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# A Case Report on Rheumatic Heart Disease

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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***Case Report***

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## ABSTRACT

**Background:** Rheumatic heart disease is caused secondary to rheumatic fever. Rheumatic fever, a systemic immune response to a beta-hemolytic streptococcal throat infection, remains a significant health issue in developing countries.
**Clinical Findings:** This is a case report of Rheumatic heart disease in which a 19-year-old female patient was admitted to the hospital with chief complaints of cough with expectoration for 3 months (sputum of minimal quantity, white to yellowish in colour), bilateral lower limb swelling and joint pains for 2 months insidious in onset gradually progressive in nature. She did not have any comorbidities. So, based on her signs and symptoms the physician has advised her for CBC, 2D

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Echo, ECG, C3 & C4 test, chest X-ray, urine routine & analysis, thyroid profile, anti-nuclear antibody test (ANA) and ASLO (antistreptolysin) test. In which her hemoglobin, RBC, WBC and platelets levels were abnormal. Chest X-ray shown presence of cardiomegaly, Urine routine & Analysis shown 4-5 pus cells and 1-2 epithelial cells are seen/hpf. 2D echo shown Dilated chamber, Global LV dysfunction EF- 40%, MVP severe MR: PML (posterior mitral leaflet) calcified, Moderate Aortic regurgitation (AR), Inferior vena cava dilated. ECG shown sinus rhythm, T wave inversion on V1-V3. ASLO test was 549.5 mg/dL which confirms recent streptococcal infection.
**Management:** The treatment was initiated with Antibiotics, Proton pump inhibitors, Antiemetics, Diuretics, Anti-hypertensive, Corticosteroids and NSAID's etc.
**Outcome:** Therefore Rheumatic heart disease can be prevented by preventing streptococcal infections or treating them with Antibiotics when they occur.

*Keywords: Rheumatic heart disease (RHD); rheumatic fever; beta-hemolytic streptococcal; cardiomegaly; LV dysfunction; aortic regurgitation; mitral regurgitation (MR); mitral valve prolapse (MVP).*

## 1. INTRODUCTION

Rheumatic heart disease is caused secondary to rheumatic fever. Rheumatic fever, a systemic immune response to a beta-hemolytic streptococcal throat infection, causing around 320,000 deaths annually among young people [1]. Acute rheumatic fever (ARF) primarily affects children aged 5-15 and is uncommon in those over 30, about 60% of ARF cases progress to rheumatic heart disease (RHD), which Heart Murmurs, Fatigue, Shortness of Breath, Chest Pain, Palpitations, Swollen Joints and Fever characterise. It primarily affects the mitral and aortic valves. The mitral valve is affected in 75-80% of cases, the aortic valve in 30%, and the tricuspid and pulmonary valves in less than 5% [1].

Mitral Valve Prolapse (MVP) is a condition where the two valve flaps of the mitral valve do not close smoothly or evenly but instead bulge (prolapse) upward into the left atrium during the heart's contraction. This can sometimes lead to blood leaking backward into the left atrium. Mitral Regurgitation (MR) occurs when the mitral valve doesn't close tightly, allowing blood to flow backward into the left atrium when the left ventricle contracts. This backward flow can cause symptoms such as fatigue and shortness of breath, as the heart must work harder to move blood through the body [2]. Dilated cardiomyopathy (DCM) is a heart muscle disorder characterized by a dilated and poorly functioning left ventricle, occurring without abnormal loading conditions (such as hypertension or valve disease) or ischemic heart disease that could cause global systolic impairment [3].

**Table 1. Standard treatment for rheumatic heart disease [4]**

| Antibiotic | Dose | Route | Frequency | Duration |
|---|---|---|---|---|
| *First-line treatment* | | | | |
| Benzathine penicillin G (BPG) | 1 200 000 U (body weight ≥ 27 kg)<br>600 000 U (body weight < 27 kg) | Deep intramuscular injection | 4 weekly, or 3 weekly for selected groups | **All people with ARF or RHD:** Minimum 10 years after most recent episode of ARF or until age 21 years (whichever is longer) |
| Amoxicillin | 50 mg/kg (Max. 1g) | Intra vascular | Once daily | |
| **Second-line treatment (if intramuscular routine not possible or refused)** | | | | **Status after initial period has elapsed:**<br>• No RHD or mild RHD: discontinue at that time<br>• Moderate RHD: continue until age 35 years<br>• Severe RHD: continue until age 40 years or longer |
| Phenoxy methylpenicillin (penicillin V) | 250 mg | Oral | Thrice daily | |
| **Treatment in cases of documented penicillin allergy** | | | | |
| Clindamycin | 20 mg/kg | Oral | Thrice daily | |
| Azithromycin | 12 mg/kg | Oral | Once daily | |
| Clarithromycin | 15 mg/kg | Oral | Twice daily | |
| Cephalosporin | variable | Oral | | |
| Minimally invasive procedure | valvuloplasty to widen the valve | | | |
| Surgery | heart valve surgery<br>Ross procedure | | | |

## 2. CASE REPORT

A 19-year-old female patient was admitted in Vijayanagara Institute of medical science, Ballari (Karnataka) with chief complaints of cough with expectoration for 3 months (sputum of minimal quantity, white to yellowish in colour), bilateral lower limb swelling and joint pains since 2 months insidious in onset gradually progressive in nature. On examination, patient was conscious and oriented, BP-120/80mmHg, PR 84 beats/min, P/A-soft, non- tender, no organomegaly and bowel sounds +ve, CVS-S1S2+, R/S-B/L NVBS+. She did not have any comorbidities.

**Provisional diagnosis:** Acute rheumatic fever, post streptococcal glomerulonephritis, nephrotic syndrome (?)

**Final diagnosis:** Rheumatic heart disease with mitral valve prolapse and severe mitral regurgitation, dilated cardiomyopathy with severe left ventricular dysfunction.

**Treatment:** She was started with the following medications.

**Table 2. Patient laboratory report**

| Laboratory test | Lab parameters | Results | | | | |
|---|---|---|---|---|---|---|
| | | D1 | D3 | D6 | D9 | D11 |
| Haematology | Haemoglobin (12-16 g/dl) | **9.0** | **8.8** | **8.6** | **8.9** | **11.3** |
| | RBC (3.5-5.0 million/cmm) | **5.88** | **5.64** | **5.38** | **5.81** | **6.74** |
| | WBC (4000-11000 cells/cumm) | **17570** | **14050** | **23700** | **17670** | **16550** |
| | PCV (33-43 %) | **32** | **30.3** | **29.0** | **31.4** | 38.5 |
| | MCV (76-100 fl) | **54.4** | **53.8** | **53.9** | **54.0** | **57.1** |
| | MCH (27-33 pg/cell) | **15.3** | **15.6** | **16.0** | **15.3** | **16.8** |
| | MCHC (33-37 g/dl) | **28.0** | **29.0** | **29.8** | **28.3** | **29.4** |
| | Platelets (1.5-4.5 lacs/cumm) | 1.63 | **4.62** | 2.24 | **4.88** | **7.25** |
| | ESR (0-20 mm/hr) | 18 | | | | |
| LFT | Total protein (6 – 8.3 g/dL) | **5.6** | **5.8** | 6.3 | | |
| | Albumin (3.2 - 5.4 g/dL) | **2.9** | **3.0** | **3.0** | | |
| | Globulin (2.5 – 3 g/dL) | 2.7 | 2.8 | **3.3** | | |
| | A: G (1.2 – 1.5) | **1.1** | **1.1** | **0.9** | | |
| | Total bilirubin (0.1-1mg/dL) | **1.2** | **1.3** | **1.5** | | |
| | Conj. Bilirubin (0-1.2 mg/dL) | 0.5 | 0.5 | 0.7 | | |
| | Unconj. Bilirubin (0.1-0.8)) | 0.7 | 0.8 | 0.8 | | |
| | ALT (0.35 U/L) | 22 | 16 | 24 | | |
| | AST (0-35 U/L) | 10 | 15 | 10 | | |
| | ALP (32-120 U/L) | 67 | 63 | 59 | | |
| RFT | Blood urea (20-50mg/dL) | 20 | **16** | 20 | | |
| | Serum creatinine (0.6-1.2mg/dL) | 1.0 | 0.9 | 0.9 | | |
| Thyroid profile | T3 (0.202- 0.443 ng/dL) | | **0.26** | | | |
| | T4 (0.92- 1.68 ng/dL) | | **1.75** | | | |
| | TSH (0.27- 4.2 mlU/mL) | | 3.64 | | | |
| Serology | CRP (0-6 mg/L) | **52** | **114** | | | |
| | RA factor | **-** ve | | | | |
| | C3 (90- 180 mg/dl) | 105.4 | | | | |
| | C4 (10- 40 mg/dl) | 25.5 | | | | |
| Serum electrolytes | Sodium | 139 | 139 | 140 | | |
| | Potassium | 4.1 | **3.4** | 3.9 | | |
| | Chloride | 100 | 104 | 99 | | |
| Biochemistry | RBS | 55 | 107 | | | |
| Urine routine & Analysis | Urine microscopy | 4-5 pus cells and 1-2 epithelial cells are seen/hpf. NIL | | | | |
| | Urine sugar | Present | | | | |
| | Urine albumin | 30.9 mgs% | | | | |
| | Spot protein | 99.5 mgs% | | | | |
| | Spot creatinine | 0.31, 0.75 | | | | |
| | Protein/ creatinine ratio(<0.2) | | | | | |
| ASLO test (Antistreptolysin) | 549.5 mg/dl (Upto 200) | | | | | |
| ANA | Weak positive | | | | | |
| 2D echo | Dilated chamber | | | | | |
| | Global LV dysfunction EF- 40% | | | | | |
| | MVP severe MR: PML (posterior mitral leaflet) calcified | | | | | |
| | Moderate Aortic regurgitation (AR), Inferior vena cava dilated | | | | | |
| ECG | sinus rhythm, T wave inversion on V1-V3 | | | | | |

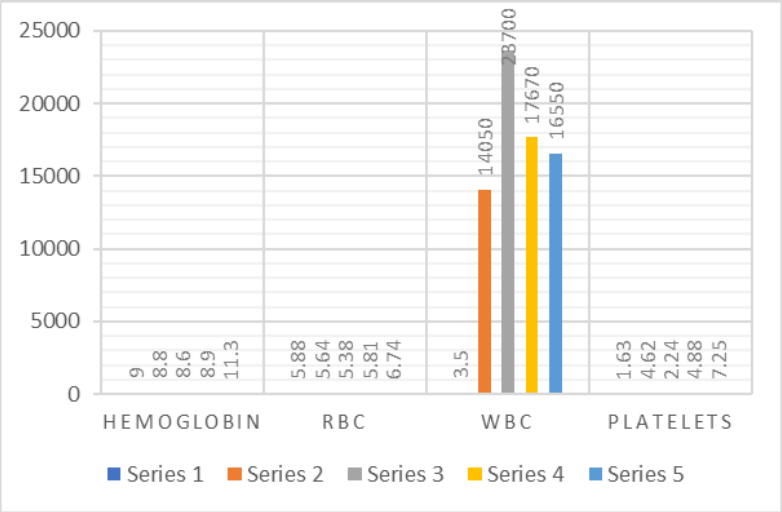


**Fig. 1. Statistical analysis of lab data**

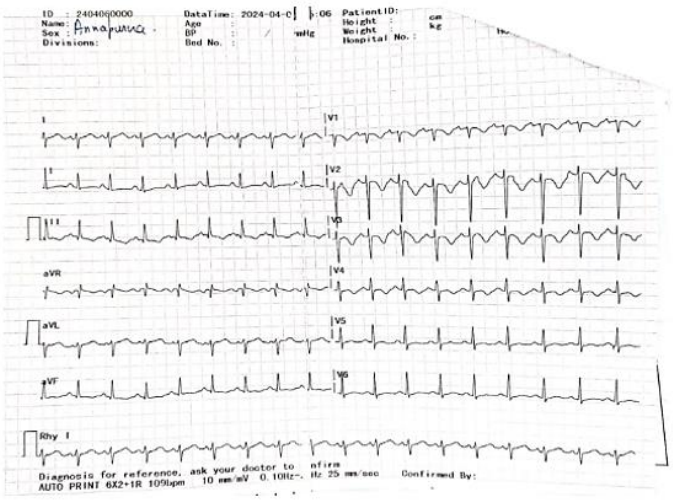

**Fig. 2. ECG suggestive sinus rhythm, T wave inversion on V1-V3**


**Fig. 3. Chest X-ray suggestive of cardiomegaly**

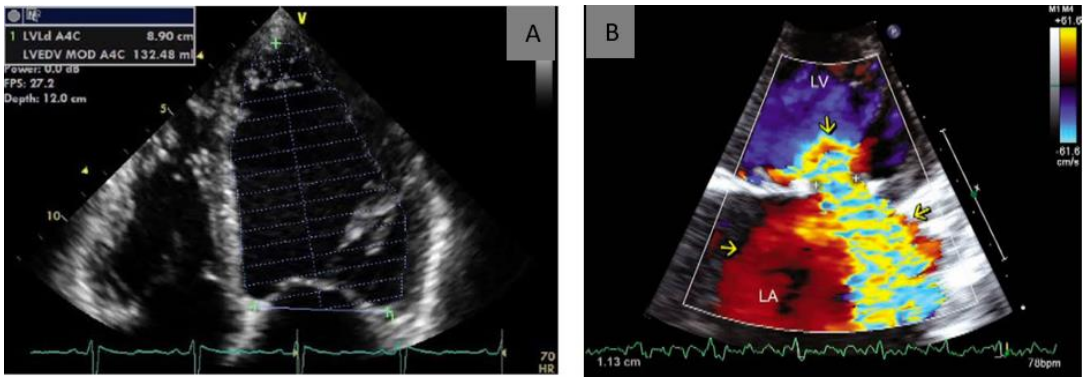


**Fig. 4. (A) Dilated cardiomyopathy (B) Mitral valve regurgitation**

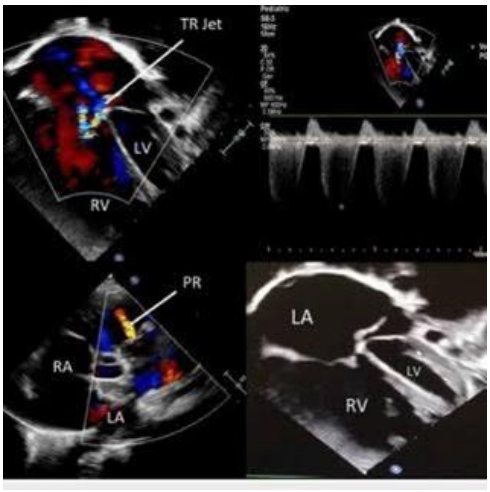


**Fig. 5. Dilated inferior vena cava**

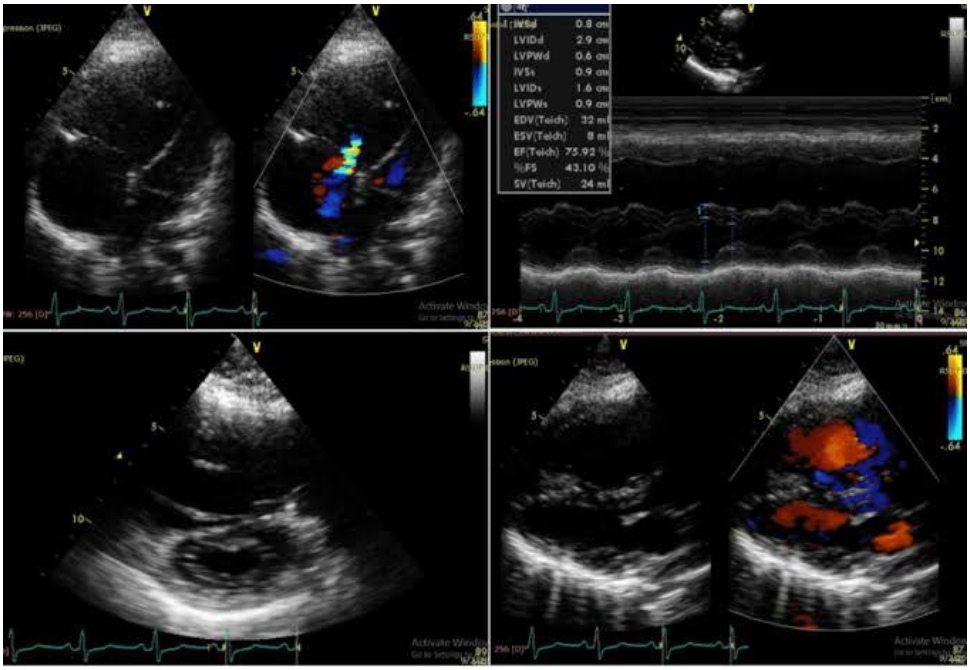

**Fig. 6. Left Ventricular dysfunction**

**Table 3. Treatment chart**

| Sl No | Name of drugs | Dose | Route | Frequency | Days |
|---|---|---|---|---|---|
| 1 | Amoxicillin & Clavulanate | 1.2 g | IV | 1-0-1 | D1-D11 |
| 2 | Pantoprazole | 40 mg | IV | 1-0-0 | D1-D11 |
| 3 | Azithromycin | 500 mg | PO | 1-0-0 | D1 |
| 4 | Salbutamol | 5 ml | PO | 1-1-1 | D1-D4 |
| 5 | Neb Duolin & Budecort | $6^{th}$ hrly | PN | 1-1-1-1 | D1-D2 |
| 6 | Ondansetron | 8 mg | IV | 1-0-1 sos | D2-D3 |
| 7 | Furosemide | 20 mg | IV | 1-1-0 | D3-D11 |
| 8 | Benzathine Penicillin | 1.2 mu | IM | | D2 |
| 9 | Dexamethasone | 4 mg | IV | 1-1-1 | D4-D11 |
| 10 | Aspirin | 300 mg | PO | Stat | D4-D11 |
| | | 150 mg | | 1-1-1-1 | |
| 11 | Metoprolol | 25 mg | PO | 1-0-1 | D11 |

**Table 4. Discharge medication**

| Sl no | Name of Medication | Dose | Route | Frequency |
|---|---|---|---|---|
| 1 | Tab Aspirin | 150 mg | PO | 0-1-0 |
| 2 | Tab Atorvastatin | 40 mg | PO | 0-0-1 |
| 3 | Tab Furosemide | 20 mg | PO | 1-1-0 |
| 4 | Inj Benzathine Penicillin | 1.2 mu | IM | Every 21 days |
| 5 | Tab Pantoprazole | 40 mg | PO | 1-0-0 |

## 3. DISCUSSION

Rheumatic heart disease (RHD) is caused secondary to rheumatic fever which is caused due to untreated Group a Streptococcal (GAS) infection. When streptococcal bacteria invade the body, the immune system typically responds by identifying and eliminating the bacteria. In approximately 97% of cases, this immune response successfully clears the infection. However, in the remaining 2-3% of individuals who are genetically predisposed, the immune system mistakenly targets its own tissues. This occurs because the antigens of the streptococcal bacteria bear structural similarities to human antigens, a phenomenon known as antigenic mimicry. As a result, inflammation and tissue damage can occur, particularly affecting the heart, joints, skin, and central nervous system (CNS) [5]. RHD is characterised by chest pain, shortness of breath, fatigue, palpitation, heart murmur, lower limb swelling and cough. It mainly affects valves of our heart particularly mitral and aortic valve and lead to complications of mitral regurgitation, mitral or valvular stenosis, mitral valve prolapse, left ventricular dysfunction and dilated cardiomyopathy. In this case the patient mitral valve was affected.

In this case a 19-year-old female patient was admitted with chief complaints of cough with expectoration since 3 months (sputum of minimal quantity, white to yellowish in colour), bilateral lower limb swelling and multiple joint pains since 2 months insidious in onset gradually progressive in nature. Her past medical history reveals that she did not have any comorbidities so based on her sign and symptoms the physician has advised her for hematology, 2D Echo, ECG, C3 & C4 test, chest X-ray, urine routine & analysis, thyroid profile, anti nuclear antibody test (ANA) and ASLO (antistreptolysin) test. In which her hemoglobin, RBC, WBC and platelets levels were abnormal. Chest X-ray shown presence of cardiomegaly, Urine routine & Analysis shown 4-5 pus cells and 1-2 epithelial cells are seen/hpf. 2D echo shown Dilated chamber, Global LV dysfunction EF- 40%, MVP severe MR: PML (posterior mitral leaflet) calcified, Moderate Aortic regurgitation (AR), Inferior vena cava dilated. ECG shown sinus rhythm, T wave inversion on V1-V3. ASLO test was 549.5 mg/dL which confirms recent streptococcal infection, ANA shows weak positive and C3, C4, Thyroid tests were normal (Table 2).

The treatment was initiated with amoxiclav which is a combination of amoxicillin and clavulanate to treat bacterial infection, Pantoprazole to treat gastro-intestinal irritation, azithromycin to treat bacterial infection, salbutamol and nebulisation duolin & budecort to treat breathlessness, ondansetron given as a prophylactic treatment, furosemide to treat edema, Benzathine penicillin to treat streptococcal infection, dexamethasone to treat inflammation, aspirin to treat heart disease, metoprolol to treat hypertension but in this patient tab metoprolol has been prescribed without any indication (Table 3).

The treatment was initiated as per standard treatment guidelines. Patient's disease condition got improved, cough and bilateral lower limb swelling have resolved, and joint pain has improved during the hospital stay. As the patient remained stable, they were discharged from the hospital with the following medications Aspirin to treat heart disease, atorvastatin to prevent high cholesterol levels, furosemide to treat edema, Benzathine penicillin (every 21 days for life time) to treat streptococcal infection and pantoprazole to treat gastro-intestinal irritation (Table 4). Physician advised patient to review after 10 days.

The patient's condition was managed using a combination of antibiotics, anti-inflammatory drugs, and supportive care, which aligns with standard treatment protocols for RHD (Table 1) [6]. Comparative studies show that early intervention with antibiotics like Benzathine penicillin G remains the cornerstone of preventing RHD progression, as noted in other studies such Ambari AM etal. (2024) Adherence to penicillin treatment is essential for effective secondary prevention of rheumatic heart disease: a systematic review and meta-analysis [7].

## 4. CONCLUSION

Rheumatic heart disease is a condition where the heart valves have been permanently damaged by Rheumatic fever. Rheumatic heart disease can be prevented by preventing streptococcal infections or treating them with Antibiotics when they occurred. Untreated or under treated strep infections put the patient at increased risk. Treatment depends on how much damage has been done to the heart valves. It may even include surgery to replace a badly damaged valve. The best way to avoid RHD is to treat strep throat when patient has suffering, start using Antibiotic immediately. When strep is treated properly it does not have the opportunity to turn into Rheumatic fever and cause heart problems.

## DISCLAIMER (ARTIFICIAL INTELLIGENCE)

We hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

## CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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