

Cardiac tamponade due to anorexia nervosa in young women: A case study

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Abstract

Background: We present two cases of pericardiocentesis due to anorexia nervosa in young women.

Case description: A twenty-year-old and a twenty-four-year-old female with a history of anorexia nervosa were admitted to the cardiac surgery department due to pericardial effusions.

Discussion and evaluation: Both cases needed urgent pericardiectomy. Our patients did not show any signs of acute heart failure during the hospitalization. Due to their primary diagnosis, they needed psychological support and their food intake required monitoring.

Conclusions: Pericardial effusions are common in adolescent AN patients, and echocardiography monitoring is necessary to prevent the progression of acute cardiac tamponade.

Keywords: cardiac tamponade, anorexia nervosa, pericardiocentesis

Introduction

Anorexia nervosa (AN) is a significant medical and social problem affecting an increasing number of people. The risk factors are very often psychological, but the disease also manifests itself as a result of the fashion for a slim figure promoted in the media. The etiology of the disease is not fully understood, but research indicates that the pathogenesis of AN is multifactorial. The causes of the disease can be divided into factors that cause a predisposition to the disease, trigger the disease, and maintain the symptoms [1,2].

Anorexia nervosa leads to changes in all systems of the human body. The most common complications include growth disorders, osteoporosis, cessation of menstrual periods and sexual development, as well as neurological and cardiac problems. Anorexia nervosa is characterized by the highest mortality rate among psychiatric disorders, of which approximately one third of deaths are caused by complications of the cardiovascular system.

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The leading cause of hospitalization among AN patients is cardiovascular complications, which occur in up to 80% of cases and account for at least one third of all patient deaths [3]. Cardiovascular disorders occurring in the course of anorexia nervosa have a complex etiology. Protein deficiency and weight loss result in decreased heart muscle mass, hypercholesterolemia, and fluid accumulation in the pericardial sac. Long-term high cholesterol levels can cause the build-up of atherosclerotic plaques in the vessel walls, which increases the risk of atherosclerosis in later years. Accumulation of fluid in the pericardial sac requiring pericardiocentesis is described in the literature only casuistically [4,5], but statistics show that pericardial effusion develops in about 25% of individuals with AN [6]. The fluid accumulating in the pericardial cavity compresses the heart from the outside and prevents it from dilating properly, which contributes to the development of congestive heart failure. The reduction in heart muscle mass and the accompanying slower metabolism of cardiomyocytes lead to reduced contractility. Electrolyte deficiency, dehydration, and the use of pharmacological agents lead to hypotension and changes in the ion balance. The resulting consequences include cardiac arrhythmias and numerous complications outside the circulatory system [7].

Cardiac tamponade

Cardiac tamponade (pericardial tamponade) is a complex clinical symptom caused by excessive fluid accumulation in the pericardial sac, where the heart is anatomically located. Physiologically, the heart is surrounded by a serous membrane called the pericardium, and under normal conditions, around 30–35 ml of fluid is present. When tamponade occurs, a large amount of fluid or blood accumulates in the pericardial sac, up to about 2 litres. The result of the accumulated fluid creates pressure on the heart and impairs its work, especially in the diastolic, or filling, phase. As a result, blood ejection to the periphery is reduced, thereby reducing blood flow through the body, ultimately leading to organ and tissue hypoxia [8].

Risk factors

The incidence of pericardial effusion in the general population is unknown, while statistics conducted in the United States report about two cases per 10,000 people. It has been reported that about 2% of penetrating chest injuries end in cardiac tamponade [9]. However, there are subgroups of patients in whom pericardial effusion is more common. These include HIV-infected patients, patients with end-stage renal failure, patients with known or hidden malignancies, a history of congestive heart

failure, tuberculosis, autoimmune diseases such as lupus, and penetrating traumatic injury to the central chest.

The classic symptoms of cardiac tamponade consist of those that form the so-called Beck triad:

- low or paradoxical blood pressure (a drop in systolic pressure during inspiration of more than 10–15 mmHg);
- muffled heartbeat;
- excessively filled neck veins.

Treatment

As part of the treatment of tamponade, immediate pericardial puncture (pericardiocentesis) or cardiac surgery (pericardiectomy) is recommended to evacuate the fluid. Drainage from surgical access is indicated, for example, in cases of purulent pericarditis or emergencies when there is bleeding into the pericardial sac [8].

The purpose of this paper is to present two case reports of cardiac tamponade in patients with anorexia.

Case 1

A 20-year-old female patient was admitted from the Central Emergency Room for urgent decompression of cardiac tamponade of unknown etiology. A history of Turner syndrome, Crohn's disease, anorexia, and weight loss were noted. The patient was conscious and of sound mind. The patient was operated on under general anesthesia, and 75 ml of serous fluid under pressure was decompressed from the sub-sternal access. Fluid was collected for cytological and bacteriological examinations. A fragment of the pericardial sac was taken for histopathological examination. A drain was placed into the pericardial sac, which was removed with minimal drainage. In the echocardiographic examination, there was no recurrence of tamponade features. After the procedure, the patient was significantly weakened, but her cardiovascular and respiratory systems were stable. She refused to take hospital meals but agreed to take meals brought by her mother. During her stay on the ward, she reported persistent nausea. There was an episode of vomiting with clear gastric content. Anti-inflammatory treatment was started. Basic laboratory diagnostics were performed (Table 1). A histopathological examination showed no malignant tumour cells. In a bacteriological examination, the fluid was sterile after five days of culture under aerobic conditions. Her wounds were dry, and healing was normal. On the fourth day of her stay on the ward, the patient was transferred

in optimal general condition and in a stable cardiovascular and respiratory condition, for further diagnosis and inpatient treatment.

Psychiatric consultation:

Her BMI was around 16. A telephone interview with her mother revealed a restrictive eating disorder since 2017. The patient had been reluctant to seek treatment and was undergoing psychotherapeutic interventions. On examination, she was found to be auto- and allopsychically healthy. She declared herself to be in a neutral mood and expressed herself quietly. She overstated MS and perceived herself to be dysmorphic. She made a disturbing criticism of eating disorders and was incoherent. She reported periodic sleep disturbances. The recommendations were to continue psychotherapy and a prescription of mirtazapine 15 mg 0–0–1/2.

Diagnostic tests:

Echocardiography before surgery

Pericardial fluid was found mainly in the area of the right atrium and right ventricle, with modelling of the right heart cavities and features of tamponade. Variable tricuspid inflow was present. The morphology and function of the heart valves did not manifest significant abnormalities. EF was 60% without pleural fluid.

Echocardiography after surgery

There was no pericardial fluid. The ascending aorta was 2.8 cm. The right ventricle was 2.4 cm; the left ventricle 4.0 cm; the left atrium 2.5 cm. There were no valvular pathologies, although there was a slight thickening of the anterior mitral cusp. There were no regurgitations, and the transvalvular gradients were normal. The patient's LVEF was 60%, and IVC was 1.5 cm. There was no pleural fluid.

Echocardiography at discharge

There was no pericardial fluid nor valvular pathologies present. Her LVEF was 60%. There was no pleural fluid.

Chest X-ray

The cast of the lower fields showed shadows of the nipples. Her lungs were without infiltrative changes, and her diaphragm was free. Her heart and aorta were radiologically normal.

Case 2

A 24-year-old female patient presented to the Central Emergency Room for suspected “chronic pericardial tamponade”. She had had no history of pericardial fluid for three years. On pre-admission, echocardiographic examination fluid was seen in the right ventricular region (up to 24 mm), with marked right atrial and right ventricular collapse; the left ventricular ejection fraction (LVEF) was 60%, and E/A ratio 2.5. An increase in pericardial fluid to 24 mm anterior to the right ventricle was noted, compared with the April 2023 study (20 mm) and July 2023 (18 mm). Her BMI was 13.7. The patient had had a history of anorexia for five years. The following concomitant abnormalities were present: protein-energy malnutrition, secondary amenorrhoea, history of depression, and oesophageal hiatal hernia. The patient was operated on under general anaesthesia, 250 ml of fluid was decompressed from a mini-access under the xiphoid process, leaving a drain, which was removed the next day. The fluid was sent for histopathological and bacteriological examination. The postoperative course and wound healing were without complications. The patient, who was in good general condition, was discharged from the Clinic on the third day after surgery with recommendations. Her histopathological examination showed no malignant tumour cells. In a bacteriological examination, the fluid was sterile under aerobic conditions after five days of culture.

Echocardiography before cardiac surgery

Figure 1 shows tamponade – parasternal long axis view (A); subcostal long axis view (B). Arrows indicate fluid accumulation.

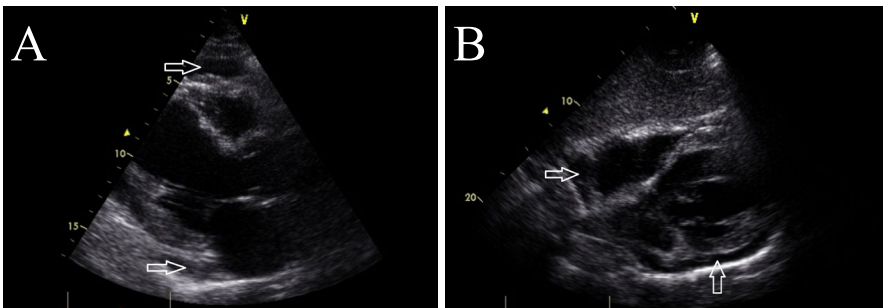


Figure 1. Echocardiography (A) parasternal (B) long axis view

Echocardiography after pericardiocentesis

No pericardial effusion. The left ventricle in the end-diastole is 4 cm, the right ventricle in the four-chamber view is 3 cm, and the ascending aorta is 3.4 cm. Heart valves have normal morphology and function. LVEF 65%, IVC 1.5 cm. No pleural effusion.

12-lead ECG tracings before operation

ECG findings: suggest sinus bradycardia with HR 45 bpm, beat-to-beat variation of PQ(PR) interval, with values changing from 80 to 160 ms (Figure 2A, 2B). Both findings are most probably attributed to impaired autonomic regulation and may correlate with malnutrition.

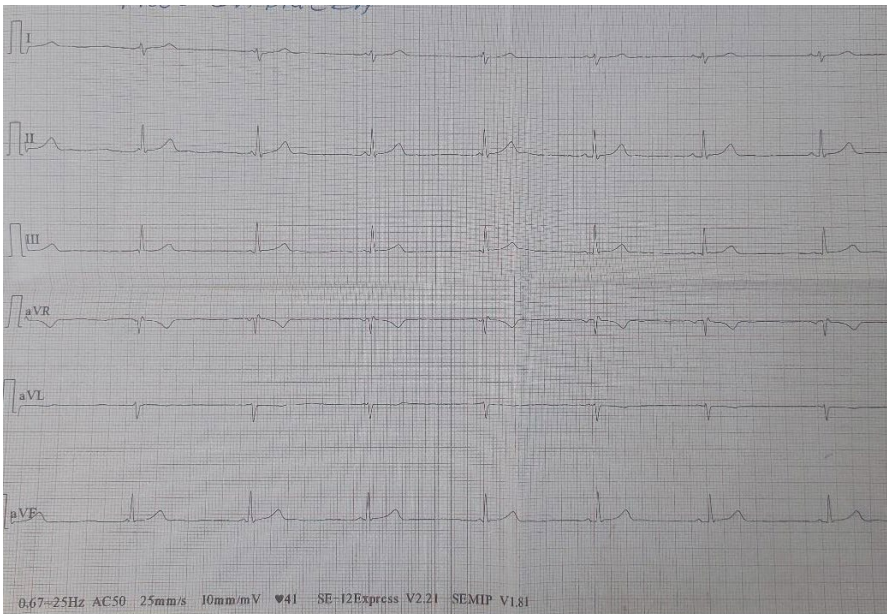


Figure 2 (A). 12-lead ECG

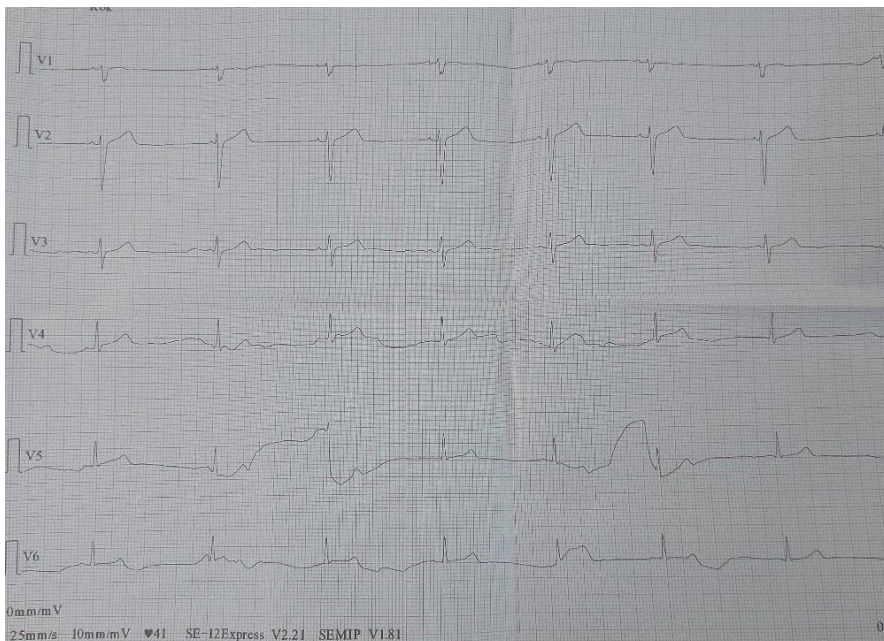


Figure 2 (B). 12-lead ECG

Chest X-ray

The heart silhouette and aorta are normal in size. The lung has no focal changes. The diaphragm has blurred outlines.

Psychological consultation

The patient received psychological care. A supportive interview was conducted. It was recommended that a psychiatric consultation be ordered to optimize treatment before the patient’s discharge.

Clinical and Laboratory Findings

Comparison of admission and discharge characteristics of two patients with anorexia nervosa and cardiac tamponade is presented in Table 1.

Table 1. Patients’ characteristics and laboratory findings

Type of test [reference ranges]	Case 1 Admission	Case 1 Discharge	Case 2 Admission	Case 2 Discharge
WBC $10^3/\mu\text{L}$ [3.80–10.00]	5.39	5.33	2.51	6.71
RBC $10^6/\mu\text{L}$ [3.70–5.10]	4.29	3.88	4.27	4.09
HGB g/dL [12.0–16.0]	13.2	12	13.5	12.9
Creatinine $\mu\text{mol/L}$ [44–80]	49	46	74	70

Type of test [reference ranges]	Case 1 Admission	Case 1 Discharge	Case 2 Admission	Case 2 Discharge
Glucose mmol/L [3.90–5.50]	5.1	4.5	4.6	4.5
Serum urea mmol/L [2.8–8.1]	2.7	2.3		7.6
Serum ALB g/L [35.0–52.0]	50.8	34.4	46.2	37.9
Serum total protein (TP) g/L [64.0–83.0]	64	62.7	67.5	53.7
HCG mIU/mL Premenopausal women: ≤1 mIU/mL	7.8	5.2		
FT4 pmol/L [12.0–22.0]		24.03	11.22	
FT3 pmol/L [3.1–6.8]		4.74	1.46	
TSH μ IU/mL [0.27–4.20]		3.450	2.490	
TIBC μ mol/L [40.0–80.0]		38.7		
UIBC μ mol/L [24.2–70.1]		34.6		
Fe μ mol/L [5.8–34.5]		4.1		
TSat % [20–40]		11		
Ferritin μ g/L [15.0–150.0]		129.1		
CHOL mmol/L [3.00–5.00]		2.55		
CRP mg/L [$<$ 5.0]	2.2	22.2	$<$ 0.6	1.4
Electrolytes				
Na mmol/L [136–145]	139	140	137	136
K mmol/L [3.5–5.1]	3.6	4.4	3.9	4.4
Magnesium mmol/L [0.66–1.07]		0.75	0.66	
Serum inorganic phosphorus mmol/L [0.87–1.45]		0.94	1.24	
Alkaline phosphatase – ALP U/L [35–105]		44	35	
SBP/DPB [mmHg]	108/76	85/60	94/61	85/60
HR [bpm]	86	78	41	40
Weight [kg]	45	37.5	45	45.9
Height [cm]	155	155	181	181
BMI	18.73	15.60	13.74	14.01
Temperature [C]	37.2	36	36.1	36.7

Discussion

We have described two cases of cardiac tamponade as a rare complication of AN with significant haemodynamic compromise in a perioperative setting. Only a few reports have described acute AN-associated tamponade requiring pericardiocentesis [10]. In their systematic review, Sachs et al. concluded that pericardial effusion is generally a reversible, asymptomatic marker of disease severity. Furthermore, they recommend that echocardiography be considered a standard examination in those patients with severely reduced BMI [11]. In our patients, echocardiographic monitoring was crucial in the diagnosis of tamponade. In a systematic review and meta-analysis Smythe

et al. showed that anorexia nervosa increases the incidence of cardiac tamponade in comparison with healthy controls [6].

Cardiovascular complications of AN also include sinus bradycardia, hypotension, tachycardia, postural hypotension, impaired myocardial performance, pericardial effusion, mitral valve prolapse, and sudden death. ECG abnormalities in eating disorders (particularly anorexia) include bradycardia, low QRS, P and T wave voltages, ventricular tachyarrhythmia, non-specific ST-T changes, the presence of U waves, and prolongation of the QTc interval.

QTc interval prolongation does not necessarily reflect underlying biochemical abnormalities, and studies have demonstrated QTc interval prolongation in individuals with normal electrolyte levels and demonstrated no correlation between the BMI and QTc interval.

A comprehensive cardiovascular assessment and ECG should also be performed regularly to detect cardiovascular manifestations of refeeding syndrome [12]. ECG abnormalities were observed in Case 2. The ECG recording revealed sinus bradycardia with a heart rate of 41–48 bpm. Some patients rapidly develop peripheral oedema and cardiac failure, and this should be suspected in the presence of rapid weight gain. The risk of heart failure in refeeding syndrome is reduced by controlled, closely monitored refeeding.

Treatment of anorexia is a multi-stage, long-term process involving various consultants – an internist, a psychiatrist, a dietitian, a psychotherapist, and, depending on possible complications, a cardiologist and an endocrinologist. The main goal of treatment for anorexia nervosa is to restore normal body weight and treat the complications of long-term malnutrition, treat mental problems related to eating disorders, and work with a consultant to try to change the patient's way of thinking about and perception of their own body and improve relationships with other people [13].

When life-threatening complications such as cardiac tamponade occur, urgent hospitalization in a surgical ward is required. Patients who experience acute complications of the disease are often treated in a general ward with a mixed population. Individuals with eating disorders are subject to complex interplays, both medical and psychiatric, that require close observation and supervision to ensure patient safety and medical stability.

Conclusion

Cardiac tamponade is a life-threatening condition. If tamponade is suspected, diagnostic echocardiography and urgent hospitalization for fluid decompression are required. Treatment includes careful fluid resuscitation,

administration of inotropic drugs, and pericardiocentesis. Careful monitoring is essential to prevent sudden deterioration [14].

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