Clinics in Surgery

Case Report
Published: 12 May, 2022

Pheochromocytoma Crisis: The Hidden Evil

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Abstract

Pheochromocytomas are catecholamine-secreting neuroendocrine tumors. They occur rarely but can cause life-threatening conditions like a multisystem crisis. A 37-year-old woman presented with lower abdominal pain and yellowish vaginal discharge a few hours after failed removal of the Intrauterine Contraceptive Device (IUCD). Per vaginal examination was normal but abdominal X-ray revealed air-fluid levels with free air under the diaphragm. We suspected intestinal obstruction, and an exploratory laparotomy was performed. The Blood Pressure (BP) and Heart Rate (HR) raised sharply before the procedure and were controlled. The post- laparotomy diagnosis was peritonitis secondary to IUCD perforation. Post laparotomy, the abdominal-pelvic ultrasound revealed a mass on the right adrenal gland, and we confirmed the diagnosis of pheochromocytoma after 24-h urinary metanephrine measurement. We planned for adrenalectomy once she was stable. However, she developed severe sepsis, and the second laparotomy was performed, which revealed extensive bowel necrosis. Afterwards, her condition improved and then started to deteriorate steadily. She became severe hemodynamically unstable with cardiogenic shock, pulmonary edema and sepsis. Despite intensive medical treatment, her condition deteriorated further, and she died on the 17th-day post-admission secondary to refractory multi-organ failure induced by pheochromocytoma crisis. We present this case to illustrate a rare case of pheochromocytoma crisis triggered by bowel perforation. It presented with pulmonary edema, labile blood pressures and cardiogenic shock. This is also a wakeup call for doctors to perform thorough investigations and early interventions to reduce mortality. Medical education and medical history may help to improve the prognosis.

Case Presentation

A 37 years old female presented with lower abdominal pain a few hours after an attempt to remove an IUCD at a local clinic. The device had stayed in place for five years. After the failed removal, she was instructed to go to the tertiary hospital. The pain started suddenly and was associated with non-smelling yellowish vaginal secretion; she also had headache, dizziness and nausea. She denied a history of fever, vomiting or constipation. The patient had normal menstruation two weeks before the presentation, and there was no per vaginal bleeding.

She denied a history of hypertension, heart disease, diabetes, or any chronic diseases. On physical examination, she was afebrile (36.50C), BP 125/90 mmHg, HR 86bpm, respiratory rate 20 cycles per minute (cpm), oxygen saturation (O2sat) 96% in room air and not sweating. The abdomen was flat with rebound tenderness in the hypogastrium. There was no palpable mass and bowel sounds were absent. Per vaginal examination, the cervix was closed, and gloved fingers were stained with non-smelling yellowish discharge. Mental state examination was normal, auscultation of the heart and lung was normal. Laboratory investigations revealed; WBC 18.3/l, platelets 372/l, hemoglobin 148 g/l, CRP 7.3 mg/dl, Urine color –yellow, nitrites +1, RBC 0, pH 5.5, urine protein =1, ketone body +2, red blood cell ++, leukocytes +1, Epithelial cells +2, UPT- negative, D-dimer 371 n/ml prothrombin time -12 sec, INR 1.05. Pelvic ultrasound showed normal findings, and IUCD echo was seen normally positioned in the uterus. Plain abdominal-pelvic X-ray showed free gas under the diaphragm, dilated small intestines, contraceptive ring shadow in the pelvis and light hyperosteogeny in some lumbar vertebrae (Figure 1). Preliminary diagnoses were; intestinal obstruction, uterine perforation with intestinal perforation, acute diffuse peritonitis and mild degeneration of the lumbar spine. The patient was prepared for emergency exploratory laparotomy. Just before she was anaesthetized, she became hypertensive (225/130 mmHg), tachycardic (160 bpm), and a large amount of pinkish watery secretions came out of the endotracheal tube (about 5000 ml). On physical examination, the patient was unconscious, not breathing, both pupils dilated 4 mm, slightly reacting to light and had cold limbs. After CPR, respiratory movements resumed with dyspnea. Her BP was fluctuating from 220/130 mmHg to 70/40mmHg, and it finally dropped to 75/40 mmHg. Acute pulmonary edema, hypertensive emergency, septic shock and cardiogenic shock were considered. She received

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Received Date: *07 Mar 2022*
Accepted Date: *05 May 2022*
Published Date: *12 May 2022*

Citation:
Yang H, Shao R, Dong R, Li F. Pheochromocytoma Crisis: The Hidden Evil. Clin Surg. 2022; 7: 3502.

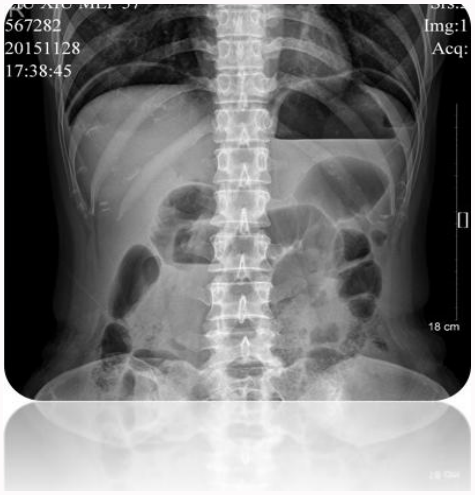

Figure 1: Abdominal X-ray.

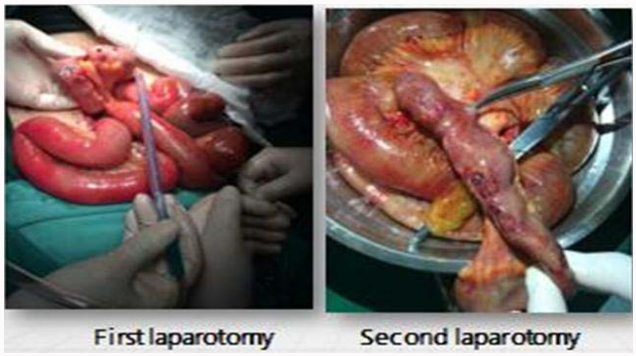

Figure 2: Showing intestinal perforations and necrosis respectively.

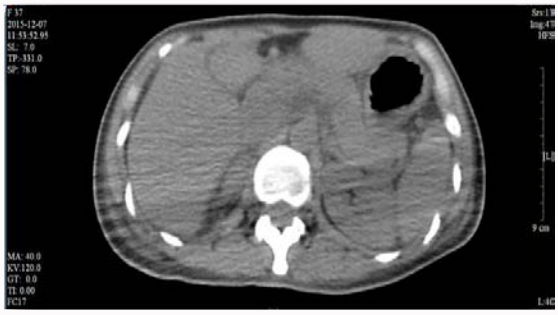

Figure 3: CT abdomen showing right adrenal gland. The adrenal mass occupies 50 mm × 30 mm.

fluid replacement, norepinephrine, dopamine, dexamethasone, oxygen therapy, and antibiotics were started. The patient stabilized two hours later, and then we did exploratory laparotomy. There were multiple perforations on the ileum at about 0.8 cm, 1 cm and 40 cm from the ileocecal junction and rupture of about 1 cm × 8 cm on the anterior uterine wall. Ovaries and fallopian tubes were normal. The repair was done under sterile condition, and drainage tubes were inserted. Head Computerized Tomography (CT) was normal, but Electrocardiography (ECG) revealed sinus tachycardia (150 bpm) with ST-segment depression and myocardial enzymes were raised. Plasma catecholamines were ordered, and they were markedly high. Abdominal-pelvic ultrasound revealed a hyperechoic space-occupying lesion in the right adrenal gland of about 50 mm × 29 mm, regular with clear boundaries. There was a dark liquid area around the liver, about 15 mm deep. 24-h urinary metanephrine levels were elevated in Table 1. The patient stayed in a coma for five days with episodes of hypertension, hypotension and persistent fever. We kept her on low dose norepinephrine, which was stopped when her BP exceeded 130/90 mmHg. She was also kept on ventilation, antibiotics (meropenem), inotropes (levosimendan), transpulmonary thermodilution, analgesia (remifentanil), sodium succinate and bedside hemofiltration. The plan was to perform adrenalectomy once the patient was stable. 6th-day post laparotomy; there was dark green leakage on the drainage tubes with no bowel sounds. We performed the second laparotomy. Intraoperatively, there was a heavy green turbid liquid in the pelvic cavity with a volume of about 300 ml, and the small intestines were densely covered with focal necrosis. About 2.8 m of the small intestines was resected, and a double-lumen enterostomy was done. The wound on the anterior wall of the uterus was clean (Figure 2). The next day post relaparotomy, she was still in a coma with decreased bowel sounds and developed right lower limb cyanosis. Vitals signs were; temperature 36.50C, HR 112 bpm, PB 94/54 mmHg, respiratory rate 19 cpm. Laboratory results were; WBC-14.6, platelets 38, hemoglobin 8.9 g/dl, CRP-7, potassium 4.9, sodium 142, calcium 1.9 mmol/l, albumin 47 g/l, AST-68, ALT 55. Culture results grew fungus, and caspofungin was added. Forty-eight hours post relaparotomy, the patient had improved significantly. She was conscious with a GCS score of 9 (E4M5VT). Head CT scan was repeated, revealing right occipital lobe infarction and abdominal CT showing right adrenal area occupying 50 mm × 30 mm (Figure 3).

4th-day post relaparotomy, the patient was conscious with a GCS score of 9 (E4M5VT).

Upon extubation, she was saturating well on room air. Repeated blood culture and catheter tip showed no growth. Sputum culture grew Ralstonia Pirelli sensitive to ciprofloxacin and levofloxacin. After counseling the patient, we discovered that she had been diagnosed with the right adrenal tumour five years before. Suddenly, her condition changed. BP dropped to 25/12 mmHg, ECG showed ventricular tachycardia, Cardiopulmonary Resuscitation (CPR) was initiated immediately with cardiac electrical defibrillation. Arterial blood gas showed normal partial pressure of oxygen, Return of Spontaneous Circulation (ROSC) was achieved after 8 min of resuscitation. The patient was kept on a ventilator, and was in a coma with fluctuating vital signs. She had many episodes of paroxysmal

Table 1: Plasma catecholamines levels.

Test	Results on day 3	Results on day 16	Unit	Prompt	Normal range
Adrenaline	>6666.00	4666.00	pg/mL	↑	0.00-100.00
Norepinephrine	10608.34	9175.82	pg/mL	↑	0.00-600.00
Dopamine	5429.26	3428.20	pg/mL	↑	0.00-100.00
Methoxyadrenaline	>20.56	>20.56	nmol/L	↑	≤ 0.50
Methoxynorepinephrine	>20.56	>20.56	nmol/L	↑	≤ 0.90

ventricular tachycardia of up to 150 bpm with premature beats. The episodes of hypotension were closely controlled by norepinephrine or epinephrine, and phentolamine infusion was given for hypertension. She was planned for adrenalectomy once she is hemodynamically stable and passes an anesthetic review. On the 17th-day post relaparotomy, the patient's HR suddenly dropped to 54 beats per minute, the BP and O_2 at could not be measured. We performed CPR, but there was no return of spontaneous circulation, and she died after 30 min, with the cause of death being multi-organ failure secondary to pheochromocytoma crisis.

Discussion

Pheochromocytomas are rare catecholamine-secreting neuroendocrine tumors arising from chromaffin cells of the adrenal medulla. They often present with a classic triad of episodic headaches, palpitations and excessive sweating. They occur rarely but can cause life-threatening conditions like a multisystem crisis [1]. Pheochromocytoma crisis is a life-threatening condition marked by excessive catecholamine secretion by pheochromocytoma. It usually presents with; multi-organ system failure, shock, severe hypertension, and or hypotension. Sometimes the patients may have high fever and Encephalopathy [2]. We report a case of a woman who presented with signs of intestinal obstruction after a failed IUCD removal. She was aware of her pheochromocytoma diagnosis but did not disclose it initially. We found it on radiological imaging and confirmed it by subsequent 24-h urine metanephrine measurement. The uterus and intestines were perforated upon explorative laparotomy, and she experienced a hypertensive crisis. Postoperatively she was hemodynamically unstable with episodes of hypertension and hypotension. Unfortunately, she died before we were able to stabilize her for adrenalectomy. Before the crisis, some patients can be entirely asymptomatic for so long [3]. Other cases can present with hypertension upon a stressful trigger like surgery or other medications [4-6]. Usually, they are found coincidentally on radiologic imaging [7,8]. Higher plasma or urine catecholamine levels play an important role in biochemical diagnosis, and imaging studies are used to localize the tumor [9,10]. We had considered our case as a perforation by a copper IUCD without knowing that there was another hidden evil. Pheochromocytoma was thought of after excluding other causes of the catecholamine storm. The blood pressure was very labile, changing from low to high, which was very challenging. An unexplained cardiogenic shock, pulmonary edema, and encephalopathy were refractory to treatments. Other studies have reported the same findings [11-13]. High-dose norepinephrine and epinephrine were used repeatedly to maintain BP during hypotension, and a short-acting alpha-blocker (phentolamine) was given for hypertension. The treatment of hypotensive shock in a patient with pheochromocytoma is more demanding and needs aggressive treatment with volume substitution and high dose catecholamines. The literature recommends using alpha-blockers before beta-blockers to manage hypertension [9,13]. Circulatory support is mandated if active drug treatment cannot obtain stable hemodynamics. ECLS is feasible as a bridge to recovery in patients suffering from cardiogenic shock and massive pulmonary edema due to pheochromocytoma and is associated with a good prognosis [12-14]. Although adrenalectomy is the ultimate management, there is a need to stabilize the patient hemodynamically before the surgery. Hence adrenalectomy should not be considered an emergency surgery; this helps control the acute crisis and improve survival [2,9]. Our patient was scheduled for adrenalectomy after stabilizing her acute condition, but unfortunately, she died before that. Her APACHE score was 37 with an estimated mortality rate of 82%, and her SOFA score was 21 with an estimated mortality rate of 95%. Several literatures reported similar incidents with failed stabilization of patients before they died [12,15,16].

Conclusion

This case is a wakeup call for doctors to have a high suspicion of pheochromocytoma in all patients with unexplained cardiogenic shock and catecholamine storms. Moreover, medical education on the outcomes of the condition should be stressed in every diagnosed patient so that they can make an informed decision. After the diagnosis is confirmed, interventions should not be delayed if the patient is fit for surgery.

Funding

This work was supported by the National Natural Science Foundation of China (Grant no. 81871551) and Natural Science Foundation of Guangdong province (Grant no. 2020A1515010227) to Professor Hong Yang.

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