

## CASE REPORT

# A Patient with Hyperthyroid Related Severe Secondary Pulmonal Hypertension, Paroxysmal Atrial Fibrillation, and Cyanosis

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## ABSTRACT

It is uncommon to have pulmonary hypertension. We describe a case of pulmonary hypertension in which the underlying etiology was determined to be hyperthyroidism. Clinical manifestations of hyperthyroidism-induced pulmonary hypertension can result in cyanosis and heart rhythm abnormalities, which are indicators of right heart failure. The 56-year-old woman in this case study complained of tightness and edema in both of her legs when she arrived at the emergency room. Upon examination, cyanosis, atrial fibrillation, and right heart failure were noted. Due to the patient's prior history of hyperthyroidism, secondary pulmonary hypertension is currently complicating the condition. In order to improve the prognosis for pulmonary hypertension, the patient's thyroid function is managed with medication while receiving treatment in the hospital.

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## INTRODUCTION

As to the guidelines of the 6th World Symposium on Pulmonary Hypertension in 2018, pulmonary hypertension (PH) is characterized by a rise in mean pulmonary artery pressure (mPAP) that is greater than 20 mmHg, as determined through direct measurement using right heart catheterization. According to epidemiology, pulmonary hypertension affects only 20–70 million individuals globally, making it a rare condition. Unless pulmonary arterial hypertension is detected and treated effectively, the prognosis is poor, especially for these patients. Nonetheless, several uncommon causes of PH, such as hematological, systemic, or metabolic problems, should be taken into consideration. Right heart catheterization is the gold standard for PH diagnosis; however, Doppler echocardiography is usually the method for screening. In most cases, PH is diagnosed by means of the requested echocardiogram due to other suspected cardiac changes, and even so adequate follow-up and management are not always performed.

A prospective study evaluating 75 hyperthyroid patients found 47% with SPAP above 35 mmHg on Doppler

echocardiography. According to reports, PH may coexist with thyroid disease while it is being treated. In a retrospective analysis, the prevalence of thyroid illness was considerably higher in patients with PH (24%) compared to 698 sex-matched control persons without PH (15%). The study included 356 consecutive PH patients. We describe a case of paroxysmal hyperthyroidism which was thought to be caused by hyperthyroidism.

## CASE REPORT

A 56-year-old woman arrived at the Dr. Wahidin Sudirohusodo General Hospital's emergency room in Mojokerto City complaining of tightness and palpitations that had been worsening over the previous five days. The woman had been experiencing these symptoms for a month. She tires out from walks easily. Resting does not make her symptoms better. Additionally, reports of dizziness were made. She has taken propranolol and thiamazole on a regular basis and has a history of hyperthyroidism. About a year ago, the patient had a transesophageal echocardiography examination, and the results showed that the interatrial septum was intact. She has a history of cardiovascular disease and takes nifedipine and nitroglycerin on a regular basis. A weak overall state was found during the physical examination; the GCS score was 15, the blood pressure was 110/70 mmHg, the pulse was perceptible at 82 beats per minute, the SpO<sub>2</sub> was 88%, the body temperature was 36°C,

and the respiration rate was 28 times per minute. Upon cardiac assessment, the fourth ICS's left parasternal had a systolic murmur. An examination of the abdomen revealed ascites. Her fingers looked cyanotic and clubbed. Both legs are edematous.

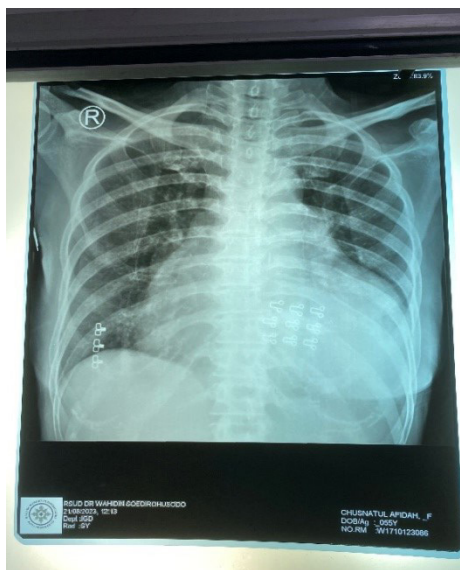


Fig. 1: CXR on admission showed cardiomegaly

The results of the thyroid function test were 1.705 TSHS and 10.42 FT4. On the sixth day of treatment, she started having palpitations and dyspnea. Physical examination results included a blood pressure reading of 100/70 mmHg, an obviously irregular pulse rate of 130–140 beats per minute, a respiratory rate of 38 beats per minute, and a SpO<sub>2</sub> of 94% with 4 lpm oxygen supplementation.

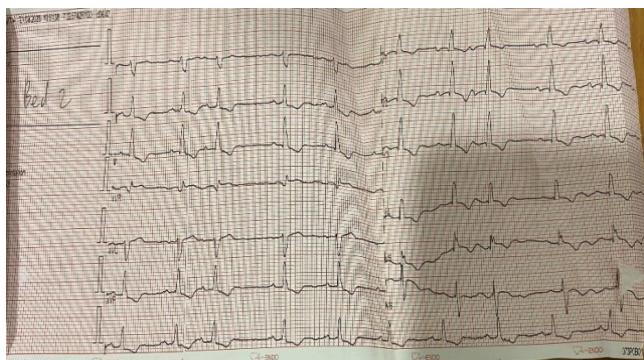


Fig. 2: ECG on admission showed sinus rhythm 70 bpm, right axis deviation with multiple PACs in all leads

Digoxin 0.125 mg intravenous, dobutamine 3 mcg/kgBB/minute, furosemide twice daily, spironolactone 25 mg once daily, ramipril 1.25 mg once daily, sildenafil 20 mg three times a day, thiamazole 10 mg twice a day, and propylthiouracil 100 mg twice a day were administered to her after she was moved to the ICU room.

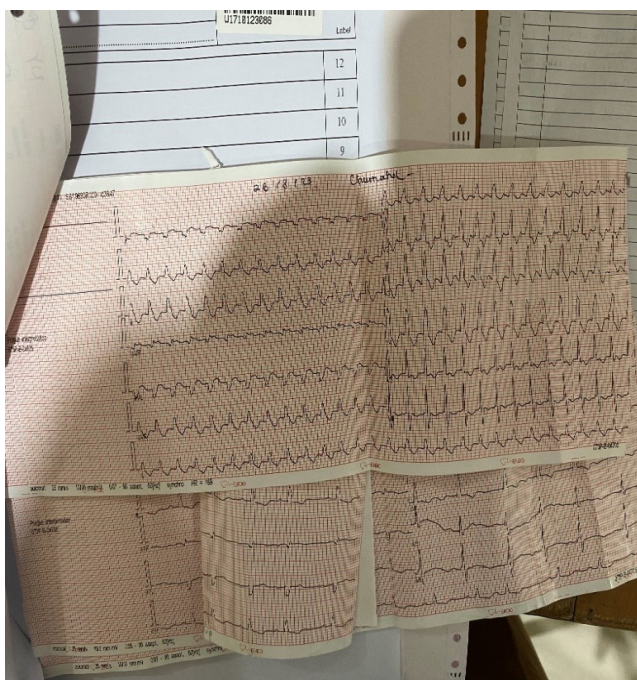


Fig.3: ECG on ICU showed atrial fibrillation with rapid ventricular response and 130-140 bpm of heart rate right axis deviation, and incomplete RBBB.

She was moved to a regular room once she started to settle after two days of observation in the intensive care unit. The results of the echocardiography examination showed RA and RV dilation, EF 57%, estimated SPAP 55.57 mmHg, and estimated RAP 15 mmHg. After an echocardiography evaluation, it was discovered that there was right heart failure, moderate PH, and secondary PH. Although cardiac catheterization is considered the gold standard method for the PH diagnosis, on echocardiography, SPAP can be indirectly estimated by the reflux velocity through the tricuspid valve, thus estimating the gradient between the ventricle and the right atrium, to which is added the estimated pressure of the right atrium. In this case, secondary pulmonary hypertension is due to hyperthyroidism. The patient has been taking thiamazole and propranolol regularly.

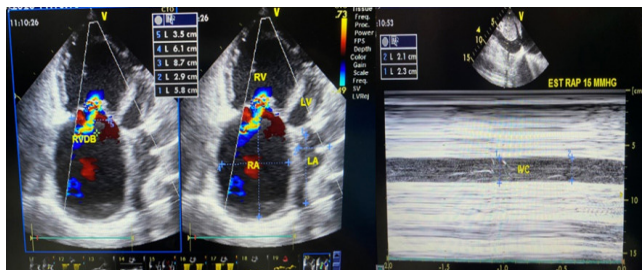


Fig.4: Echocardiography showed severe TR (eyeball), dilated RA RV, small LA LV, abnormally relaxed LV diastolic function, decreased RV systolic function (TAPSE 1.5 cm), LV septal dyssynchrony, estimated RAP 15

After the patient's complaints gradually improved on the ninth day of treatment, she was discharged home

on a regimen of 40 mg of furosemide twice daily, 25 mg of spironolactone once daily, 1.25 mg of ramipril once daily, 20 mg of sildenafil three times a day, 10 mg of propranolol three times a day, 10 mg of thiamazole twice a day, and 100 mg of propylthiouracil twice a day.

## DISCUSSION

After experiencing palpitations and discomfort, the patient's pulmonary hypertension was discovered. Evaluation of Graves' disease-related hyperthyroidism in a laboratory. The increase in serum thyroxine and triiodothyronine in GD leads to typical cardiorespiratory changes and can develop PH. Based on etiology and pathophysiological processes, five kinds of PH were identified: The first group is pulmonary arterial hypertension (PH); the second is associated to left heart disease; the third is related to hypoxia; the fourth is related to chronic thromboembolic PH; and the fifth is due to uncertain multifactorial reasons. It was concluded that this patient could not be placed in Groups 2, 3, or 4, even though no invasive testing was performed to assess pulmonary artery pressure, pulmonary capillary wedge pressure, or pulmonary vascular resistance. PH is categorized as Group 5 in this case based on the clinical history, and it is associated with metabolic diseases (thyroid disorders), while pulmonary arterial hypertension (Group 1) is seldom treated without PH-specific intervention.

Whether there is a causal or coincidental relationship between PH and thyroid disease is still unknown. The effects of hypo- and hyperthyroidism on elevated pulmonary artery vascular pressure have been documented in a number of investigations. The precise mechanism may be complex and has not been well studied. The chronotropic effects of hormones on the cardiovascular system, autoimmune-mediated endothelial dysfunction, and direct effects of thyroid hormones on pulmonary vascular proliferation are the mechanisms that have been hypothesized. Therefore, the finding that FT4 was associated with PH suggests that, in addition to the effects of thyroid hormones on systemic circulation, we can postulate pulmonary vascular effects of hyper-reactivity, vasoconstriction, remodeling, and thrombosis in situ.

## CONCLUSION

In this instance, the 55-year-old female patient had severe secondary PH as a result of hyperthyroid. There

were symptoms of edema and discomfort in both legs while under anamnesis. Physical examination revealed ascites, cyanosis of the fingers, edema of the legs, and a systolic murmur on the tricuspid valve. Following analysis, a spike in TSH and FT4 levels was found to be within normal limits. This patient, who previously experienced hyperthyroidism, has right heart failure, a consequence of severe pulmonary arterial hypertension that leads to defective closure of the tricuspid valve (severe tricuspid regurgitation). In order to treat the patient's hyperthyroidism and manage both thyroid function and pulmonary hypertension, complementary therapies are required. In conclusion, this case reinforces the importance of screening for PH, especially with echocardiographic assessment, thus allowing early, incisive and effective treatment of patients with GD in thyrotoxicosis, both due to the high prevalence, and also the possibility of reversion and normalization of pressure pulmonary artery, avoiding irreversible complications.

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