



Adrenal Pheochromocytoma: A Case Report

Milind Pande^{a≡}, Sunita Vagha^{b*⊕}, Aditi Goyal^{b#} and Raunak Kotecha^{ct}

^a Department of Pathology, Datta Meghe Medical College, Nagpur, India.

^b Department of Pathology, Jawaharlal Nehru Medical College, Wardha, India.

^c Department of Medicine, Datta Meghe Medical College, Nagpur, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Pheochromocytoma is a rare catecholamine secreting tumour originating usually from adrenal medulla and produces signs and symptoms due excessive catecholamine secretion from tumour. A young male patient of 36 yrs age presented with hypertension since 2 yrs, palpitation, profuse sweating, weight loss. Clinical suspicion of Pheochromocytoma was confirmed by CT scan and USG abdomen followed by catecholamines levels in plasma and urine. After preoperative preparation laparoscopic removal of Pheochromocytoma was done. Postoperative recovery was uneventful and BP regains to normal range from 1st postoperative day. Pheochromocytoma is a rare cause of hypertension. If the diagnosis of Pheochromocytoma is overlooked, the consequences could be disastrous, even fatal; however, if a pheochromocytoma is identified, it is potentially curable, as being one of the cause of surgically correctable hypertension.

Keywords: Pheochromocytoma; catecholamines; Computed Tomography.

1. INTRODUCTION

Pheochromocytoma is a rare but life-threatening condition that has varied clinical presentations

particularly hypertension, headache, palpitation, and sweating [1]. Patients with suggestive clinical features are frequently tested for Pheochromocytoma. The medical interest in this

[≡] Associate Professor,

[⊕] Professor and Head,

[#] Post-Graduate,

[†] Junior Resident

^{*} Corresponding author

tumor has increased with the improved availability of diagnostic laboratory tools particularly plasma or urinary fractionated metanephrines (metanephrine and normetanephrine), and other neuroendocrine markers particularly chromogranin A [2,3]. The wide universal availability of different imaging facilities, both anatomical and functional, has also improved the detection of Pheochromocytoma [4].

The growing awareness for implementing different protocols and guidelines that consider Pheochromocytoma in the work-up and differential diagnosis has improved diagnosis of the disorder. Accurate diagnosis is important because if the tumor is detected early laparoscopic or surgical treatment is usually curative before other changes or complications take place [5,6].

Catecholamine-producing tumors are neuroendocrine tumors that affect the chromaffin cells of adrenal medulla and postganglionic fibers of the sympathetic nervous system. These tumors are characterized by the synthesis, storage, release, and secretion of catecholamines and their metabolites [7,8]. They include pheochromocytomas in the adrenal medulla and paragangliomas in the extra-adrenal sympathetic ganglions usually below the diaphragm in the retroperitoneum or organ of Zuckerkandl and various sites including the head, neck, thorax, and abdomen. However, although the majority of these tumors are benign and adrenal, investigation workup should consider their tendency for being multiple, malignant, and familial with genetic pathogenesis [9].

Epinephrine (and its metabolite metanephrine) is the catecholamine that is produced exclusively by the adrenal medulla and adrenal Pheochromocytoma [10]. On the other hand, norepinephrine (and its metabolite normetanephrine) is the catecholamine produced by the adrenal medulla and adrenal Pheochromocytoma as well as by the extra-adrenal Pheochromocytoma and paraganglioma, which can also produce dopamine and its metabolite methoxytyramine. However, this is rare.

Pheochromocytomas can affect individuals of all ages. They are common in people aged between 40 and 50 years, and relatively more common among females [11]. Adrenal

pheochromocytomas constitute nearly 85% of cases of pheochromocytomas, with 15% being extra-adrenal paragangliomas that affect the sympathetic ganglions anywhere from the base of the brain to the urinary bladder. Laboratory diagnosis is usually achieved by measuring the catecholamines, or more importantly their metabolites in plasma or urine [12]. Although different markers, including catecholamines and vanillylmandelic acid, are utilized as diagnostic tests, total and fractionated metanephrines in plasma or urine provide the best valid laboratory test for excluding or confirming Pheochromocytoma. In addition, chromogranin A is another reliable marker for neuroendocrine tumors, including Pheochromocytoma and is increasingly used in the diagnostic workup and follow-up of patients with these tumors [13]. Following diagnosis, removal of the adrenal gland or the tumor is done by open surgery or by the laparoscopic technique, which is considered the 'gold standard' treatment choice since 1992 [14].

2. CASE REPORT

A 36 yrs male patient from Amravati having complaints of uncontrolled hypertension since 2 yrs, Headache, Generalised weakness, Profuse sweating suddenly, Palpitation, and Weight loss sudden 10 kg in one month, Feeling heaviness in chest, having such complaints, CT Abdomen and pelvis (contrast) was done at Amravati and was reported as Well defined moderately enhancing hypodense rounded lesion in right adrenal region with central areas of necrosis, findings are suggestive of right adrenal Pheochromocytoma in given clinical scenario. And also USG Abdomen and KUB with Doppler renal vessels was done and reported as evidence of hpoechoic mass lesion superior and medial to upper pole of right kidney measuring 4.58 x 4.36 cm. in size, suggestive of right adrenal tumor. With above mentioned complaints and investigations patient was referred to our hospital for further management. On admission patient's general condition was moderate, Afebrile, Blood pressure 150/100 mm og hg, pulse 86/min, Respiratory Rate 20/min, Respiratory system- chest clear, Cardiac system-unremarkable, CNS examination- conscious, oriented, P/A- soft and non tender. With above history and investigations pheochromocytoma profile was advised which revealed the following parameters:

- 1) Plasma Epinephrine - 33 pg/ml (less than 100 pg/ml). 2) Plasma Norepinephrine - 3326.6 pg/ml less than 600)

- 3) Plasma Metanephrine – 30.4 pg/ml (less than 65).
- 4) Plasma Normetanephrine – 533 pg/ml (less than 196)
- 5) 24 hrs. urine Epinephrine – 15.4 (less than 20).
- 6) 24 hrs. urine Norepinephrine – 955.4 (less than 90)
- 7) 24 hrs. Metanephrine/Creatinine ratio – 182.94 (33-109).
- 8) 24 hrs. Normetanephrine/Creatinine ratio - More than 8823 (86-236)
- 9) 24 hrs. Urine VMA – 47.6 (less than 8.0).
- 10) 24 hrs. VMA ratio to Creatinine – 41.18 (less than 8.0)

All the investigations were pointing towards right adrenal Pheochromocytoma. Patient was discharged with proper medication to control blood pressure and advised for surgery after 10 days.

Patient was admitted for surgery and after discussion with relatives and their consent and proper fitness from anaesthetist, patient underwent laparoscopic excision of right adrenal tumor, procedure was uneventful, specimen sent for histopathology. Patient was discharged on seventh postoperative day. In pathology department received tumor mass of size 5 cm. in diameter, cutsection brownish in colour, haemorrhagic, necrotic areas seen. Microscopically sections show trabeculae, nests, separated by fibrovascular septae and comprising of cells having finely granular cytoplasm with round to oval nuclei and prominent nucleoli. Tumor is rich in vascular net work. Necrotic material seen. So reported as suggestive of Pheochromocytoma and Immunohistochemistry advised. Blocks sent to SRL Mumbai for IHC. They confirmed it as right adrenal Pheochromocytoma. Which was chromogranin, synaptophysin -positive, S-100 protein was positive in sustentacular cells, ki-67-positive 2 %, CD56- focal positive. Pan cytokeratin and vimentin – Negative. After two years of followup patient is not having any complaints.

3. DISCUSSION

Pheochromocytoma is a rare neoplasm, which are derived from cells of the chromaffin tissue and mostly situated within adrenal medulla. Only approximately 15% Pheochromocytoma develops from extra-adrenal chromaffin tissue which lies in the paraganglion chromaffin tissue of the sympathetic nervous system extending from base of skull to the urinary bladder [15].

Common locations of extra-adrenal Pheochromocytomas include the organ of Zuckerkandl (close to origin of the inferior mesenteric artery), urinary bladder wall, heart, mediastinum and carotid and glomus jugulare bodies [16].

Pheochromocytomas occur in people of all races, although they are diagnosed less frequently in blacks and equal frequency in male and female. Pheochromocytomas may occur in persons of any age. The peak incidence, however, is between the third and the fifth decades of life. Approximately 10% occur in children [17]. The majority of cases are sporadic, with only 16% having a history of associated endocrine disorder such as Multiple Endocrine Neoplasia type II (MEN IIA and IIB), Neurofibromatosis 1 (NF 1) and von Hippel-Lindau disease (VHL). Approximately 10% of pheochromocytomas are malignant. Direct invasion of surrounding tissue or the presence of metastases determines malignancy. Unfortunately, no reliable clinical, biochemical or histological features distinguish a malignant from a benign pheochromocytoma [18].

The clinical manifestations of a pheochromocytoma results from excessive catecholamine secretion by tumour. Catecholamines typically secreted, either intermittently or continuously, includes norepinephrine and epinephrine; rarely dopamine is secreted. The biological effects of catecholamines are well known [19]. Catecholamine secretion in Pheochromocytoma is not regulated in the same manner as in healthy adrenal tissue. Relative catecholamine levels also differ in Pheochromocytoma [20]. Most pheochromocytomas secrete norepinephrine predominantly, whereas secretions from normal adrenal medulla are composed of 85% epinephrine [21]. The classic history of a patient with Pheochromocytoma includes spells (Paroxysms) characterized by headaches, palpitations and diaphoresis in association with severe hypertension. The spells may vary in occurrence from monthly to several times per day and the duration may vary from seconds to hours. Paroxysms may be precipitated by physical training, induction of general anaesthesia and numerous drugs and agents (contrast media, tricyclic antidepressive drugs, metoclopramide and opiates). Typically, they worsen with time, occurring more frequently and becoming more severe as the tumour grows [22].

The first step in the diagnosis of a pheochromocytoma is the biochemical confirmation of catecholamine excess. Plasma metanephrine testing has the highest sensitivity (96%) for detecting a pheochromocytoma, but it has a lower specificity. In comparison, a 24 hour urinary collection for catecholamines and metanephrines has a sensitivity of 87.5% and a specificity of 99.7%. The biochemical diagnosis is followed by the localization of the Pheochromocytoma and/ or metastases. Magnetic Resonance Imaging (MRI) is preferred over Computed Tomography (CT) scanning because contrast media used for CT scans can provoke paroxysms. Surgical resection of the tumour is the treatment of choice and usually results in the cure of hypertension. Careful preoperative preparation requires with combined alpha and beta-blockade to control blood pressure and to prevent intraoperative hypertensive crisis [23].

Surgical management has progressed through the years. Prior to introduction of laparoscopic adrenalectomy, thoracoabdominal approach was utilized at some centers, more commonly the midline abdominal and flank approaches have been used. Since the first laparoscopic adrenalectomy for Pheochromocytoma was done in 1992, it has been performed in numerous centers with excellent success over past decade [24-25]. Laparoscopic adrenalectomy is comparable to open approach, and should be considered preferentially in patients with tumour less than 6 cm. For larger or extra-adrenal tumour an open approach is favoured. Biochemical cure should be confirmed by assay of 24 hour urinary catecholamine 2-3 weeks after surgery and the lifelong urinary catecholamine measurement should be performed to identify recurrent or metachronous Pheochromocytoma [26-27].

4. CONCLUSION

Pheochromocytoma is one of the few causes of hypertension that can be treated surgically. Although it is the causative factor of hypertension in about 0.1% to 0.6% of the hypertensive population, detection is mandatory, not only for the potential cure of the hypertension but also to avoid the potentially lethal effects of the unrecognized tumor.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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