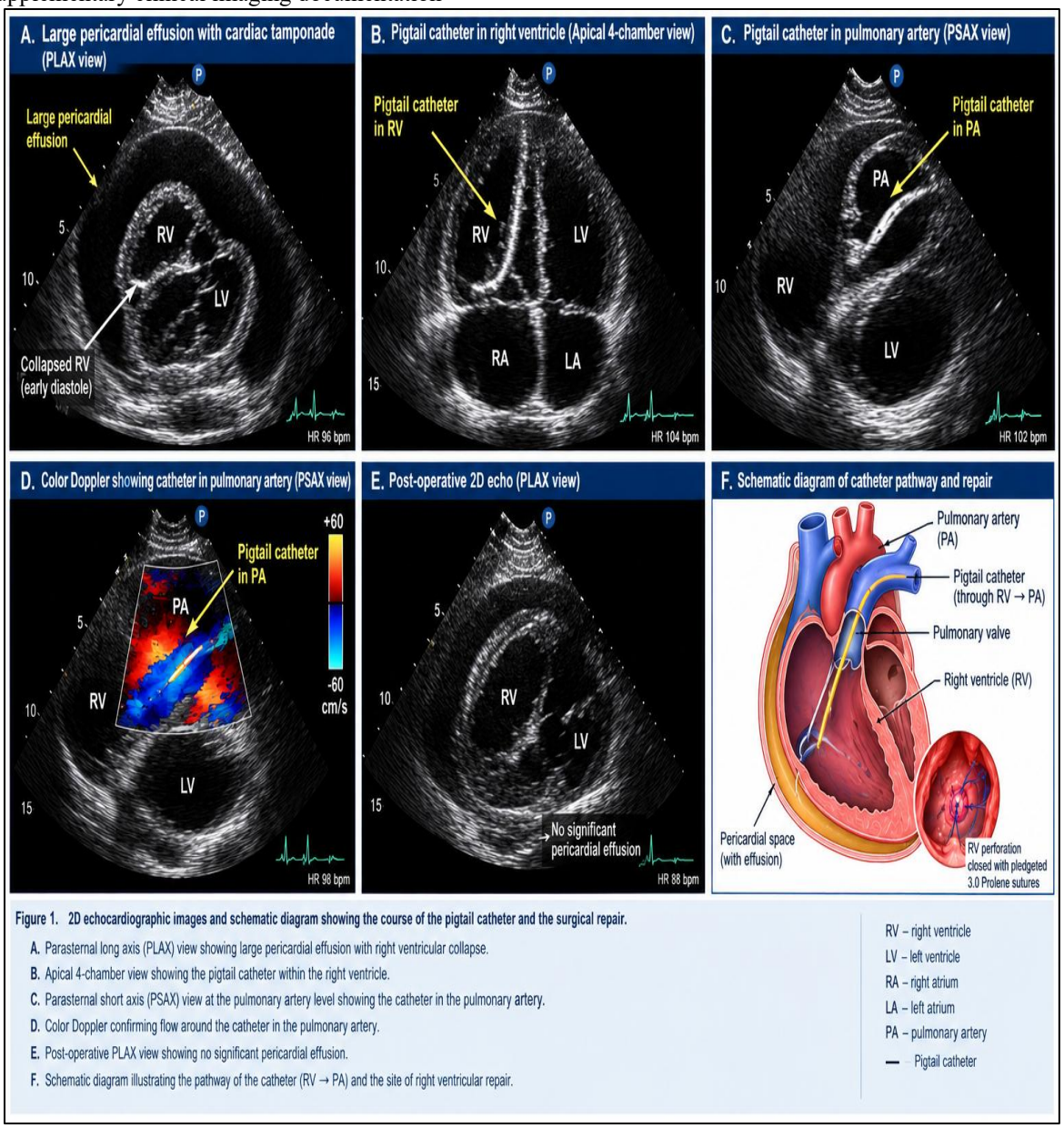

Figure A. Comprehensive 2D echocardiographic panel showing the large pericardial effusion, right-ventricular collapse, pigtail catheter in the right ventricle and pulmonary artery, color Doppler appearance, and postoperative echocardiographic view.

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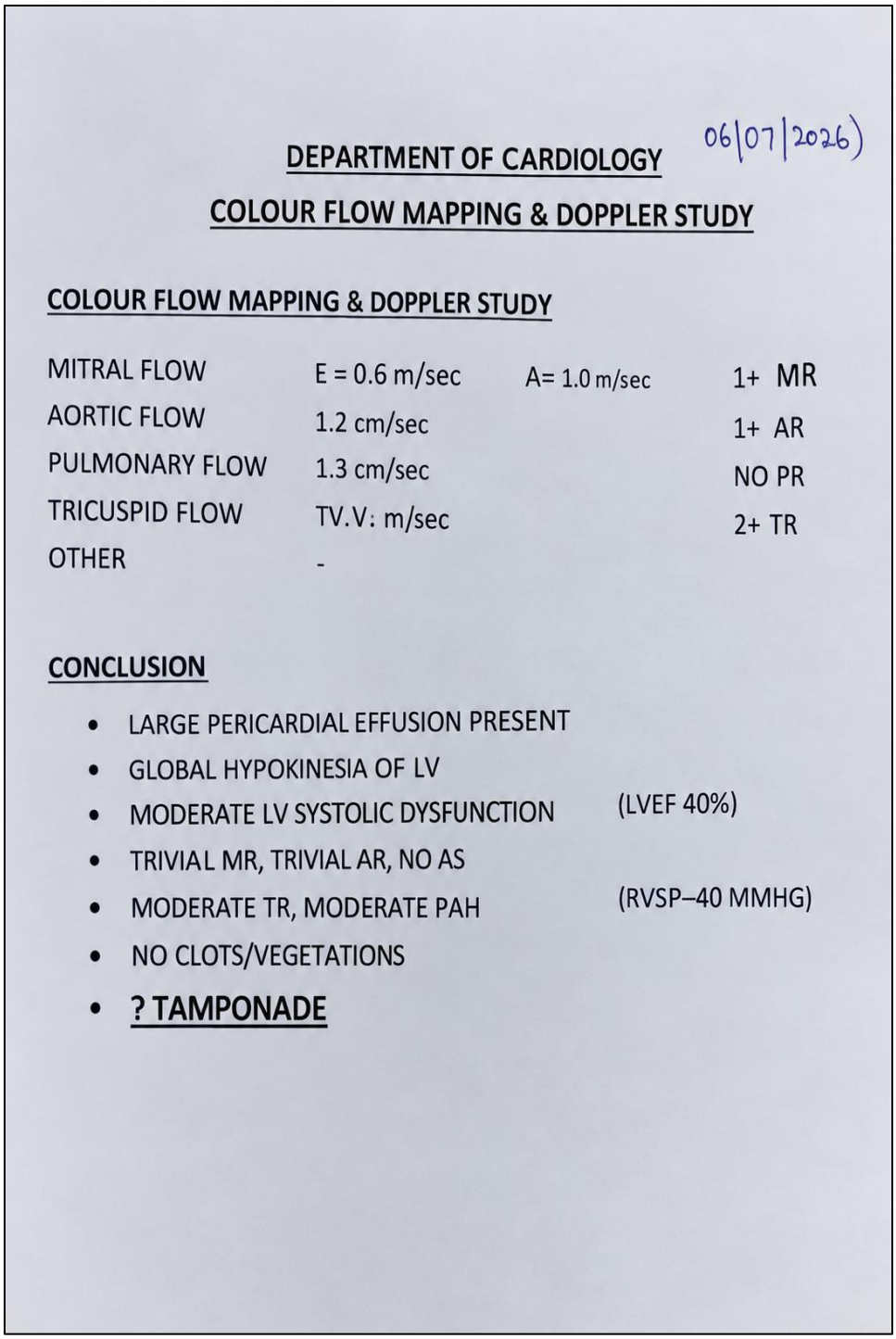

DEPARTMENT OF CARDIOLOGY 06|07|2026)

COLOUR FLOW MAPPING & DOPPLER STUDY

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MITRAL FLOW	E = 0.6 m/sec	A= 1.0 m/sec	1+ MR
AORTIC FLOW	1.2 cm/sec		1+ AR
PULMONARY FLOW	1.3 cm/sec		NO PR
TRICUSPID FLOW	TV.V: m/sec		2+ TR
OTHER	-		

CONCLUSION

- LARGE PERICARDIAL EFFUSION PRESENT
- GLOBAL HYPOKINESIA OF LV
- MODERATE LV SYSTOLIC DYSFUNCTION (LVEF 40%)
- TRIVIAL MR, TRIVIAL AR, NO AS
- MODERATE TR, MODERATE PAH (RVSP–40 MMHG)
- NO CLOTS/VEGETATIONS
- **? TAMPONADE**

Figure B. Echocardiography/colour-flow mapping report documenting a large pericardial effusion with suspected tamponade.

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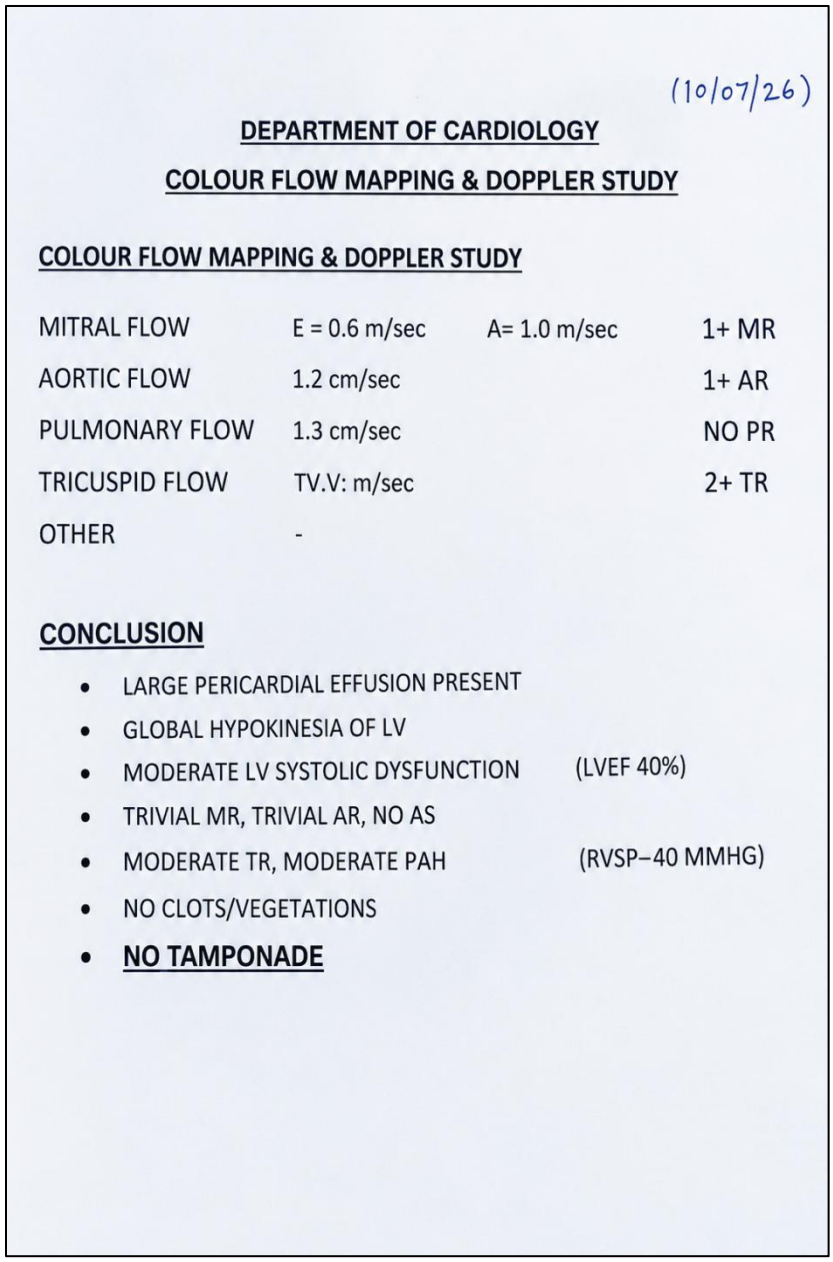

(10/07/26)

DEPARTMENT OF CARDIOLOGY

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- GLOBAL HYPOKINESIA OF LV
- MODERATE LV SYSTOLIC DYSFUNCTION (LVEF 40%)
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- MODERATE TR, MODERATE PAH (RVSP–40 MMHG)
- NO CLOTS/VEGETATIONS
- **NO TAMPONADE**

Figure C. Follow-up echocardiography/colour-flow mapping report documenting a large pericardial effusion with no tamponade.