CASE REPORT

Embolisation of pheochromocytoma to stabilise and wean a patient in cardiogenic shock from emergency extracorporeal life support

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SUMMARY

Pheochromocytoma is a catecholamine-secreting tumour associated with varying symptoms ranging from episodic headache, sweating, paroxysmal hypertension and tachycardia to intractable cardiogenic shock. Cardiogenic shock is rare but well-described and the timing of correct management is crucial since mortality is high. Fifty per cent of pheochromocytomas are diagnosed on autopsy. We report on a case of embolisation of the adrenal artery during ongoing extracorporeal life support (ECLS) in order to stabilise and wean the patient from ECLS as a bridge to final surgery.

BACKGROUND

This case highlights the difficulty in the differential diagnosis of cardiogenic shock secondary to pheochromocytoma and the importance of extracorporeal membrane oxygenation in the successful resuscitation and management of these patients, including the importance of embolisation as an alternative to emergency surgery in order to stabilise the patient.

CASE PRESENTATION

A 55-year-old healthy woman was re-admitted to the cardiology emergency unit under suspicion of recurrent Takotsubo cardiomyopathy. The patient had a history of recurrent palpitations and chest pain and was diagnosed with Takotsubo cardiomyopathy with full recovery 7 months earlier. Clinical assessment showed signs of heart failure, elevated troponin markers and an ECG revealed sinus tachycardia with a frequency of 130 bpm and ST-elevations in II, III, aVF, V6 and inverted T-wave in aVL. Acute echocardiography showed apical akinesia and a left ventricular ejection fraction (LVEF) of 15–20%, with contraction only in the basal segments. Acute coronary angiography showed normal coronary anatomy. During the procedure the patient desaturated, the blood pressure remained stable, but the heart frequency rose. Under anaesthetic assistance, the patient was given β -blocker intravenously; blood pressure dropped dramatically and the patient developed acute heart failure with pulmonary oedema. The patient was stabilised with inotropics, nitroglycerine and intubation, and transferred to the intensive care unit (ICU). In the ICU the patient received circulatory support, first with a heart pump device (Impella), but the patient deteriorated and extracorporeal life support (ECLS) was chosen for further

stabilisation. The cannulas for the ECLS were placed peripherally. The patient was unstable with alternating mean arterial pressure between 40–160 mm Hg. The patient's medical history and previous examinations were reviewed and the clinical presentation with, intermittently, palpitations, headache and chest discomfort, together with the cardiac manifestations, raised suspicion of pheochromocytoma as the pathogenic cause. A CT scan showed a 45 mm tumour in the left adrenal gland. Biochemical analysis and urine samples normally used in diagnosing pheochromocytoma were not reliable because of the patient's treatment with inotropics. Treatment with an α -blocker (phentolamine) before a possible adrenalectomy was initiated. The patient was too unstable to undergo regular surgery, and due to the patient's unstable condition we decided to embolise the tumour at the left adrenal gland with assistance from an interventional radiologist. Embolisation of the left adrenal artery was performed with ongoing ECLS, and the patient's haemodynamics subsequently stabilised. The Takotsubo-like changes seen on the echocardiography remised and the LVEF normalised. In 2 days, the patient was weaned from ECLS and after 10 days she was transferred to the endocrinology department. After 8 weeks the patient underwent conventional adrenalectomy and the diagnosis was confirmed by pathology. The patient is now in complete recovery and back to her full-time job.

DIFFERENTIAL DIAGNOSIS

Takotsubo cardiomyopathy.

DISCUSSION

Fulminant cardiogenic shock in patients with pheochromocytoma is rare. The initial presentation of pheochromocytoma can be cardiovascular manifestations such as acute myocardial infarction, heart failure, cardiac shock, cardiomyopathy including Takotsubo-like cardiomyopathy, arrhythmias and hypertensive crises,^{1–6} and the diagnosis can be difficult. ECLS treatment is described in several cases.^{7–14} Either medical treatment with α -adrenergic blocking agents or acute surgery has been used to stabilise patients so ECLS could be weaned. Our patient rapidly deteriorated, but timely treatment with ECLS gave us time to confirm the pheochromocytoma diagnosis. Treatment with an α -adrenergic blocking agent was not enough to stabilise the patient and a multidisciplinary team

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Figure 1 Contrast injected through a microcatheter (white arrow) in the left adrenal artery showing contrast (pheochromocytoma) filling of an adrenal tumour. Extracorporeal life support catheter (black arrow).

was assembled. Owing to the possibility of necrosis in and the anatomy of the tumour, the surgeon found that acute surgical removal was too risky.¹⁵ The team suggested embolisation of the adrenal artery. Embolisation of the adrenal artery in stable patients with pheochromocytoma has been described^{16–18} as a bridge to final surgery. To the best of our knowledge, however, arterial embolisation during ongoing ECLS has not yet been described.

Our interventional radiologist carried out the embolisation through the right femoral artery (figures 1 and 2) with the venous catheter for the ECLS in the right femoral vein (black arrow). The arterial catheter was placed in the left renal artery (white arrow) and, through a microcatheter placed in the adrenal artery, the embolisation was performed using

Figure 2 Catheter placed in the renal artery visualising the left kidney and the adrenal artery (white arrow). Extracorporeal life support catheter (black arrow).

0.3–0.5 mm particles (Contour, Boston Scientific). After the procedure the patient stabilised, and ECLS was weaned in 48 h without complications. After 10 weeks, laparoscopic adrenalectomy was performed, and the patient is now back to work, full time.

Learning points

- Cardiogenic shock caused by pheochromocytoma is a rare and difficult diagnosis that mimics Takotsubo cardiomyopathy.
- Extracorporeal life support should be thought of as a treatment to buy time when a patient presents with fulminant cardiogenic shock.
- Embolisation is a safe alternative to emergency surgery in these patients.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Lenders JW, Eisenhofer G, Mannelli M, *et al.* Pheochromocytoma. *Lancet* 2005;366:665–75.
- 2 Prejbisz A, Lenders JW, Eisenhofer G, *et al.* Cardiovascular manifestations of pheochromocytoma. *J Hypertens* 2011;29:2049–60.
- 3 Agarwal V, Kant G, Hans N, *et al.* Takotsubo-like cardiomyopathy in pheochromocytoma. *Int J Cardiol* 2011;153:241–8.
- 4 Yu R, Nissen NN, Bannykh SI. Cardiac complications as initial manifestation of pheochromocytoma: frequency, outcome, and predictors. *Endocr Pract* 2012;18:483–92.
- 5 Zelinka T, Petrák O, Turková H, *et al.* High incidence of cardiovascular complications in pheochromocytoma. *Horm Metab Res* 2012;44:379–84.
- 6 Kizer JR, Koniaris LS, Edelman JD, *et al.* Pheochromocytoma crisis, cardiomyopathy, and hemodynamic collapse. *Chest* 2000;118:1221–3.
- 7 Noorani A, Vuylsteke A, Lewis C, *et al.* A moribund athlete. *Lancet* 2012;380:74.
- 8 Banfi C, Juthier F, Ennezat PV, *et al.* Central extracorporeal life support in pheochromocytoma crisis. *Ann Thorac Surg* 2012;93:1303–5.
- 9 Sheinberg R, Gao WD, Wand G, *et al.* Case 1—2012. A perfect storm: fatality resulting from metoclopramide unmasking a pheochromocytoma and its management. *J Cardiothorac Vasc Anesth* 2012;26:161–5.
- 10 Sojod G, Diana M, Wall J, *et al.* Successful extracorporeal membrane oxygenation treatment for pheochromocytoma-induced acute cardiac failure. *Am J Emerg Med* 2012;30:1017.e1–3.
- 11 Ritter S, Guertler T, Meier CA, *et al.* Cardiogenic shock due to pheochromocytoma rescued by extracorporeal membrane oxygenation. *Interact Cardiovasc Thorac Surg* 2011;13:112–13.
- 12 Suh IW, Lee CW, Kim YH, *et al.* Catastrophic catecholamine-induced cardiomyopathy mimicking acute myocardial infarction, rescued by extracorporeal membrane oxygenation (ECMO) in pheochromocytoma. *J Korean Med Sci* 2008;23:350–4.
- 13 Huang JH, Huang SC, Chou NK, *et al.* Extracorporeal membrane oxygenation rescue for cardiopulmonary collapse secondary to pheochromocytoma: report of three cases. *Intensive Care Med* 2008;34:1551–2.
- 14 Chao A, Yeh YC, Yen TS, *et al.* Pheochromocytoma crisis—a rare indication for extracorporeal membrane oxygenation. *Anaesthesia* 2008;63:86–8.
- 15 Sumino Y, Tasaki Y, Satoh F, *et al.* Spontaneous rupture of adrenal pheochromocytoma. *J Urol* 2002;168:188–9.
- 16 Pua U, Wong DE. Transarterial embolisation of spontaneous adrenal pheochromocytoma rupture using polyvinyl alcohol particles. *Singapore Med J* 2008;49:e126–30.
- 17 Park JH, Kang KP, Lee SJ, *et al.* A case of a ruptured pheochromocytoma with an intratumoral aneurysm managed by coil embolization. *Endocr J* 2003;50:653–6.
- 18 Baguet JP, Hammer L, Tremel F, *et al.* Metastatic pheochromocytoma: risks of diagnostic needle puncture and treatment by arterial embolisation. *J Hum Hypertens* 2001;15:209–11.

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