

Case Report

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Congestive Heart Failure: An Uncommon Presentation of Pheochromocytoma

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Abstract

Introduction: Pheochromocytomas are rare catecholamine secreting tumors that arise from the chromaffine tissue of the adrenal medulla. Rarely, these tumors are associated with cardiomyopathy. We herein present a patient with pheochromocytoma presenting initially with congestive heart failure and hypertensive emergency.

Case presentation: A 62-year-old female with no past medical history presented to the emergency department for dyspnea and lower extremity edema of 2 weeks duration. The patient was tachycardic at 120 BPM, hypertensive at 197/90 mmHg. She had decreased breath sounds bilaterally. Electrocardiogram showed sinus tachycardia. Chest x-ray revealed bilateral pulmonary infiltrates and effusions. Laboratory testing demonstrated a white blood cell count of 18.06 TH/mm³, platelet count of 693 TH/mm³, D-dimer of 540 ng/ml, and a brain natriuretic peptide of 888pg/ml. A lower extremity duplex was negative for venous thromboembolism. Computed tomography scan of the chest ruled out pulmonary embolism. An Echocardiogram showed diffuse hypokinesis, and an estimated ejection fraction of 35 percent. Thyroid stimulating hormone, Urine and plasma metanephrines and renal artery duplex were done as part of the workup. Renal ultrasound and arterial Doppler were negative for renal artery stenosis, but revealed a right upper pole partially solid mass. An MRI of the abdomen confirmed a mass in the upper pole of the right kidney. Initial laboratory tests showed elevated plasma Metanephrines at 8065 pg/ml and urine metanephrines at 1594 mcg/g. The patient was started on Phenoxybenzamine. Surgical resection with histo-pathological examination performed 4 weeks later confirmed the diagnosis of pheochromocytoma.

Discussion: Pheochromocytomas are rare tumors, associated with a number of cardiovascular complications. The acute onset of severe congestive heart failure secondary to catecholamine overproduction is a rare entity, and is associated with a poor prognosis. This case teaches us, that in patients presenting with heart failure with no obvious cause, the diagnosis of pheochromocytoma should always be contemplated.

Keywords: Cardiomyopathy; Pheochromocytoma

Introduction

Pheochromocytomas are rare catecholamine secreting tumors that arise from the chromaffine tissue of the adrenal medulla. The classic triad of episodic headache, sweating, and tachycardia is frequently absent [1,2]. Sustained or paroxysmal hypertension is the most common sign, but approximately 5 to 15 percent of patients present with normal blood pressure [3]. Rarely, pheochromocytomas are associated with cardiomyopathy [4]. Patients may present with pulmonary edema and may deteriorate with initiation of beta-adrenergic blockade [5]. We herein present a patient with pheochromocytoma presenting initially with pulmonary edema and hypertensive emergency.

Case Presentation

A 62 year old female, with no significant past medical or surgical history presented to the emergency department for worsening shortness of breath, orthopnea and lower extremity edema that have been ongoing for 2 weeks. This was preceded by an episode of upper respiratory tract infection accompanied by myalgia and arthralgia. History was also positive for a 20 pounds weight loss, and moderate night sweats. The patient had taken antibiotics during the previous week, with no improvement of respiratory symptoms.

On presentation the patient was afebrile, tachycardic at 120 BPM, and hypertensive at 197/90 mmHg. The physical exam showed decreased breath sounds bilaterally, crackles in the lower lung fields and bilateral pitting lower extremity edema. The rest of the exam was unremarkable.

Electrocardiogram on admission showed sinus tachycardia, with signs of left ventricular hypertrophy, and no ischemic changes (Figure 1). Chest x-ray revealed bilateral pulmonary effusions (Figure 2). Patient's

blood tests showed white blood cell count of 18.06 TH/mm³ (reference range 4.8-10.8 TH/mm³), platelets of 693 TH/mm³ (reference range 130-400 TH/mm³), D-dimer of 540 ng/ml (reference range: 0-230 ng/ml), and BNP of 888 pg/ml (reference range 0-99 pg/ml). Her blood urea nitrogen,



Figure 1: Sinus tachycardia, with signs of left ventricular hypertrophy according to the Sokolow-Lyon index: S in V₁ + R in V₅ or V₆ ≥ 35 mm (≥ 7 large squares) on 12 lead electrocardiogram.

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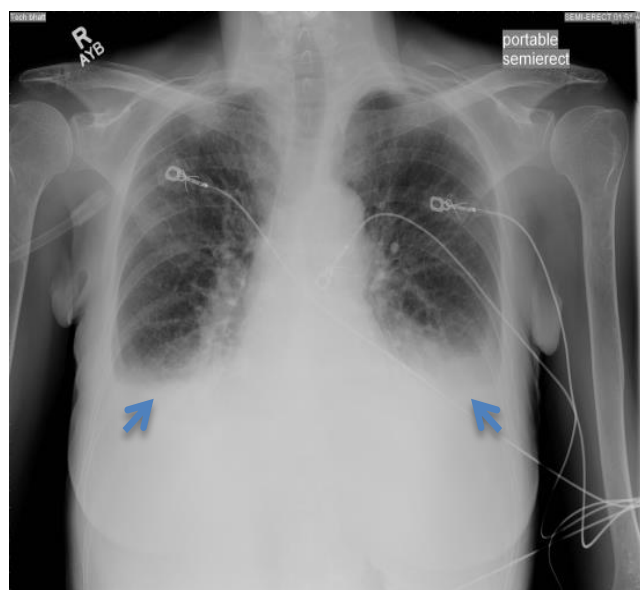


Figure 2: Portable chest X-ray showing bilateral pleural effusions (arrows), and increased interstitial markings.

creatinine and electrolytes were within normal limits. A lower extremity duplex at the bedside was negative for venous thromboembolism. A computed tomography scan of the chest with contrast ruled out pulmonary embolism, but showed bilateral moderate pleural effusions and partially visualized ascites. An Echocardiogram then performed at the bedside, showed moderate diffuse hypokinesis, with wall hypertrophy and an estimated ejection fraction of 35-40 percent. The patient had no previous history of heart disease. Antinuclear antibodies, erythrocyte sedimentation rate, thyroid stimulating hormone, urine and plasma metanephrines and renal artery duplex were done as part of the workup. The patient was placed on a nitroglycerin infusion, loop diuretics, an ACE inhibitor and transferred to the intensive care unit.

During her stay, her respiratory symptoms improved; however, she had an episode of syncope while trying to get out of bed, and was found to have orthostatic hypotension. A diagnostic cardiac catheterization was performed and ruled out obstructive coronary disease. Renal artery duplex was negative for renal artery stenosis, whereas ultrasound of the abdomen revealed an incidental right upper pole partially solid mass measuring $6.9 \times 5.6 \times 6.2$ cm (Figure 3). This was completed by an MRI of the abdomen, which confirmed the finding (Figure 4). Initial laboratory workup done on admission showed a thyroid stimulating hormone level of 1.4 uIU/ml (reference range 0.27-4.2 uIU/ml), plasma total metanephrines of 8065 pg/ml (reference range ≤ 205 pg/ml), urine metanephrines of 1594 mcg/g (reference range 21-153 mcg/g), erythrocyte sedimentation rate of 40 mm/hr (reference range 0-20 mm/hr), and a normal antinuclear antibodies titer $<1:80$. The patient was started on Phenoxybenzamine. She was then discharged from the hospital in stable condition with planned surgical intervention in 4 weeks. The tumor was resected surgically under general anesthesia without significant complications. Histo-pathological examination was positive for chromogranin, synaptophysin, S-100 (sustentacular cells) without capsular invasion, significant mitotic activity, necrosis, or atypical histological features. The diagnosis of pheochromocytoma was confirmed. Follow up at an outpatient clinic one-month later, revealed normalization of the blood pressure, and a repeat echocardiogram showed improvement of the left ventricular systolic function with



Figure 3: Kidney ultrasound showing a partially solid mass in right upper pole of the kidney (arrow).

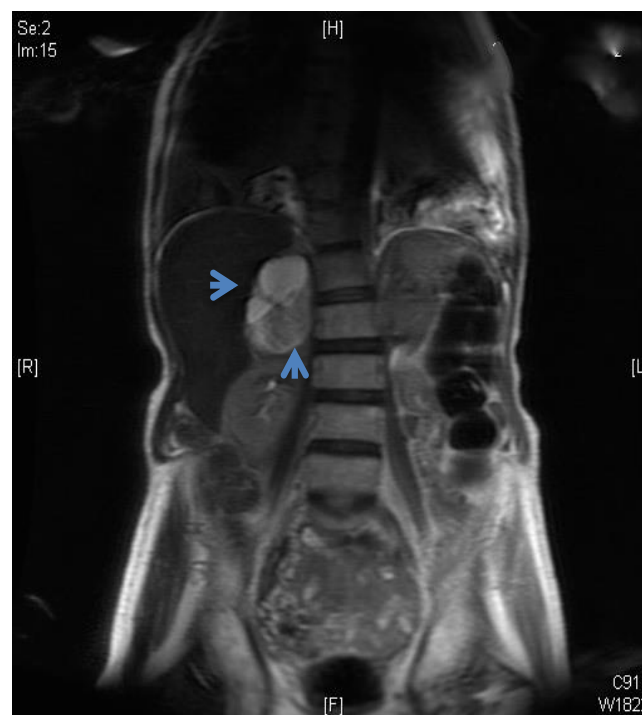


Figure 4: MRI of the abdomen with a $6.9 \times 5.6 \times 6.2$ cm enhancing mass in the upper pole of the right kidney/adrenal gland (arrows).

an estimated ejection fraction of 60%. The patient was completely asymptomatic and was taken off her anti-hypertensive medications.

Discussion

Pheochromocytomas are rare tumors, affecting about 1 in 2500-6500 individuals, with 500-1600 cases diagnosed annually in the United States [6]. However, their true incidence may be higher owing to the lack of diagnosis until post-mortem [7,8].

Pheochromocytomas are either sporadic or hereditary due to

underlying genetic mutations. Hereditary pheochromocytoma occurs with neurofibromatosis, multiple endocrine neoplasias (MEN 1 and 2), von Hippel-Lindau syndrome, and familial paraganglioma syndromes [9]. In patients with an established mutation or underlying hereditary syndrome, the condition may manifest at a younger age than in those with sporadic disease [7].

In the elderly, pheochromocytomas are usually sporadic and may present without typical signs and symptoms. Instead, they may present unexpectedly with acute onset stroke, heart failure in absence of coronary artery or valvular disease, arrhythmias and ketoacidosis [10]. The classic triad of headache, palpitations, and paroxysmal hypertension is not always present. Therefore recognition requires a high index of suspicion [11].

These tumors have been associated with a number of cardiovascular complications that result from excessive catecholamine secretion [6]. Although rare, myocardial involvement includes paroxysmal or sustained hypertension, angina pectoris, acute heart failure, dilated cardiomyopathy, myocardial infarction and arrhythmias. Patients with pheochromocytoma usually have normal or increased ventricular systolic function on echocardiography with only around 10% presenting with catecholamine-induced cardiomyopathy [12]. The acute onset of severe congestive heart failure secondary to catecholamine overproduction is a rare entity [13], and is usually associated with a poor prognosis [14,15]. In one report, 5 of 6 patients with acute pulmonary edema caused by pheochromocytoma died within 24 hours of the acute event [15].

The diagnosis is established via biochemical confirmation of hormonal excess with urine and plasma metanephrines, followed by anatomical localization of the catecholamine-secreting tumors with imaging in the correct clinical setting. That being said, pheochromocytomas are increasingly being diagnosed incidentally on imaging tests performed for different reasons [7].

Once the diagnosis of pheochromocytoma has been established, the mainstay treatment is complete surgical resection of the tumor [16]. Before surgical excision, patient's hemodynamics should be optimized with pharmacological agents to avoid perioperative complications. Routine preoperative preparation consists of phenoxybenzamine; an α -adrenoceptor blocker started 7-14 days preoperatively [7]. The goal is to suppress catecholamine excess in order to control blood pressure, heart rate and volume status. β -Adrenergic receptor blockers are needed when catecholamine or α -blocker induced tachyarrhythmia occur.

Conclusion

The patient in this case presented with hypertensive emergency and acute cardiogenic pulmonary edema, with no other previous symptoms of pheochromocytoma. In patients presenting with heart failure without an obvious cause, the diagnosis of pheochromocytoma should be contemplated and worked up. Delay in diagnosis and treatment could result in potential harm to the patient.

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