

## Post-Pericardiotomy Syndrome Following Mitral Valve Replacement Surgery in a Patient with Rheumatic Fever: A Case Report

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### Abstract:

#### Background:

Post-cardiac injury syndrome (PCIS) is an inflammatory condition triggered by immune responses following cardiac injury. PCIS encompasses post-myocardial pericarditis, post-pericardiotomy syndrome (PPS), and post-traumatic pericarditis, whether iatrogenic or not. In this case report, we describe a patient who developed PPS after undergoing mitral valve replacement surgery.

#### Case presentation:

A young African woman with mitral stenosis caused by rheumatic fever underwent successful mitral valve replacement surgery. Approximately one month later, she developed post-pericardiotomy syndrome, which was subsequently diagnosed and treated. The patient initially presented to the hospital with exertional dyspnoea, and echocardiography revealed severe mitral stenosis, leading to the scheduling of surgery. While awaiting the procedure, she developed atrial fibrillation (AF) and congestive heart failure. In 2022, she underwent mitral valve replacement surgery and was discharged one week later after experiencing a smooth recovery. Two weeks after discharge, she visited the emergency department due to shortness of breath, but no concerning signs were found upon examination. She was prescribed diuretics and discharged. One week later, she was admitted to the hospital again due to chest pain, dyspnoea, and an elevated C-reactive protein (CRP) level of 123. Echocardiography and chest computed tomography (CT) scans were normal. She was treated with antibiotics under suspicion of pneumonia and subsequently discharged. Ten days later, she returned to the emergency department with high fever, chest pain, and dyspnea, and her CRP level had risen to 240. Echocardiography revealed no signs of endocarditis or pericardial effusion. Considering the patient's surgical history and frequent hospitalizations for similar symptoms, PPS was suspected. The patient was administered a first-line treatment of colchicine 0.5mg once a day. As a result, CRP levels decreased, fever and chest pain resolved, and she was discharged in a stable condition. A month later she was re-admitted to the hospital due to PPS relapse, Colchicine dose was elevated to 1mg a day and was discharged in good condition. Colchicine was planned to be continued for six months.

#### Conclusion:

PPS is a common complication following open-heart surgery, characterized by a generally mild course but with the potential for severe complications. Treatment typically involves anti-inflammatory agents, aspirin, and colchicine. The recurrence rate is approximately 10-15%. Early diagnosis and treatment of PPS can minimize frequent hospitalizations and reduce the need for extensive testing

#### Background:

Post-cardiac injury syndrome (PCIS) is an immune-mediated condition that occurs after cardiac surgery, chest trauma, or myocardial infarction. It is characterized by pleuritic chest pain, fever, and elevated inflammatory markers. While PCIS generally has a mild disease course and a favourable prognosis, it can lead to severe complications and frequent hospitalization in rare cases. One specific subset of PCIS is post pericardiotomy syndrome (PPS), which refers to pericardial inflammation after open heart surgery. In this case, we present a patient who developed PPS after mitral valve replacement due to rheumatic fever-induced mitral stenosis.

### Case Description:

A young woman in her twenties moved from Africa to Finland in 2022. She had a history of rheumatic fever-induced severe mitral stenosis and moderate mitral regurgitation, as well as pulmonary hypertension since 2021. The patient initially experienced dyspnoea on exertion and cough four years ago, leading to frequent hospitalizations due to chest infections.

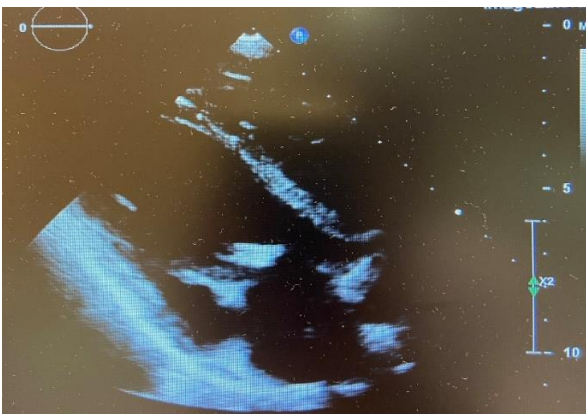
In 2022, she visited a general practitioner for dyspnoea on exertion. Physical examination revealed a blood pressure of 109/70 mmHg, weight of 50 kg, and height of 168 cm. A grade II-III systolic murmur was heard on auscultation of the mitral valve area. An electrocardiogram (ECG) showed sinus rhythm and P-pulmonale. Chest X-ray indicated cardiomegaly without pulmonary congestion. Blood tests showed normal haemoglobin, electrolyte levels, and liver enzymes. Pro-B-type natriuretic peptide (ProBNP) was slightly elevated at 662 ng/L. 3 months later in cardiology clinic, echocardiography revealed severe mitral stenosis and moderate mitral regurgitation.

- Mitral gradient was 16 mmHg
- Mitral valve area was 1 cm<sup>2</sup>
- Mitral regurgitation neck was 4 mm, and effective regurgitant orifice area was 22 mm<sup>2</sup>.
- Left atrium was enlarged (26 cm<sup>2</sup>), and left atrial volume index was 46 ml/m<sup>2</sup>.
- Left ventricle had a normal size and ejection fraction (58%).
- Septal thickness of 9 mm, posterior wall thickness of 7 mm, E/A ratio of 1.0, and E/lateral E' of 26.
- Aortic valve function was normal without regurgitation, and the right ventricle contracted normally with mild tricuspid regurgitation and a gradient of 40/25.

Based on the echocardiography findings the cardiologist made an urgent referral for surgical evaluation.

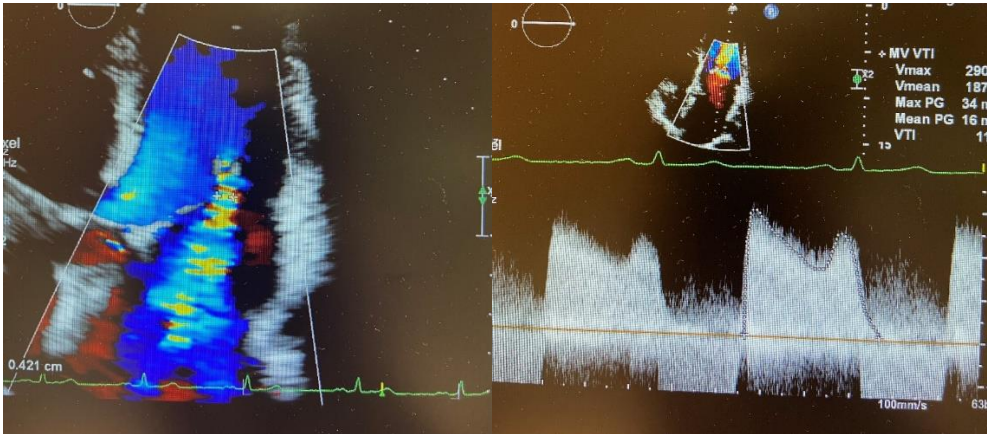
Below Fig.1,2 and 3 are echocardiogram images illustrating the pre-operative stage for severe mitral stenosis.

Fig.1



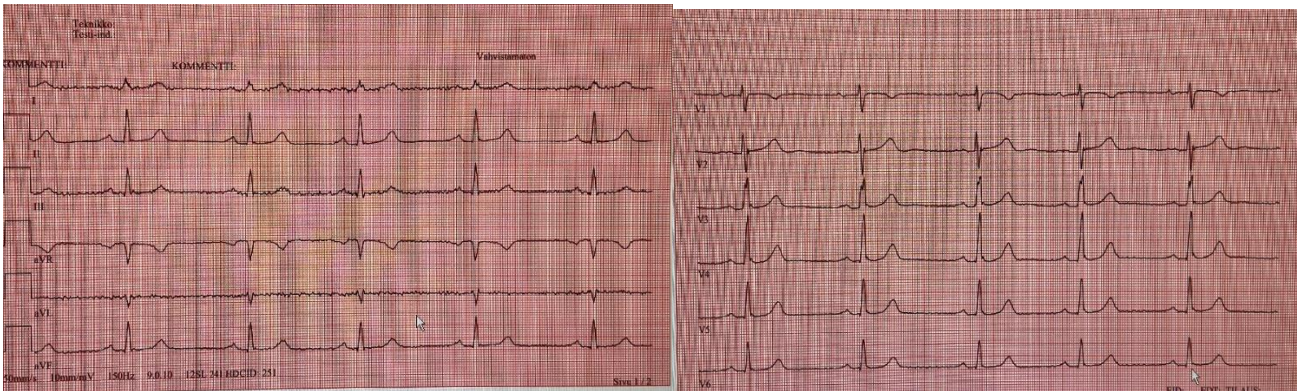
Mitral valve stenosis in this pre-operative electrocardiography can be seen, revealing the heart's struggle.

Fig.2 & Fig.3



ECG with normal sinus rhythm before surgery Fig. 4-5.

Fig.4 & Fig.5



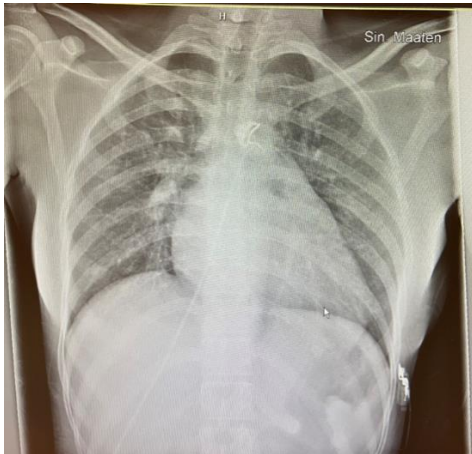
At the end of 2022, the patient was admitted to a hospital due to atrial fibrillation (AF) Fig. 6-7. and pulmonary congestion Fig. 8. She was put on diuretics and following Amiodarone infusion AF was converted to sinus rhythm.

Fig.6 & Fig.7



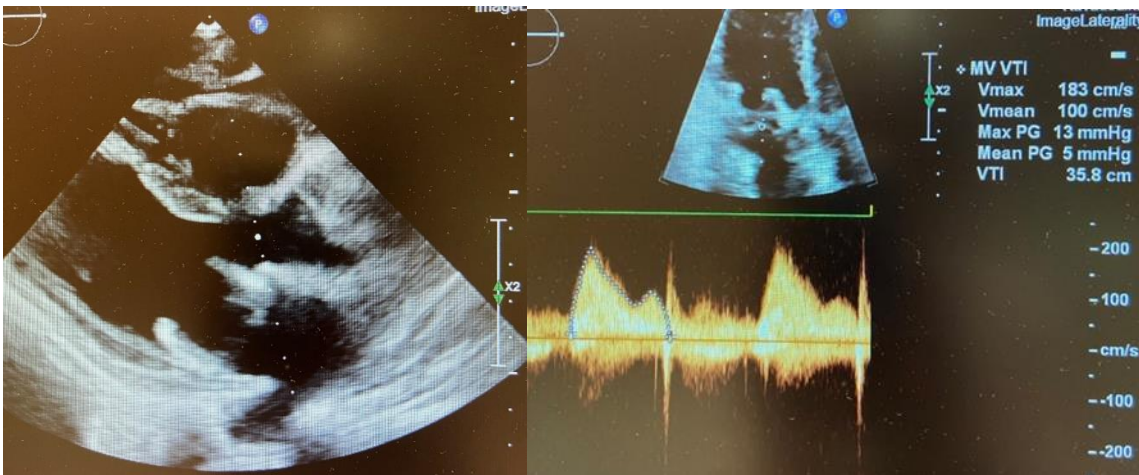


Fig.8



About two weeks later she underwent mitral valve replacement surgery with a biological valve. Postoperative recovery was uneventful, and the patient was discharged a week later with a normal echocardiogram showing a functioning replaced mitral valve and no other valve abnormalities or pericardial effusion. Below are echocardiogram images after surgery Fig. 9,10.

Fig.9 & Fig.10



The patient's CHADSVASC score was 0 and she was not indicated for permanent anticoagulation treatment. Due to the presence of a biological valve, the patient received Warfarin for three months, followed by permanent administration of Aspirin 100 mg/day. Two weeks after her discharge, she visited emergency department due to shortness of breath, which was a new symptom after the surgery. ECG was normal except for new T-wave inversions in V1-V3. ProBNP was elevated at 2000 ng/L. The patient was started on Furosemide and discharged.

At the beginning of 2023, the patient was re-admitted to the emergency department due to chest pain and shortness of breath. CRP was elevated at 123, while leukocyte count and ECG were normal. Chest X-ray was also normal. Chest computed tomography (CT) was performed due to the elevated CRP level, revealing a 9 mm pericardial effusion consistent with reactive pericarditis. Additionally, consolidation was observed in the left lung, suggesting possible pneumonia. The patient was transferred to cardiology department for further examination and treatment. Intravenous Cefuroxime was initiated for pneumonia, and echocardiography showed normal findings. CRP decreased to 31, and the patient was discharged subsequently with oral Amoxicillin prescribed for a week.

A week after her previous discharge, the patient returned to the emergency department with a high fever of 39°C and chest pain worsening with deep breathing. CRP was significantly higher at 240. Another chest CT was performed to rule out infection in the surgical area, which showed the same amount of pericardial effusion as the previous scan, with no signs of infection Fig.11. Intravenous Cefuroxime was initiated, and the patient was admitted to internal medicine ward for further investigation.

Fig.11



The next day echocardiography showed normal ejection fraction and no signs of endocarditis or pericardial effusion. Considering the patient's repeated similar symptoms after sternotomy, post pericardiotomy syndrome was suspected. The patient was started on Colchicine 0.5 mg once a day, resulting in decreasing CRP levels (240 → 176 → 97). Chest pain and fever resolved, and the patient was discharged subsequently. Colchicine was planned to be continued for six months, and follow-ups were scheduled at cardiology outpatient clinic. However, a month later, the patient was readmitted with fever, chest pain, and elevated CRP levels, leading to the diagnosis of a PCIS relapse. The dose of Colchicine was increased to 1 mg once a day, and the patient was discharged safely with a positive response to the treatment.

#### Discussion:

Post-cardiac injury syndrome (PCIS) encompasses a group of syndromes characterized by inflammation of the pericardium, pleura, and lung parenchyma following various cardiac injuries, including surgery, trauma, myocardial infarction, and other interventions. PCIS is a common complication after cardiac surgery, with a prevalence of 40% in patients, particularly among younger age groups (1,2). The underlying etiology of PCIS is believed to be immune-mediated (1-6), as evidenced by elevated antimyocardial antibodies following cardiac surgery (1,2)

Post pericardiotomy syndrome (PPS) is a specific type of PCIS that occurs after cardiac surgery, particularly valve replacement procedures. PPS typically manifests 2-3 weeks after surgery but can also occur months later. Clinical features of PCIS include pleuritic chest pain, fever, elevated inflammatory markers (such as erythrocyte sedimentation rate and C-reactive protein), dyspnea, pericardial rub on auscultation, diffuse ST segment elevation on ECG, and pericardial and sometimes pleural effusion (1,2,4,5). The first-line treatment for PCIS involves the use of anti-inflammatory analgesics, aspirin, and colchicine (1-6). Steroids may be used in refractory cases, and immunomodulators like anakinra and azathioprine are recommended if colchicine and steroids are ineffective (4). In

severe cases, pericardiectomy can be considered as a last resort. Generally, PPS has a good prognosis (1-6), but it can lead to complications such as cardiac tamponade, pleuropericarditis, or massive pleural effusion (1,2,4). The recurrence rate after treatment is around 10%-15% (2,3,4)

Frequent hospitalization can result from underdiagnosed Post-Cardiac Injury Syndrome (PCIS). In our patient's case, the diagnosis of Post-Pericardiectomy Syndrome (PPS) was made during her third hospitalization, a month after her surgery. The patient's clinical manifestations and history of open-heart surgery indicated a high likelihood of PPS. However, the delayed diagnosis was due to the absence of prominent pericardial effusion. It is important to note that not all patients exhibit all the classic symptoms of PCIS. According to Imazio et al., early diagnosis of PPS primarily relies on the following key factors: prior injury to the pericardium, myocardium, pleura, or a combination thereof; presence of pericarditis and/or pleural or pericardial effusion (typically mild); evidence of inflammation with fever, excluding other causes; and elevation of inflammatory markers and leukocytosis without alternative explanations (1,4).

In this particular case, administering Colchicine as the first-line treatment was chosen because the patient was already on Warfarin for anticoagulation. Adding Aspirin or anti-inflammatory agents would increase the risk of bleeding

### **Conclusion:**

Early diagnosis of PPS is crucial to minimize hospitalizations and unnecessary testing. The patient's history of cardiac injury and clinical manifestations should guide healthcare providers toward considering PPS. The potential role of the underlying rheumatic fever in the development and recurrence of PCIS in this case raises questions that warrant further investigation and research.

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- **Conflict of Interest Statement**

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