



Cardiac Tamponade: A Rare Revealing form of Hypothyroidism

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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 Study

ABSTRACT

Hypothyroidism is a common disorder that affects multiple organs, we report on a case of primary hypothyroidism with cardiac tamponade in a 50-year-old man who presented with dyspnea. A bedside echocardiogram revealed tamponade; pericardiocentesis was performed, two liters of yellow fluid was removed. Laboratory analysis revealed the diagnosis of hypothyroidism due to elevated TSH and low T3 and T4.

In the presence of a barrier, hypothyroidism should be suspected in patients without sinus tachycardia. The fluid's characteristic changes from clear to yellow, the prognosis is favorable after hormone therapy.

Keywords: *Tamponade; hypothyroidism; pericardiocentesis.*

1. INTRODUCTION

Hypothyroidism is an endocrine disorder that is commonly found and can affect multiple organs and systems, as well as

exhibit a variety of symptoms [1]. It is defined by high levels of serum thyroid-stimulating hormone (TSH) coupled with lower or normal levels of free thyroxine (fT4).

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Thyroid hormone, particularly Triiodothyronine (T3), plays an essential role in the development and function of the cardiovascular system (CVS). The absence of T3 in hypothyroidism can result in cardiovascular issues such as sinus bradycardia, pericarditis, dyslipidemia, and even subclinical or overt pericardial effusion. Therefore, maintaining appropriate levels of T3 is crucial for optimal CVS health.

We report an uncommon case of primary hypothyroidism revealed by a cardiac tamponade.

2. CASE PRESENTATION

A 50-year-old man who was active smokers and had no known toxic behaviors, he presented to the emergency department with a complaint of progressive dyspnea for 1 month. Dyspnoea has increased in severity from Class II to Class IV in New York over the past 10 days prior to his presentation.

He also exhibited a history of sluggishness and constipation, with complaints of bilateral leg swelling that lacked a cause.

During the physical exam, his pulse was at 56 beats per minute, regular, and normal in volume. His blood pressure was 92/60 mm of Hg, his respiratory rate was 23 c per minute, he exhibited peripheral hypoperfusion with cold extremities, sweat with paradoxical pulsus. Other parts of the exam revealed a swollen jugular vein, pale skin, and no petechiae on the extremities. Oxygen saturation (SpO₂) was 89%. The lungs were audible, and the cardiac auscultation revealed a muffled heart.

The electrocardiogram showed low voltage complexes and electrical alternans (Fig. 1). Chest X-ray revealed grade III cardiomegaly and suggestive water bottle image.

A bedside echocardiogram was performed (Fig. 2), showed a large pericardial effusion of 26 mm in regard of RV, 25 mm at the apex level, with swinging heart features, Right Atrium (RA) and Right Ventricle (RV) diastolic collapse and significant transmitral 25% and transtricuspid 50% respiratory flow variation on pulsed wave doppler PW suggesting of tamponade.

Patient was immediately admitted to ICU under non-invasive monitoring, patient was placed in 30° semi-reclining position, we performed an urgent pericardiocentesis, retrieving 2 L- of clear yellow fluid (Fig. 3).

The patient showed dramatic dyspnea relief with better oxygen saturation raising to 94% from 89%. Control 2-D echocardiogram revealed minimal pericardial effusion with no evidence of tamponade.

On laboratory investigation, complete blood count (CBC), renal function test (RFT), liver function test (LFT), along total serum protein and albumin were normal. Thyroid function test was performed, which revealed high thyroid stimulating hormone (>100mUI/l) and low T3(<1.5 nmol/l) and free T4(<0.4 nmol/l). Considering these findings, additional studies were performed where the antimicrosome antibody and antithyroglobulin antibody were negatives.

The examination of the fluid surrounding the heart revealed an exudate with a protein content of 36g/l and LDH level of 230.0 U/l. The ADA level was normal, and there was no evidence of microbial culture or malignancy upon cytological evaluation.

A high frequency probe was utilized for thyroid ultrasonography, and it revealed a normally sized thyroid gland with standard vasculature and echotexture.

Following a five-day hospital stay, the patient was released with a prescription of Tab. Levothyroxine 50 µg/day and scheduled for regular check-ins. The patient's pericardial effusion was monitored with sequential transthoracic echocardiograms, which showed no indication of either recurrence or constriction. To avoid the possibility of a relapse, thyroid dosage adjustments were made every 6-8 weeks, based on the patient's TSH levels.

3. DISCUSSION

Pericardial effusion, the buildup of fluid within the pericardial cavity, can manifest in different forms ranging from transudate to hemopericardium [2].

The heart and its nearby main vessels are enveloped by a tough, elastic casing known as the pericardium. Its primary role is to anchor the heart within the mediastinum while safeguarding it from abrupt ventricular enlargement and infections. Comprising of two delicate membranes, the pericardium has a slim serous visceral leaflet that adheres closely to the epicardium and a fibrous parietal leaflet that forms the outer layer touching the chest wall [3].

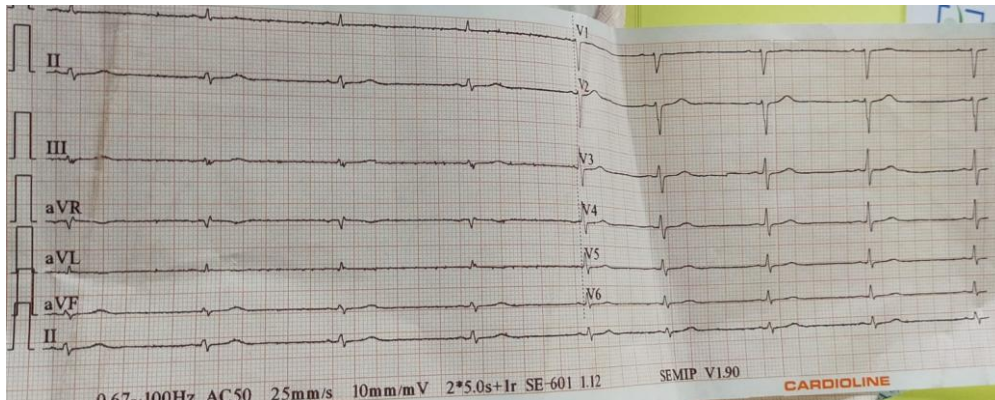


Fig. 1. 12 Leads electrocardiogram: Micro voltage with discrete electrical alternans

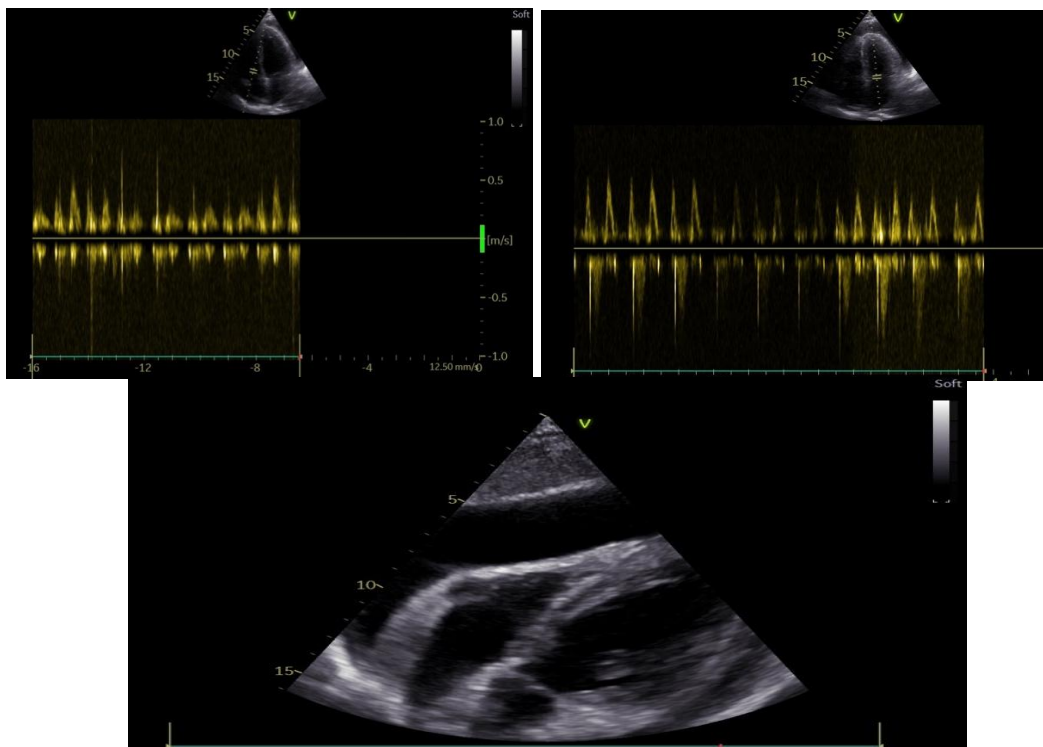


Fig. 2. Echocardiographic findings: Large pericardial effusion 26 mm at the RV level, with significant mitral 25% and tricuspid 50% respiratory flow variation

The presence of pericardial capillaries initiates the ultrafiltration that leads to the formation of pericardial fluid. Typically, arteriole hydrostatic pressure is greater than venules pressure, while colloid osmotic pressure remains relatively constant on both ends. As a result, the majority of the fluid is reabsorbed at the venous end, with some remaining fluid drained away through lymphatic drainage [4].

Pericardial effusion can arise from various causes. Inflammation, injury or impediment of lymph drainage can all contribute to its

development. The potential causes can be categorized as either inflammatory or non-inflammatory in nature [5].

Pericardial effusion, characterized by specific symptoms, is a common manifestation of metabolic disorders such as hypothyroidism. This condition leads to decreased plasma volume, elevated vascular permeability, and decreased albumin synthesis and catabolism rates [6]. The net result is a prolonged passage time through the extravascular spaces, which leads to an increase in albumin mass within the extravascular space [7].



Fig. 3. Clear yellow appearance of pericardial fluid after pericardiocentesis

In hypothyroid cardiac tamponade, the fluid feature is typically an effusion, ranging in color from clear to a golden hue. In our case, lymphocytes dominate, and high protein content is evident. Further, we eliminated other potential causes, including infection, connective tissue disease, and trauma. However, it's worth noting that spontaneous pericardial hemorrhage may still be a possibility [8-10].

The patient's hemodynamic state determines the course of treatment. Even the removal of a small quantity of pericardial fluid, roughly 50 milliliters, results in noticeable improvement in both hemodynamic and symptomatic conditions, thanks to the sharp relationship between pericardial pressure and volume.

The prognosis after hormone replacement therapy is good. Pericardial effusions generally resolve after 2 to 12 months. Thyroid replacements alone are sufficient to remove these fluid buildups. Pericardiocentesis is only required in cases of cardiac tamponade [11,12].

However, if euthyroidism is not achieved, there is a significant risk of re-exudation within the first few weeks. Therefore, it is important to ensure strict ultrasound monitoring until thyroid function returns to normal. In addition, the presence of chronic effusions requires long-term follow-up to ensure that the condition does not progress to constrictive chronic pericarditis

4. CONCLUSION

Hypothyroidism with large pericardial effusions associated with pericardial tamponade is uncommon, and thyroid replacement alone is sufficient to resolve these effusions.

Pericardiocentesis is required only in cases of cardiac tamponade.

CONSENT

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

ETHICAL APPROVAL

As per international standard or university standard 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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