

A Rare Case of Right Adrenal Ganglioneuroma: A Case Report.

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Abstract

Background:

Adrenal ganglioneuromas are rare benign neuroectodermal tumors. Preoperative diagnosis is often challenging, with most cases being diagnosed after adrenalectomy. The incidence of adrenal ganglioneuromas is approximately 0.3%-2% of all adrenal incidentalomas.

Case presentation:

A case of a 29-year-old female who presented with mild right flank pain. A contrast-enhanced computed tomography (CECT) scan of the abdomen and pelvis identified a well-defined soft tissue density lesion of 6 x 5.4 x 7.7 cm in the right suprarenal region with few calcifications. Post-contrast images showed minimal enhancement of 7 HU (pre-contrast at 35 HU, post-contrast venous phase at 42 HU, and delayed images at 15 minutes showing 60 HU). The absolute washout was 19%, and the relative washout was 7%. Hormonal workup (serum aldosterone, plasma free metanephrines, plasma free normetanephrines, plasma 3-methoxytyramine, and serum cortisol) was normal. The patient was clinically diagnosed with a large non-functioning right adrenal tumor with a suspicion of malignancy. The patient underwent laparoscopic right adrenalectomy. Intraoperative and postoperative periods were uneventful. Histopathological examination confirmed the diagnosis of adrenal ganglioneuroma (a spindle cell tumor composed of cells arranged in sheets with spindle to wavy normochromic nuclei, moderate eosinophilic cytoplasm, fibrous stroma, scattered ganglion cells, and areas of calcification, but absence of neuroblasts). Postoperatively, the patient is doing well and has completed 6 months of follow-up. Although adrenal ganglioneuromas are benign with mostly normal hormonal evaluation, they can mimic malignancies due to their large size.

Conclusion:

This case underscores the importance of considering adrenal ganglioneuroma in the evaluation of adrenal masses.

Keywords: Adrenal, ganglioneuroma, adrenalectomy, spindle cells, Schwann cells.

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Introduction

Ganglioneuromas are exceedingly rare benign tumors originating from neuroectodermal tissue, consisting of ganglion and Schwann cells [1]. The incidence of adrenal ganglioneuromas is approximately 0.3%-2% of all adrenal incidentalomas [2-4]. The largest meta-analysis concerning ganglioneuroma, irrespective of age, was published in 2021; it found 364 reported cases so far [5].

Despite their rarity, they should be considered in the differential diagnosis of an adrenal mass [6]. In a substantial study, 21% of ganglioneuroma cases originated from the adrenal gland.

Other common sites included the mediastinum (39%) and retroperitoneum (31%), with occasional instances in the pelvis and neck [1].

These tumors predominantly affect younger individuals, with only 20% of cases in people over 40 years of age, and approximately 50% of cases occurring in those aged 10 to 29 years.

Ganglioneuromas are typically benign, although there have been rare reports of them undergoing malignant transformation [1].

Additionally, instances of peripheral nerve sheath tumors

(PNST) developing within ganglioneuromas, as well as composite tumors involving both ganglioneuroma and pheochromocytoma, are documented in the literature [7]. Ganglioneuromas have also been noted to secrete vasoactive intestinal polypeptide (VIP), which can cause diarrhea in some patients [1]. Additionally, some ganglioneuromas produce catecholamines and their metabolites, and in rare instances, cortisol and androgen [8-12]. However, most individuals with ganglioneuromas remain largely asymptomatic [7]. At present, histopathologic examination is the only method to diagnose ganglioneuroma and distinguish it from other adrenal tumors, including other neural crest tumors.

Hereby, we report a rare case of a 29-year-old female patient with a large, non-functioning right adrenal tumor who underwent laparoscopic right adrenalectomy, and histopathological examination confirmed the diagnosis of an adrenal ganglioneuroma.

Case presentation

A 29-year-old multiparous female patient, homemaker by occupation, from Mysore, Karnataka, India, presented with right flank pain for 3 months. The pain was mild,

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continuous, dull aching, radiating to the back, and was relieved by analgesics. There was no history of fever, vomiting, hematuria, urinary symptoms, trauma, or comorbidities. Her menstrual history was normal. No significant family history. No relevant medical history. No prior medication history and no history of allergy. No previous history of any urological procedures. Patient was a non-smoker and non alcoholic.

On examination, her vitals were stable, and her BMI was 20 kg/m². Per abdominal examination was normal. Routine blood investigations revealed the following: Hemoglobin (Hb) 12.8 gm/dl, total leucocyte count (TLC) 8620/mm³,

blood urea 16 mg/dl, serum creatinine 0.7 mg/dl, serum sodium 140 mEq/l, and serum potassium 4.3 mEq/l. Urine analysis showed 1+ leucocytes, no red blood cells (RBCs), 4-6 pus cells, and no albumin. Urine culture showed no growth.

An ultrasound (USG) of the abdomen revealed a space-occupying lesion in the right adrenal region measuring 5.8 x 4.9 cm and bilateral polycystic ovary disease. A contrast-enhanced computed tomography (CECT) scan of the abdomen and pelvis identified a well-defined soft-tissue density lesion measuring 6 x 5.4 x 7.7 cm in the right suprarenal region with few calcifications (Figure 1).

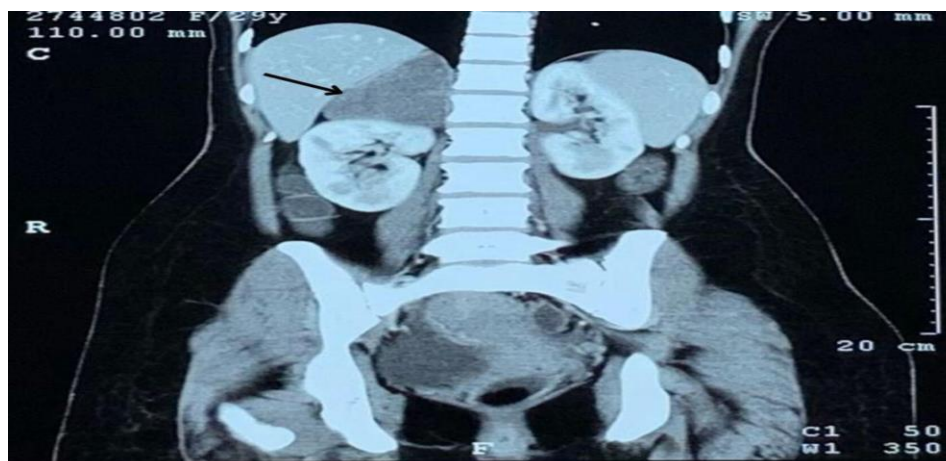


Figure 1 - CECT abdomen and pelvis showing a well-defined soft-tissue density lesion measuring 6 x 5.4 x 7.7 cm in the right suprarenal region with a few calcifications

Post-contrast images showed minimal enhancement of 7 HU (pre-contrast at 35 HU, post-contrast venous phase at 42 HU, and delayed images at 15 minutes showing 60 HU). The absolute washout was 19%, and the relative washout was

7%. The mass was abutting the D10 to D12 vertebrae, abdominal aorta, VI and VII hepatic segments, compressing the suprarenal inferior vena cava (IVC) and left renal vein (Figure 2).

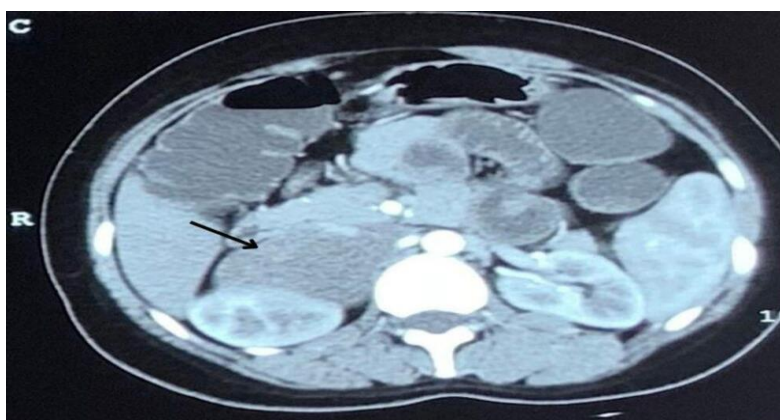


Figure 2 - CECT abdomen and pelvis showing the mass abutting the D10 to D12 vertebrae, abdominal aorta, VI and VII hepatic segments, and compressing the suprarenal inferior vena cava (IVC) and left renal vein

Hormonal analysis was normal, with serum aldosterone at 3.43 mg/dl, plasma free metanephrines at 8 ng/l, plasma free normetanephrines at 74.2 mg/dl, plasma 3-methoxytyramine at 5.59 ng/l, and serum cortisol (8 AM) at 15.4 µg/dl. The patient was clinically diagnosed with a large non-functioning right adrenal tumor with a provisional diagnosis of malignancy.

She underwent right laparoscopic adrenalectomy transperitoneally. The patient was placed in the left lateral decubitus position with the right flank elevated around 60 degrees. 12 mm port was inserted at the lateral border of the rectus abdominis just above the level of the umbilicus. Two subcostal 5 mm ports were placed: one in the midclavicular line and the other in the lateral border of the rectus abdominis. The third 5 mm working port was placed in the anterior axillary line, and the fourth 5 mm working port, for retraction of the liver, was placed in the epigastrium. The triangular ligament was dissected, and the liver was retracted superiorly and medially. The subhepatic inferior vena cava was identified lateral and posterior to the

gallbladder. The peritoneum along the lateral aspect of the IVC was incised to expose the IVC just below the intrahepatic course, and dissection was carried out inferiorly along the lateral edge of the IVC up to the superior edge of the right renal vein. A large right adrenal mass was noted, indenting the upper pole of the right kidney and extending behind the suprarenal IVC. Further dissection was done posteriorly, bordering the superior aspect of the right renal vein, for inferior adrenal dissection. The inferior adrenal gland was retracted laterally, as the medial dissection was performed in a cephalad direction. The right adrenal vein was identified and ligated, and medial dissection was completed with care taken not to injure the IVC. Lateral dissection was done, and the specimen was retracted out in an endopouch. The total duration of surgery was approximately 2.5 hours, and total blood loss was approximately 100 mL. No adverse events or unexpected complications were observed during surgery. The gross specimen showed a grey-brown mass measuring 7 x 9.5 x 5 cm with grey-yellow areas on cross-section (Figure 3).



Figure 3 - Gross specimen of left adrenal gland, showing a grey-brown mass measuring 7 x 9.5 x 5 cm with grey-yellow areas on cross-section

The postoperative period was uneventful. The abdominal drain and Foley's catheter were removed on the first postoperative day. The patient was discharged on the second postoperative day. Histopathology revealed a spindle cell tumor composed of cells arranged in sheets with spindle to wavy normochromic nuclei, moderate eosinophilic cytoplasm, fibrous stroma, and scattered Schwann and

ganglion cells, and areas of calcification; no neuroblasts were observed, which was consistent with the diagnosis of Ganglioneuroma (Figure 4). Postoperatively, the patient is doing well and has completed 6 months of follow up. No adverse events or unexpected complications were observed during follow-up.

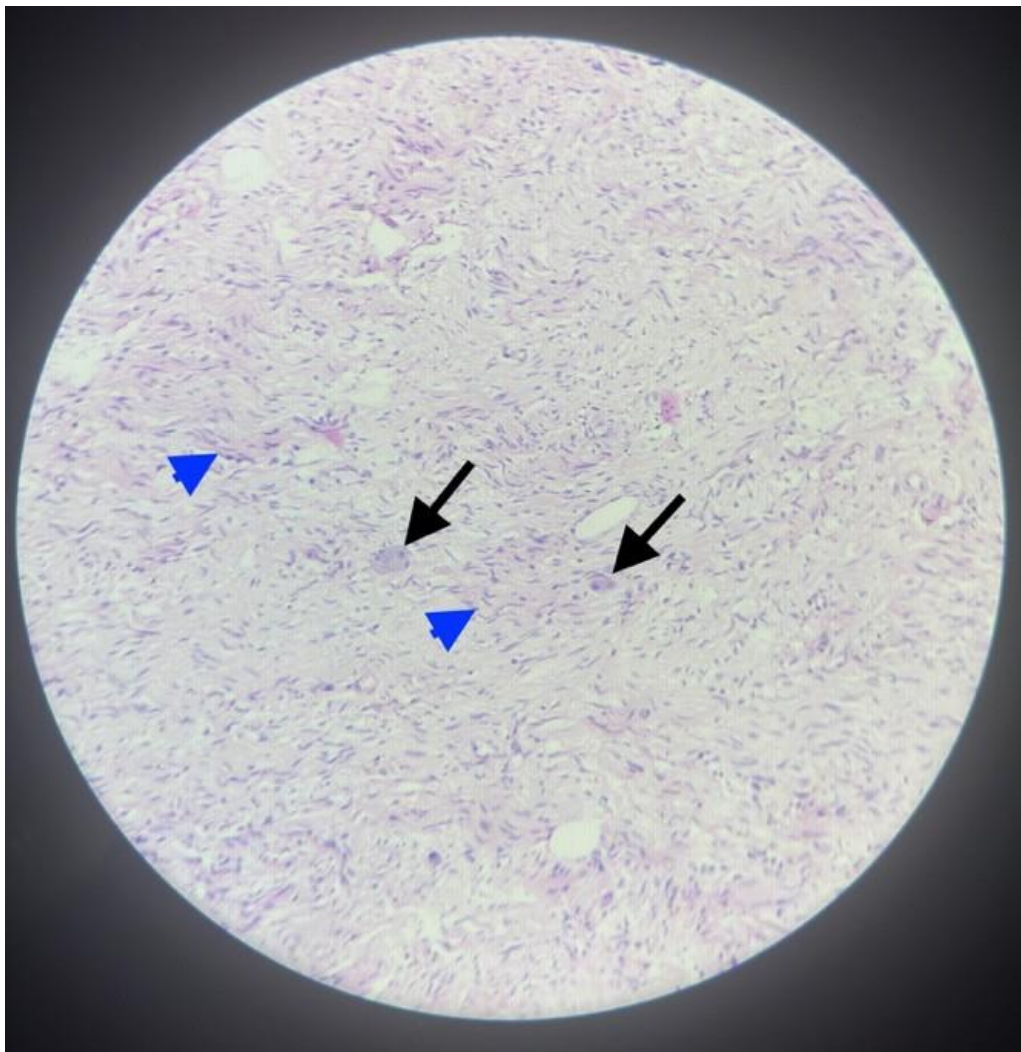


Figure 4: Histopathology specimen with black arrow showing ganglion cells and blue arrow suggestive of wavy spindle-shaped cells

Discussion

Ganglioneuromas are extremely rare and benign neuroectodermal neoplastic tumors that consist of Schwann cells and ganglion cells [1]. There is a relative paucity of information in the literature concerning their exact incidence.

In a large study of 88 cases, 21% of ganglioneuromas originated from the adrenal gland. Other common sites included the mediastinum (39%) and retroperitoneum (31%) [1]. In this study, the ganglioneuroma developed from neuroectodermal cells in the right adrenal gland.

The tumor tends to affect younger individuals, with approximately 80% of cases occurring in people under 40 years old and around 50% found in patients aged between 10 and 29 years [1]. Females are more prone to be affected than males. In this case, the patient is a young female who is 29 years old.

Although most ganglioneuromas are non-functional, there have been reports of these tumors secreting vasoactive intestinal polypeptide (VIP) due to their origin from neural crest cells of the sympathetic nervous system, which can act on the intestines to stimulate massive secretion of water and electrolytes, causing severe secretory diarrhea [1]. However, most of the patients with ganglioneuromas are largely asymptomatic [7]. Approximately up to 30% of patients were found to have elevated plasma and urinary catecholamines, but they rarely develop symptoms of vasoactive amine excess. In this case, the patient presented with right flank pain, and there were no symptoms of any hormonal hypersecretion. Hormonal assays showed serum aldosterone, plasma free metanephrines, plasma free normetanephrines, plasma 3-methoxytyramine, and serum cortisol within normal limits, denoting the adrenal mass as non-functional.

Ganglioneuromas can grow to an enormous size and tend to encase blood vessels due to their origin in the sympathetic nervous chain, but they virtually never invade the vessel wall or cause true luminal stenosis [7]. Because they lack aggressive, infiltrative cellular features, they grow via an indolent "soft" expansion. Instead of invading, eroding, or squeezing rigid arterial structures (such as the celiac axis, superior mesenteric artery, or aorta), the pliable tumor tissue simply flows around and molds itself to the contours of the major great vessels. In this case also, a large 7 x 9.5 x 5 cm right adrenal mass was seen abutting the abdominal aorta, compressing the suprarenal IVC and left renal vein, but with no lumen or vessel wall involvement.

On CECT abdomen, ganglioneuromas show attenuation less than that of muscle [7]. Calcifications within the ganglioneuroma lesions are found in as many as one-third of the cases [1]. Some authors propose that a metabolically inactive adrenal mass with an unenhanced attenuation below 40 HU, along with stippled calcifications, should prompt consideration of a ganglioneuroma [6]. In this case, on CECT abdomen, there was a right adrenal mass that showed

a pre-contrast attenuation of 35 HU with post-contrast enhancement of 7HU and a few calcifications within.

The management of choice is either open, laparoscopic, or robotic adrenalectomy. Laparoscopic adrenalectomy is an ideal surgical procedure for ganglioneuromas of the adrenal gland [13-14]. In this case, the patient underwent right laparoscopic adrenalectomy, with an uneventful hospital stay of 4 days. Nevertheless, the prognosis after surgical resection of ganglioneuroma is good, and no further postoperative management, such as adjuvant therapy, is required, as it is a benign tumor [13].

Conclusions

Although adrenal ganglioneuromas are benign, they can mimic malignancies due to their large size. Preoperative diagnosis is challenging because ultrasonography and computed tomography scans do not reveal specific characteristics unique to ganglioneuromas. Therefore, all patients with suspected adrenal ganglioneuromas should undergo adrenalectomy. Definitive diagnosis can only be confirmed through postoperative histopathological examination.

Generalizability

The generalizability of the study is statistically limited due to its single-patient case report format involving a rare condition, yet it retains clinical utility for differential diagnoses in endocrinology and oncology. The findings provide transferable lessons regarding diagnostic exceptions for large, non-functioning adrenal tumors despite the extremely limited population validity.

Limitations

1. **No Statistical Generalizability:** The findings are based on a single 29-year-old female, making it impossible to establish a broader statistical trend, cause-and-effect relationship, or universal diagnostic criteria.
2. **Short Follow-Up Period:** The patient was only followed for **6 months postoperatively**. While the immediate outcome was uneventful, a longer follow-up period is required to definitively confirm the complete absence of long-term recurrence or late complications.

Recommendation

The primary recommendation of this study is that clinicians must include adrenal ganglioneuroma in the differential diagnosis of large, non-functioning adrenal masses, even when imaging characteristics falsely suggest malignancy.

Takeaway lessons

Due to widespread utilization of abdominal ultrasonography, CT scan, and MRI, detection of such

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tumors has increased; the differential diagnosis of an adrenal/retroperitoneal mass should include ganglioneuroma.

List of abbreviations

PNST - Peripheral Nerve Sheath Tumors VIP - Vasoactive Intestinal Peptide Hb – Hemoglobin
 TLC – Total Leucocyte Count mEq/L- milliequivalents per litre RBCs – Red Blood Cells
 USG – Ultrasound
 CECT - Contrast-enhanced computed tomography; HU – Hounsfield Unit
 IVC - inferior vena cava Mg/dl – milligram per decilitre ng/l – nanogram per litre
 ug/dl – microgram per decilitre

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images

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Conflict of interest

No conflict of interest

Author contributions

Dr Ravikumar BR conceived the study, participated in the surgical management (right laparoscopic adrenalectomy) of the patient, and performed critical revision of the manuscript for important intellectual content. Dr Gunjot Singh Ghai collected the clinical data, reviewed the radiological imaging (CECT scan), and drafted the initial manuscript. Dr Suhas Umakanth followed up with the patient postoperatively, managed the clinical records, and assisted in literature review and drafting the discussion section. All authors have read and approved the final version of the manuscript to be published and agree to be accountable for all aspects of the work.

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