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Chylous Ascites as a Manifestation of Thyrotoxic Cardiomyopathy in a Patient with Untreated Graves' Disease

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Background: Thyrotoxicosis is an uncommon cause of heart failure, and patients with heart failure rarely present with chylous ascites. In this report, we describe a patient with uncontrolled Graves' disease with thyrotoxicosis, heart failure, and chylous ascites.

Summary: A 39-year-old woman with no previous cardiac disease presented with dyspnea, orthopnea, palpitations, exophthalmos, goiter, distended abdomen, and pedal edema. The thyroid function tests demonstrated hyperthyroid Graves' disease (serum-free triiodothyronine level, 7.12 pg/mL [reference range, 2.0–4.0]; free thyroxine level, 4.33 ng/dL [reference range, 0.54–1.40]; thyroid-stimulating hormone level, $<0.015\ \mu$U/mL [reference range, 0.34–5.60]; and thyrotropin receptor antibodies, 84.5% [reference value, <15%]). The chest radiograph showed moderate cardiomegaly and bilateral pleural effusions, electrocardiogram revealed atrial fibrillation, and the abdominal sonography found ascites. Chylous ascites was diagnosed by paracentesis and analysis of the ascitic fluid (triglyceride level, 347 mg/dL). Laboratory and imaging studies demonstrated no apparent hepatic dysfunction, abnormal tumor, lymphadenopathy, or lymphatic drainage deficit. With aggressive treatment of the heart failure and hyperthyroid state, her dyspnea, pleural effusion, chylous ascites, and edema resolved completely within a few days.

Conclusions: Chylous ascites may develop as a result of heart failure secondary to thyrotoxic cardiomyopathy and resolve promptly if treated appropriately.

Introduction

Chylous ascites is an uncommon condition featured by accumulation of ascitic fluid with high triglyceride content in the peritoneal cavity. It is usually caused by disruption of lymphatic drainage, resulting in extravasation of milky chyle from the lymphatic channels (1). On rare occasions, high central venous pressure secondary to heart failure produces chylous ascites (2–5). Hyperthyroidism may worsen preexisting cardiac disease and lead to heart failure, and thyrotoxicosis by itself may cause a cardiomyopathy (6). In this report, we describe a patient with uncontrolled Graves' disease with thyrotoxicosis, heart failure, and chylous ascites.

Patient

A 39-year-old woman without previous cardiac disease was admitted because of progressive dyspnea, orthopnea, palpitations, distended abdomen, and bilateral leg edema for 1 week. She had been found to have hyperthyroidism 4 years earlier, but she did not receive medical therapy thereafter. There had been no obvious weight loss, depressed appetite, or chronic diarrhea since hyperthyroidism was diagnosed. The patient did not smoke or drink alcohol. Apart from hyperthyroidism, her medical history was unremarkable. She denied previous abdominal trauma, surgery, or pelvic irradiation.

On physical examination, she looked acutely unwell and tachypneic. She was 159 cm tall, weighed 59 kg (body–mass index, 23.3 kg/m^2), and appeared well nourished. Her blood pressure was 125/63 mmHg; pulses were rapid, bounding, and irregular; the body temperature was 36.7°C. She had mild proptosis and periorbital edema. The neck vein was distended, and the thyroid gland was diffusely enlarged and nontender. Pulmonary and cardiac auscultation revealed bilateral basilar crackles and S3 gallop. The abdomen was distended and soft without tenderness. The musculature of the trunk and limbs was intact, but pitting edema in the lower extremities was evident. There were no palpable lymph nodes in the cervical, axillary, and inguinal areas.

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Serum-free triiodothyronine and thyroxine levels were 7.12 pg/mL (reference range, 2.0–4.0) and 4.33 ng/dL (reference range, 0.54–1.40), respectively. The thyroid-stimulating hormone level was <0.015 μU/mL (reference range, 0.34–5.60), while the thyrotropin receptor antibodies (84.5%) were increased (reference value, <15%). Levels of blood glucose, triglyceride, cholesterol, and lactate dehydrogenase were not elevated. The B-type natriuretic peptide concentration was 403 pg/mL (reference value, <100). Other studies showed mild hypoalbuminemia, normal renal function, and negative for hepatitis B virus surface antigen (HBsAg), anti-hepatitis C virus (anti-HCV) antibody, antinuclear antibody (ANA), and rheumatoid factor. The aspartate aminotransferase level was elevated very slightly (Table 1).

A chest X-ray showed moderate cardiomegaly, pulmonary congestion, and bilateral pleural effusions. Electrocardiogram showed atrial fibrillation with rapid ventricular response.

The abdominal ultrasonography found a moderate amount of ascites, and a diagnostic paracentesis was performed. The ascitic fluid was milky and turbid. Analyses of the ascitic fluid showed elevated triglyceride level (347 mg/dL), high serum-ascites albumin gradient (>1.1 g/dL), and higher leukocyte count that was lymphocyte-predominant (white blood cells, 1890/μL; lymphocyte, 98%) (Table 2). Biochemical studies of the ascites were consistent with chylous ascites. Results of microbiologic cultures and cytological analysis of the ascites were negative.

The thyroid ultrasonography showed a diffusely enlarged thyroid gland with hypoechoic, heterogeneous echotexture and hypervascularity. An echocardiogram revealed mild left ventricular systolic dysfunction, moderate mitral valve and tricuspid regurgitation, and pulmonary hypertension, but no structural abnormality. The estimated left ventricular ejection fraction was 43%. Magnetic resonance imaging of the abdomen and pelvis showed no cirrhosis of liver, abnormal mass, or enlarged lymph node. The ^{99}mTc lymphoscintigraphy demonstrated no apparent defect in the lymphatic system.

We administered methimazole 10 mg three times a day and propanolol 10 mg every 6 hours immediately after admission. She was also managed aggressively for congestive heart failure and acute pulmonary edema with angiotensin-converting enzyme inhibitor, intravenous furosemide, and nitroglycerin. Three days after admission, the patient lost 6 kg and the dyspnea, orthopnea, edema, and abdominal distension were resolved. A repeat abdominal ultrasonography revealed striking disappearance of ascites, and the thoracic ultrasonography demonstrated resolution of the pleural effusion. The patient was discharged with antithyroid drug, propanolol, and low-dose diuretic.

She was free of symptoms of thyrotoxicosis and heart failure four weeks after discharge, when she was taking methimazole 5 mg and propanolol 10 mg three times a day and aspirin 100 mg per day. A normothyroxinemic state was achieved, but mild cardiomegaly and atrial fibrillation were still present.

Table 1. Laboratory Values on Admission

Variables	*Value (reference range)*
BUN (mg/dL)	10 (5–26)
Creatinine (mg/dL)	0.39 (0.5–1.3)
AST (U/L)	39 (5–34)
ALT (U/L)	35 (5–40)
Total bilirubin (mg/dL)	1.23 (0.2–1.3)
CPK (U/L)	51 (30–324)
Total protein (g/dL)	6.3 (6.0–8.0)
Albumin (g/dL)	3.3 (3.8–5.3)
Cholesterol (mg/dL)	119 (130–200)
Triglyceride (mg/dL)	68 (35–165)
LDH (U/L)	119 (98–192)
BNP (pg/mL)	403 (<100)
TSH (μU/mL)	<0.015 (0.34–5.60)
FT3 (pg/mL)	7.12 (2.0–4.0)
FT4 (ng/dL)	4.33 (0.54–1.40)
TRAb (%)	84.5 (<15)

BUN, blood urea nitrogen; AST, aspartate aminotransferase; ALT, alanine aminotransferase; CPK, creatine phosphokinase; LDH, lactate dehydrogenase; BNP, B-type natriuretic peptide; TSH, thyroid-stimulating hormone; FT3, free triiodothyronine; FT4, free thyroxine; TRAb, thyrotropin receptor antibodies.

Discussion

Chylous ascites means the presence of ascitic fluid containing high triglyceride concentration (>110 mg/dL) in the peritoneal cavity. It usually results from obstruction or disruption of lymphatic drainage by malignant neoplasms or a destructive process such as surgery or trauma. Rarely, heart failure due to various etiologies produces chylous ascites (2–5). Two probable mechanisms involve the formation of chylous ascites in heart failure. One is central venous hypertension, which increases abdominal lymph production due to augmented capillary filtration. The second is high central venous pressure, which impedes lymphatic drainage and decreases the effective collateral flow (7). However, the fact that heart failure is a common disorder but chylous ascites is clinically rare suggests that some undiscovered factors are responsible for its pathogenesis.

The association of hyperthyroidism and cardiovascular changes has been well documented (6,8,9). Thyrotoxicosis can aggravate underlying heart problems and worsen the clinical manifestations, especially in the elderly. Some patients with hyperthyroidism present with symptoms and signs of heart failure due to a reversible cardiomyopathy (10,11). A recent study showed that thyrotoxic cardiomyopathy can be reversed earlier than previously expected if the thyrotoxicosis is aggressively treated and a normothyroxinemic state is achieved (12).

In our patient, given that she responded promptly to antithyroid and diuretic therapy and all diagnostic examination results were negative for infection or malignancy,

Table 2. Biochemical Studies of the Ascitic Fluid

Variables	*Values*
Appearance	Milky and turbid
Specific gravity	1.020
Leukocyte count (per mm^3)	1890
Neutrophil count	2%
Lymphocyte count	98%
Proteins (g/dL)	2.3
Albumin (g/dL)	1.4
Cholesterol (mg/dL)	26
Triglyceride (mg/dL)	347
LDH (U/L)	41
Amylase (U/L)	36

heart failure secondary to thyrotoxic cardiomyopathy was the most probable cause of chylous ascites. Longstanding thyrotoxicosis seemed to play a crucial role in the development of tachyarrhythmia-induced cardiomyopathy with heart failure in this patient. Diuretic therapy, control of the heart rate, and management of thyrotoxicosis likely reduced the cardiac preload, alleviated the pulmonary congestion, and improved cardiac function, thereby lowering central venous pressure and diminishing chylous ascites. It is not clear whether the action of thyroid hormones is associated with the formation of chylous ascites because there is no direct evidence linking them together.

Conclusions

Prolonged thyrotoxicosis may cause thyrotoxic cardiomyopathy and heart failure, which in turn lead to the development of chylous ascites. With appropriate treatment, cardiac function improves and chylous ascites resolves in a short time.

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Disclosure Statement

The authors declare that no competing financial interest exists.

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