

A Case Report of Constrictive Pericarditis: Step by Step Surgical Treatment of the Disease, Complications and Long-Term Outcomes

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Abstract

Constrictive pericarditis (CP) is a chronic inflammation often characterized by chronic fibrosis, scarring, pericardial calcification, and associated with diastolic dysfunction, decreased cardiac output, and chronic heart failure. Early diagnosis of constrictive pericarditis is difficult due to absence of typical cardiopulmonary signs. In this case report, we present, a 20-years-old male. His initial disease and complains began with an increased size of the abdomen. Ultrasound showed a severe ascites with unknown cause for a long time. Only after a chest computed tomography and echocardiography was diagnosed constrictive pericarditis. Echocardiography confirmed the diagnosis of constrictive pericarditis, pericardial thickening and hyperechogenicity with abnormal myocardial wall motion, severe tricuspid valve insufficiency and moderate mitral valve insufficiency. MRI findings: irregular pericardial thickening with a maximum thickness of 4mm mostly effecting the right ventricle. Considering liver failure and, as a consequence, the presence of coagulopathy, it was decided to perform pericardectomy without the use of a heart-lung machine and without correction of valvular pathology. After the intervention, the patient retained severe tricuspid valve insufficiency and moderate mitral valve insufficiency, while the functional parameters of the liver progressively improved. Considering the unfavorable prognosis of the patient with tricuspid valve failure 3 weeks after pericardectomy, it was decided to perform mitral and tricuspid valve repair with the use of heart-

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lung machine, which was successfully done. The patient was discharged in satisfactory condition. At outpatient visit 42 days after the last surgical procedure the patient showed improvement of symptoms, normal sinus rhythm at examination, echocardiography found no signs of mitral valve failure and a minor residual tricuspid valve failure. Liver tests returned to normal on the 10-15th day.

Keywords: Constrictive pericarditis; Ascites; Echocardiography; Pericardiectomy.

Introduction

Constrictive pericarditis (CP) is a chronic inflammation often characterized by chronic fibrosis, scarring, pericardial calcification, and associated with diastolic dysfunction, decreased cardiac output, and chronic heart failure. CP is rare condition, mostly symptomatic at early stages that manifests signs of right ventricular failure, such as edema and hepatic failure [1]. CP is a well known but often forgotten reason of ascites [2].

The actual rate of constrictive pericarditis is still being investigated. CP is known to be found in 0.2%-0.4% patients, who underwent a cardiac surgery. CP was found to manifest in less than 1% of recovery cases after idiopathic pericarditis. In developed countries most cases of CP develop after idiopathic pericarditis, after cardiac surgeries, and prior radiotherapy of the chest. Less often CP accompanies rheumatic diseases, cancer, and injury. Post-tuberculous CP is more often found in developing countries in contrast to developed countries [3].

Objective

To analyze a clinical case of constrictive pericarditis and evaluate diagnostic and treatment specifics of this clinical condition.

Materials and methods

The article shows a clinical case of constrictive pericarditis. Instrumental and

laboratory diagnostic methods. Step-by-step surgical treatment of the disease, complications, and long-term outcomes.

This clinical case is of a 20-year-old patient. His initial disease and complains began with an increased size of the abdomen. Ultrasound showed a severe ascites with unknown cause for a long time. Only after a chest computed tomography and echocardiography was diagnosed constrictive pericarditis. Also, the patient was diagnosed severe tricuspid insufficiency, moderate mitral insufficiency, atrial fibrillation in combination with atrial flutter and cardiac liver cirrhosis (Figure 1).

The patient referred to our hospital with prior diagnosis of constrictive pericarditis. Previously, the regional hospital diagnosed him with toxic hepatitis, Child-Pugh B hepatic cirrhosis, ascites, hydrothorax associated with hypoalbuminemia, and hyperbilirubinemia. The medical history shows that the patient was exposed to toxic substances (dye fumes and petroleum vapors) and took narcotic drugs during his work on board of a fishing vessel.

During prior hospital admission at the residence the patient was referred to do a chest and abdominal CT that found a severe pericardial thickening with major calcifications indicative of secondary nature

of hepatic failure in contrast to heart failure (Figure 1, 2). Consequently, the patient was

referred to our hospital for further examination and specialized treatment.

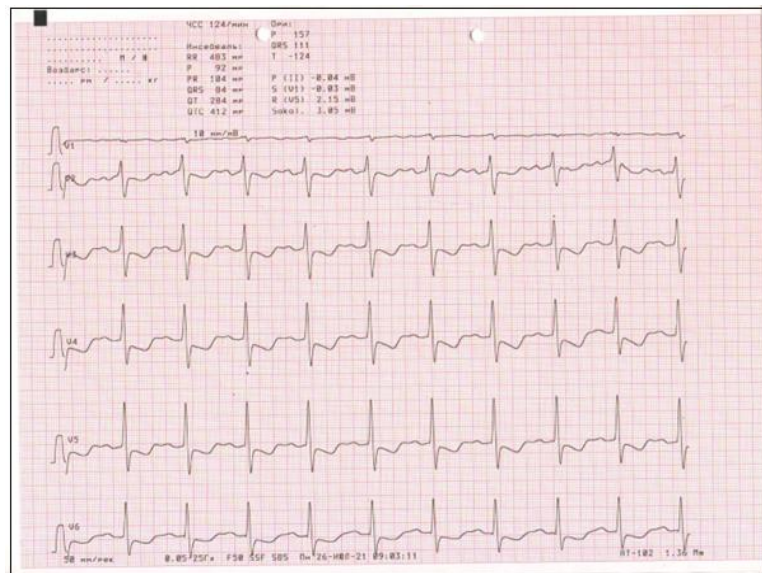


Figure 1: Electrocardiography scan upon hospital admission.



Figure 2: CT-based 3d reconstruction of pericardium.

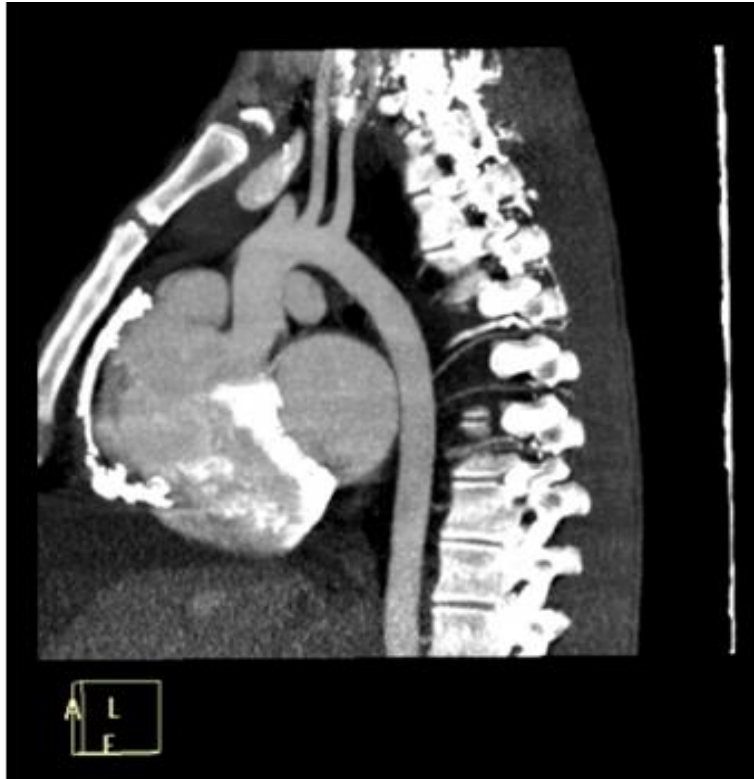


Figure 3: CT Lateral view of the heart.

Prior diagnosis upon admission

Constrictive pericarditis. Severe tricuspid insufficiency. Moderate mitral valve insufficiency. Signs of mild pulmonary hypertension. Long persistent atrial fibrillation, atrial flutter. CHA₂DS₂-VACs score of 1. HAS-BLED score of 1, Heart failure NYHA II. Bilateral hydrothorax. Cardiac hepatic cirrhosis, Child-Pugh B, MELD 19. Hepatosplenomegaly. Severe ascites. Physical examination found jaundice of visible mucosa and skin. Auscultation found vesicular breath sounds, that are getting weaker in lower lobes, and irregular heart sounds. Severe ascites presenting on visual inspection.

Echocardiography confirmed the diagnosis of constrictive pericarditis, pericardial thickening and hyperechogenicity with

abnormal myocardial wall motion. Left ventricular contractility diffuse decrease of ejection fraction (EF) 35%. RV FAC 0.15 (15%). TAPSE 13mm. Right ventricular systolic pressure (RVSP) 40 mmHg. Left atrial dilation 56 mm, measured in long-axis view (anterior-posterior diameter). Left atrial volume 40 ml/m². Severe right atrial dilation, right atrial volume 124 ml/m².

Right atrial minor dimension 60mm (Figure 4). Echo four-chamber view upon hospitalization admission). Inferior vena cava 25mm, no inspiratory collapse. Moderate mitral valve insufficiency. Severe tricuspid insufficiency. Vena contracta 9mm. Signs of mild pulmonary hypertension. Bilateral hydrothorax.



Figure 4: Echo four-chamber view upon hospital admission.

MRI findings

Irregular pericardial thickening with a maximum thickness of 4 mm mostly effecting the right ventricle.

Ultrasound of the abdomen

On June 17,2021, ultrasound sings of congestive hepatopathy, cardiac fibrosis, and hepatic cirrhosis. Severe ascites. Hepatosplenomegaly.

Complete blood count

Haemoglobin 140 g/L, red blood cells 5.0, ESR 4 mm/hr, platelets 125,000, white blood cells 4.2, color index 0.9.

Blood chemistry

Total protein 84.9 g/L, glucose 4.5 mmol/L, urea 8.0 mmol/L, creatinine 113.9 µmol/L, total bilirubin 48.3 µmol/L, direct bilirubin 10.3 µmol/L, indirect bilirubin 38.0 µmol/L.ALT 50 U/L, AST 48 U/L. Potassium

4.4 mmol/L, Sodium 136 mmol/L, ionized calcium 1.15 mmol/L. C-reactive protein 21 mg/L. Quick prothrombin time 43%, fibrinogen 2.0 g/L, INR 1.58. Albumin 44.1 g/L.

Coronary angiography upon admission

Coronary arteries are unremarkable.

The patient on June 25,2021 underwent a surgical procedure, radical pericardiectomy without a cardiopulmonary bypass. Median sternotomy. Visual presentation of a massive pericardial calcification lining the heart (Figure 5). The heart is enlarged, especially the right atrium. Pericardial separation and resection were started at the anterior area.

With some technical difficulties, complete pericardial separation and resection was conducted along the diaphragm, medial, and lateral surfaces of the heart (Figure 6). When separating pericardium along the lateral surface of the heart, debridement of a cavity with viscous contents was performed and a

sample was referred for laboratory testing. Bacteriological test found cultures of *Staphylococcus epidermidis*. Blood culture tests were negative. Tricuspid and mitral valve repair was not done to high risk of

bleeding associated with hepatic failure and coagulopathy. Central venous pressure was 310 mm H₂O before the procedure and 190 mm H₂O after that.

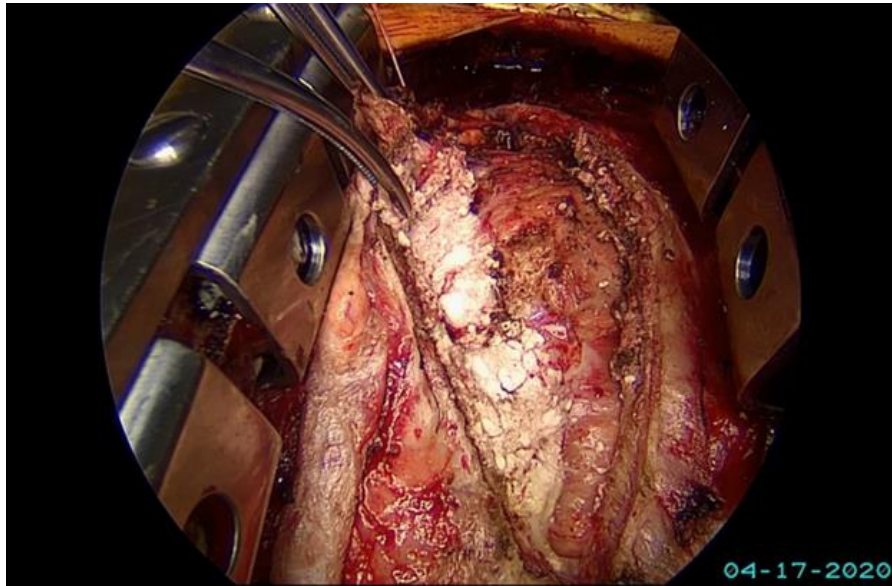


Figure 5: The view of separated pericardium.

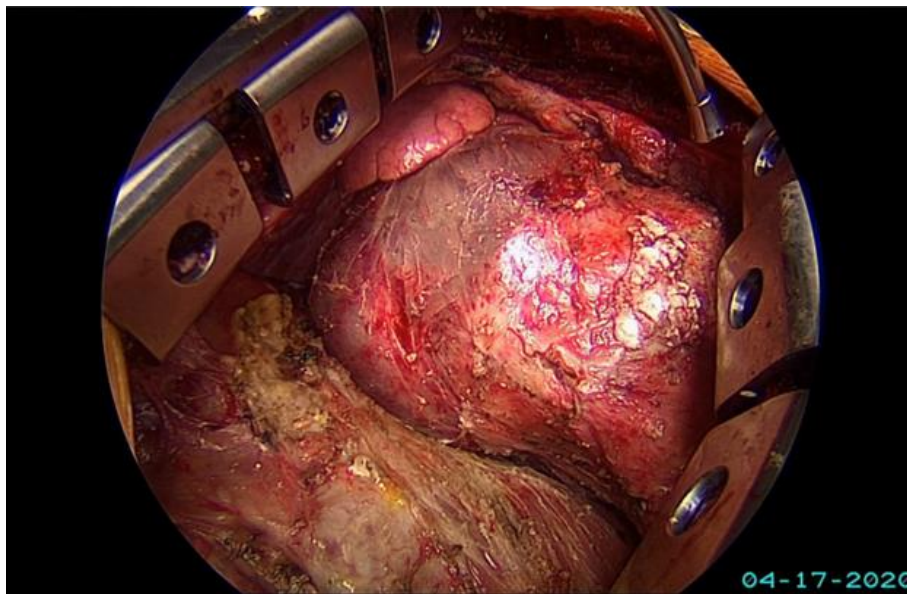


Figure 6: The view of the heart after radical pericardiectomy.

The postoperative period was marked by severe exudation for two weeks with an

average of 1.5-5 liters every 24 hours, maximum up to 5.512 liters that prompted

prescription of a short course of prednisolone 1 mg/kg for 5 days with tapering off the drug. The treatment majorly reduced exudation and drain tubes were removed on the 12 days.

At the early postoperative stage, the patient's condition improved greatly. Laboratory tests, namely total bilirubin and liver enzymes reduced to normal levels. On the 10th day after surgery total bilirubin was 24 µmol/L.

On the 15th day ALT was 36 U/L, AST-25 U/L with hepatic failure reversing to stage Child-Pugh A. Echocardiography found tricuspid valve insufficiency to remain severe (Figure 7). Tricuspid valve insufficiency in four

chamber view (very large central jet, large coaptation defect) and mitral valve insufficiency moderate. The patient recovered normal sinus rhythm. Considering the above and the unfavorable prognosis of the patient with tricuspid valve failure, the decision was made to perform mitral and tricuspid valve repair and closure of left atrial appendage with the use of heart-lung machine. On July 16, 2021 Standard re sternotomy, closure of left atrial appendage, mitral and tricuspid valve repair were performed with the use of cardiopulmonary bypass.

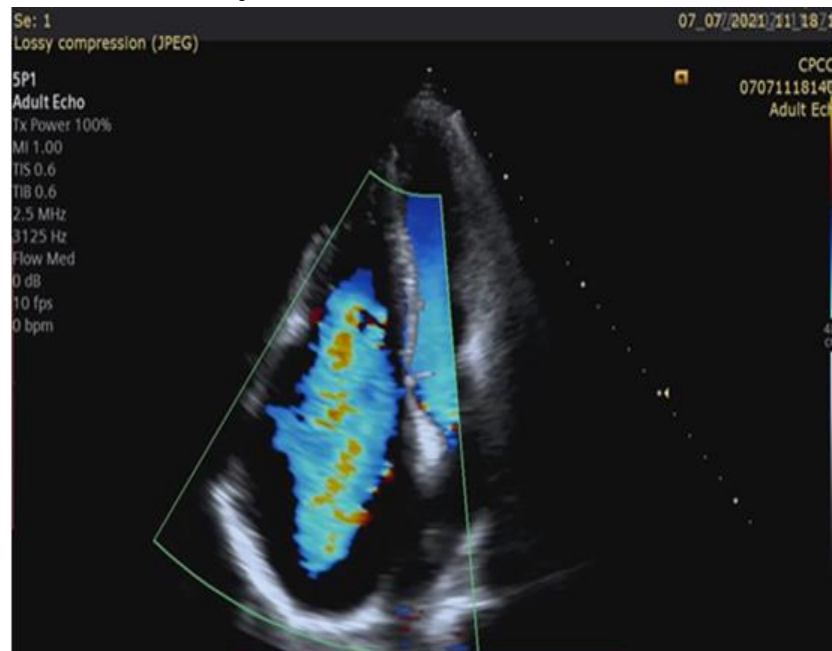


Figure 7: Tricuspid valve insufficiency in four-chamber view (Very large central jet, large coaptation defect).

In the perioperative period the main clinical concern was thrombocytopenia lasting for two weeks after the surgery. The treatment was symptomatic by transfused platelets or platelet concentrates.

Discharge record

At out-patient visit 42 days after the last surgical procedure the patient showed improvement of symptoms, normal sinus rhythm at examination, echocardiography

found no signs of mitral valve failure and a minor residual tricuspid valve failure (Figure 8). Residual tricuspid insufficiency 42 days after discharge. Four-chamber view 42 days

after the discharge (Figure 9). The patient is back to normal life, work and engages in physical training.

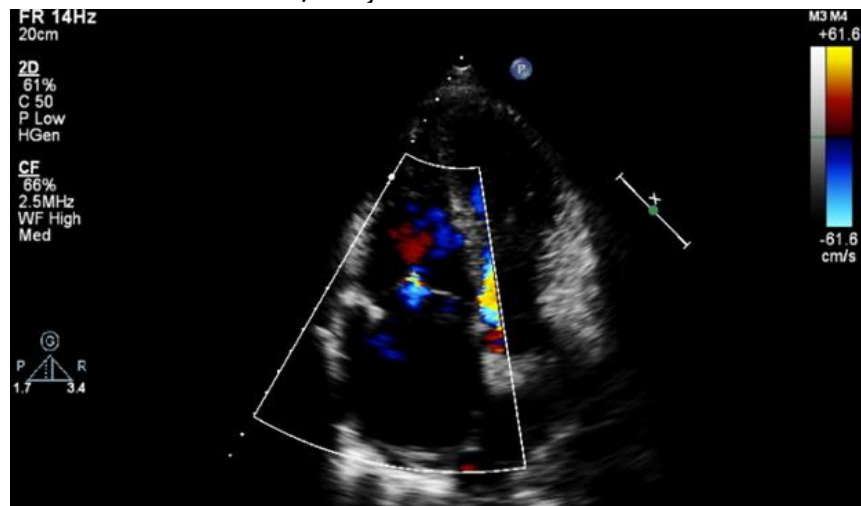


Figure 8: Residual tricuspid insufficiency 42 days after discharge.



Figure 9: Four-chamber view 42 days after the discharge.

Discussion

Chronic constrictive pericarditis is a rare disease diagnosed mostly at advanced stages on account of weak manifestation of symptoms at the early stages and a prolonged

latent period from a direct damage of the pericardium causing a chronic inflammation to manifestation of the disease. In most cases this prevents from determining the etiology of the condition, so the majority of cases remain idiopathic.

In the presented case the patient was preliminary diagnosed with toxic hepatitis and Child-Pugh B hepatic cirrhosis based on the medical history and laboratory tests. According to the established diagnosis the hepatic failure was treated for almost a year before verifying the diagnosis of CP [4]. Atrial fibrillation persisted throughout a year since the patient's first sought medical assistance. The data indicate a need for screening the patient that requires hospital treatment including 12-lead electrocardiogram, echocardiography, as well as the need for differential diagnostics of secondary liver damage associated with heart failure.

At the early postoperative stage, the condition tricuspid valve showed great improvement. According to the available data of patients with CP that underwent a pericardiectomy, severe tricuspid valve failure is associated with higher risk of postoperative mortality regardless of other factors, in particular a right ventricular dysfunction rarely takes a turn for improvement after isolated pericardiectomy and is the cause of respective symptoms and impairment in the patient's quality of life [5]. Considering the

mentioned, when conducting a radical pericardiectomy a reconstruction of tricuspid valve failure should be considered along with the risks of such surgery. In this case a simultaneous valve correction was risky due to the high probability of uncontrolled bleeding hemorrhage, thus the patient required a separate surgical procedure

During the time between surgeries, the patient showed signs of progressive tricuspid valve failure. The published data confirm high probability of a negative prognosis of tricuspid valve failure following pericardiectomy, its negative effect on postoperative survival rates, correlation of the tricuspid valve failure with progressing mitral valve failure and increased indexed volume of left atrium [6].

Conclusion

Timely fixing severe tricuspid valve regurgitation prevents progressing heart failure and right ventricular dilation in the postoperative period; however, has no statistically significant effect on the death rate in the long run [7].

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