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Pheochromocytoma Revealed by Fulminant Recurrent Myocarditis and Cardiogenic Shock

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Abstract | **Case Report**

Introduction: Pheochromocytoma is a rare catecholamine-secreting tumour that can mimic acute myocarditis and lead to life-threatening cardiogenic shock. We present a case of recurrent fulminant myocarditis ultimately attributed to an adrenal pheochromocytoma. ***Case presentation:*** A 34-year-old woman with no cardiovascular risk factors experienced recurrent myocarditis over 18 months. During her third episode, she developed cardiogenic shock with multiorgan failure. An abdominal ultrasound revealed a left adrenal mass, confirmed by CT scan. Elevated urinary catecholamine metabolites established the diagnosis of pheochromocytoma. Following emergency adrenalectomy, her haemodynamic status stabilised, and she recovered fully. ***Discussion*:** Recurrent myocarditis or unexplained cardiogenic shock should prompt consideration of secondary causes, including pheochromocytoma. Early recognition and multidisciplinary management are key to favourable outcomes.

Keywords: Pheochromocytoma, cardiogenic shock, fulminant myocarditis, catecholamine cardiomyopathy, adrenalectomy, critical care.

INTRODUCTION

Pheochromocytoma is a rare neuroendocrine tumour, derived from adrenal chromaffin cells, responsible for excessive catecholamine secretion. Although commonly associated with the classical triad of headache, palpitations, and sweating, it can present in more deceptive forms, especially when cardiovascular complications dominate. Rarely, it may manifest as recurrent acute myocarditis or fulminant catecholamine-induced cardiomyopathy, sometimes progressing to cardiogenic shock.

The pathophysiological mechanisms include direct myocyte toxicity via oxidative stress, coronary vasospasm, and beta-adrenergic overstimulation, often mimicking stress cardiomyopathy or acute viral myocarditis. In such contexts, the diagnosis may be dellayed, especially in young patients without cardiovascular risk factors, thereby compromising timely intervention.

We report here the case of a young woman admitted in shock, following multiple myocarditis episodes over 18 months. The diagnosis of pheochromocytoma was only established after multiorgan failure prompted abdominal imaging. Emergency adrenalectomy resulted in a rapid reversal of the haemodynamic instability, highlighting the need to consider this rare but curable condition in unexplained cardiomyopathies.

CASE PRESENTATION

A 34-year-old woman with a history of vitiligo but no cardiovascular risk factors presented with cardiogenic shock and multiorgan failure. The clinical history revealed three hospital admissions over 18 months for recurrent myocarditis with no identified aetiology.

Six months before the current admission, she presented with acute chest pain. Troponin and BNP were normal, ECG and echocardiography were unremarkable, and coronary angiography ruled out obstructive coronary artery disease. She was discharged on beta-blockers pending cardiac MRI.

Four months later, a second episode led to the initiation of sacubitril/valsartan. However, this was complicated by acute kidney injury and tubular necrosis, requiring two sessions of haemodialysis and discontinuation of therapy.

Two months after, a third episode occurred, marked by haemodynamic instability. ECG showed T-wave inversion in septo-apico-lateral leads. Troponin was elevated to 7816 ng/L and BNP to 590 pg/mL. Echocardiography revealed global hypokinesia. Cardiac MRI suggested acute myocarditis. She was treated with corticosteroids and beta-blockers. During this admission, she rapidly deteriorated into cardiogenic shock, complicated by acute kidney injury and acute respiratory distress syndrome (ARDS). Abdominal ultrasound, initially performed for renal evaluation, revealed a left adrenal mass. Abdominal MRI confirmed the lesion, and 24-hour urinary catecholamines showed markedly elevated metanephrines and normetanephrines, confirming the diagnosis of pheochromocytoma.

Due to her unstable condition, she underwent emergency adrenalectomy without prior alpha-blockade. Intraoperative haemodynamic instability required escalation of vasopressors. Postoperatively, she improved rapidly, weaning off dobutamine and noradrenaline within 48 hours. Renal and cardiac functions recovered fully over the following week.

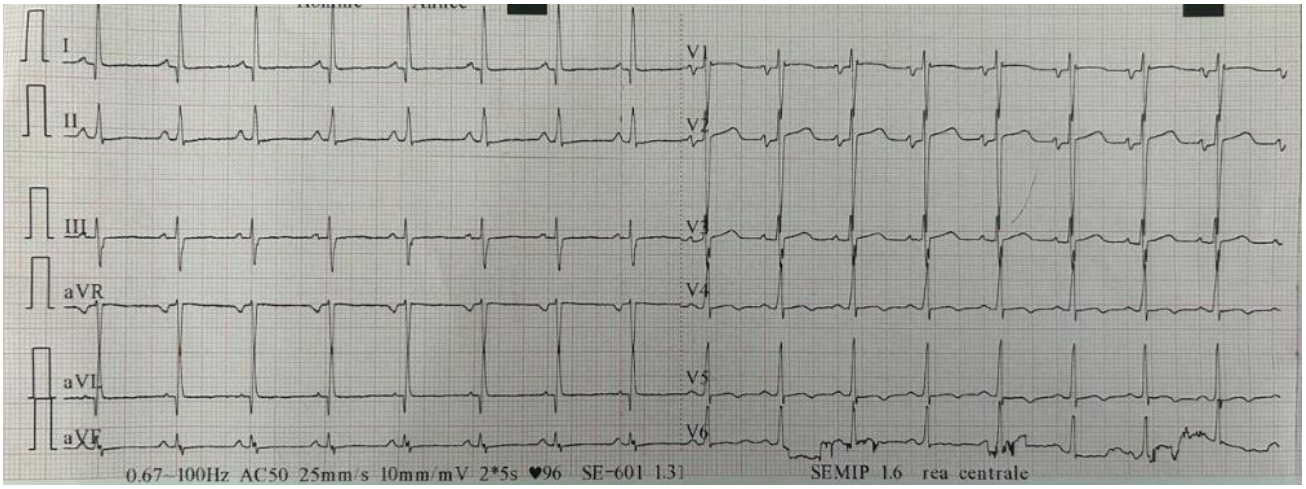

Figure 1: Electrocardiogram showing T-wave inversions in septo-apico-lateral leads

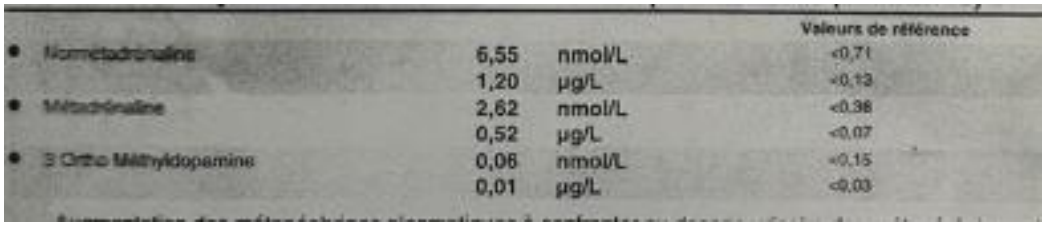

Figure 2: 24-hour urinary catecholamine assay showing markedly elevated metanephrines and normetanephrines levels

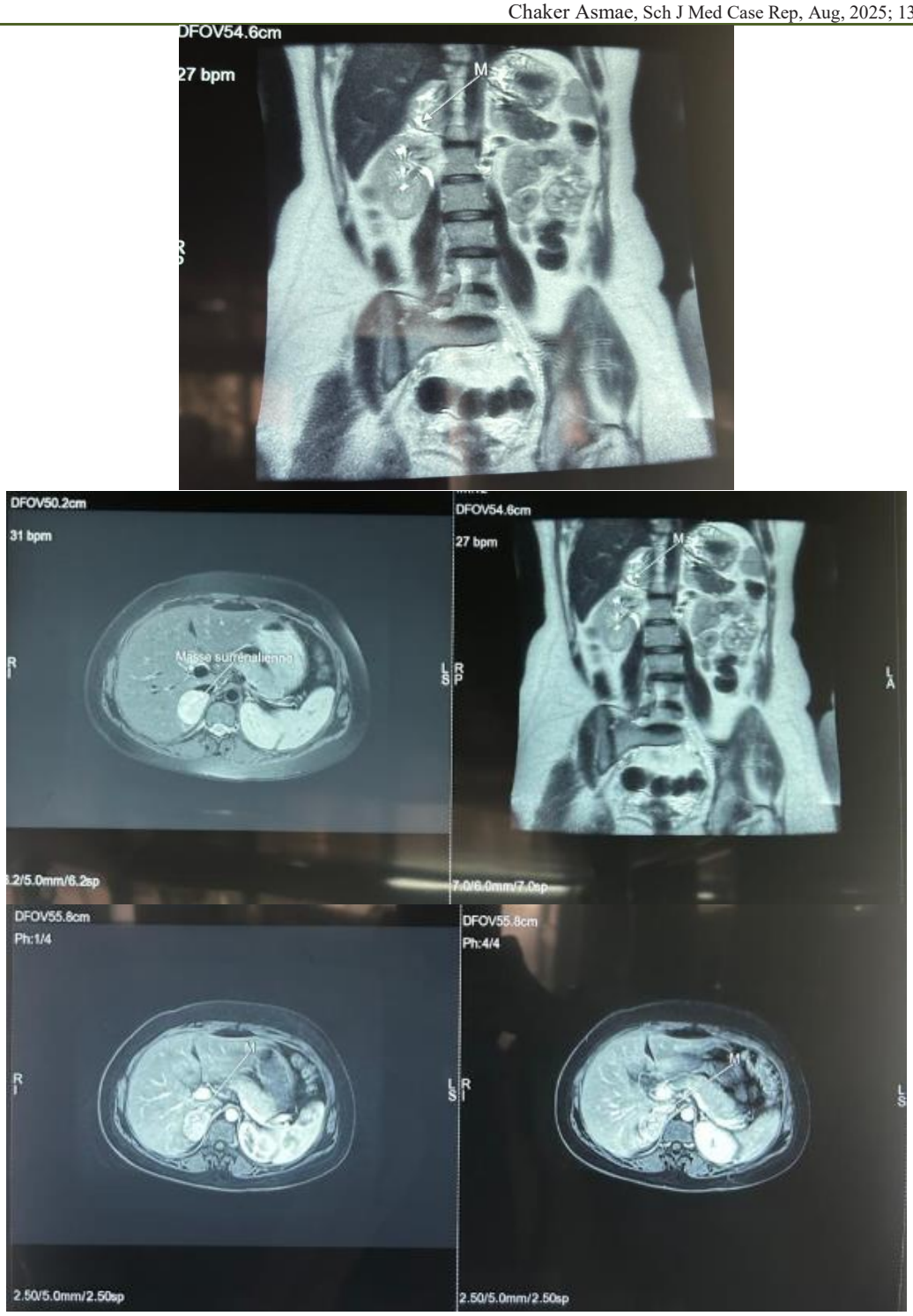

Figure 3: MRI of the abdomen showing a left adrenal mass consistent with pheochromocytoma

DISCUSSION

This case highlights a rare but clinically significant presentation of pheochromocytoma through recurrent myocarditis episodes progressing to cardiogenic shock. While pheochromocytoma is classically associated with episodic hypertension, palpitations, and headaches, its clinical spectrum can be broad and deceptive. In some instances, excessive catecholamine release causes toxic myocardial injury, leading to myocarditis or Takotsubo-like stress cardiomyopathy, which can be difficult to distinguish from viral or autoimmune causes [1].

Our patient initially presented with chest pain and elevated cardiac biomarkers, suggestive of acute myocarditis. However, she experienced three recurrent hospitalisations over 18 months, all interpreted as idiopathic myocarditis. This insidious and misleading evolution is not uncommon. Zghal *et al.,* reported a case of multiple myocarditis episodes in a young woman with

no clear aetiology before the incidental discovery of an adrenal mass [2]. Similarly, Martha *et al.,* described a young woman with suspected stress cardiomyopathy whose final diagnosis was delayed pheochromocytoma [3].

These cases, like ours, emphasise the importance of expanding the differential diagnosis when myocarditis is recurrent, unexplained, or unresponsive to standard therapy. The presence of multiorgan failure and haemodynamic collapse should prompt urgent reconsideration of underlying endocrine or toxic causes.

In our case, as in those of Tran and Cheng [4,5], pheochromocytoma was diagnosed only after cardiogenic shock and multiorgan failure prompted abdominal imaging. The identification of an adrenal mass, confirmed by MRI, and elevated catecholamine metabolites led to the definitive diagnosis.

The delayed recognition of pheochromocytoma remains a well-described challenge. The literature shows that adrenal imaging is often only performed in the context of refractory shock or renal failure [4,6]. Early inclusion of adrenal imaging and catecholamine screening in myocarditis of unclear aetiology may shorten the diagnostic delay and avoid iatrogenic complications, such as inappropriate use of beta-blockers or vasodilators.

Preoperative alpha-blockade is standard in elective cases. Lyu *et al.,* reported successful surgery after six days of alpha-blockade under ECMO support [6]. However, in cases of haemodynamic collapse, such preparation may be impossible. Our patient underwent emergency surgery without alpha-blockade—a scenario also described by Steppan *et al.,*[7], where urgent adrenalectomy was performed in a patient with shock and no time for pharmacological preparation.

While this approach increases the risk of perioperative instability, it is sometimes the only life-saving option. In resource-limited settings, where mechanical circulatory support is unavailable, the clinical judgement to proceed directly to surgery is critical.

As expected, tumour manipulation resulted in transient worsening of haemodynamics due to catecholamine surges. In our case, vasopressor requirements increased significantly intraoperatively. This mirrors the findings of Tran *et al.,* [4], where intraoperative instability was similarly managed through real-time anaesthetic adaptation. Unlike many reported cases, our patient did not require mechanical support, highlighting the importance of individualised intraoperative protocols even without ECMO availability.

Following adrenalectomy, our patient demonstrated rapid improvement, weaning off vasopressors within 48 hours and recovering full renal and cardiac function within one week. This is consistent with observations from Cheng, Zghal, and Lyu [5,2,6] who reported rapid normalisation of ventricular function and laboratory parameters after tumour removal.

The reversibility of catecholamine-induced myocardial dysfunction underscores the necessity of considering pheochromocytoma early in the course of unexplained cardiogenic shock. Our case, conducted without ECMO or elective alpha-blockade, reinforces the possibility of positive outcomes even in less-than-ideal conditions when clinical suspicion is high and surgical intervention is not delayed.

This case illustrates how important it is to maintain a high index of suspicion for pheochromocytoma in patients with recurrent, non-infectious myocarditis. It highlights the value of timely diagnosis even in resource-limited settings, and demonstrates that emergency adrenalectomy without prior alpha-blockade may be a viable, life-saving option when managed by an experienced multidisciplinary team. This observation reinforces the critical role of early recognition, collaborative decision-making, and adaptability in managing fulminant catecholamine-induced cardiomyopathy.

CONCLUSION

Pheochromocytoma must be considered in cases of recurrent myocarditis or unexplained cardiogenic shock, especially in young patients without traditional cardiovascular risk factors. Early imaging, catecholamine assays, and multidisciplinary coordination are essential for timely diagnosis and curative management. Emergency surgery without prior alpha-blockade can be justified in unstable patients and may lead to full recovery, as shown in this case.

DECLARATIONS

Consent for Publication: Written informed consent was obtained from the patient for publication of this case report.

Competing Interests: The authors declare no competing interests.

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Data Availability: Data available on request from the corresponding author.

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