



Urology case reports: Rapidly growing adrenal ganglioneuroma in a young man

Shwetha Mudalegundi, Angelica Griggs-Demmin, Nora M. Haney, Nirmish Singla*

Department of Urology at the Brady Urological Institute, Johns Hopkins University School of Medicine, Baltimore, MD, USA

ARTICLE INFO

Keywords:

Adrenal incidentaloma
Ganglioneuroma
Adrenalectomy

ABSTRACT

A 23-year-old man was incidentally diagnosed on CT scan with a 6.4 cm right adrenal mass during workup for acute abdominal pain, with interval growth to 9.4 cm over 3 months. Given the mass size and concern for potential malignancy, a right open adrenalectomy was performed. Pathologic evaluation confirmed a diagnosis of adrenal ganglioneuroma (AG) and the patient exhibited an unremarkable postoperative course. AGs are rare, benign tumors of the adrenal gland. Diagnosis is made by histopathologic assessment, and management of larger AGs is nearly always surgical given radiographic similarities between AG and malignancy. Adrenalectomy is generally curative for AG.

1. Introduction

Adrenal masses include both benign and malignant pathologies including adenoma, myelolipoma, cysts, hemorrhage, adrenal ganglioneuroma (AG), adrenocortical carcinoma (ACC), pheochromocytoma, oncocytoma, and secondary metastasis. Rarely, infections such as cryptococcus, tuberculosis, and leishmania can also present as adrenal masses. An AG is a rare finding among adrenal incidentalomas. It is a benign tumor, composed of ganglion and Schwann cells. AG is more commonly seen in patients younger than 40 and can grow to encase, but rarely impinge, critical structures such as blood vessels.¹

2. Case presentation

A 23-year-old man presented to the emergency department with acute right lower quadrant abdominal pain. A contrast-enhanced CT scan demonstrated acute appendicitis and an incidental 6.4 cm right adrenal mass (Fig. 1A and B). He underwent an urgent laparoscopic appendectomy for acute appendicitis, recovered without complications, and was referred to both endocrinology and urology as an outpatient for further evaluation and management of his adrenal mass.

At his outpatient follow-up, the patient endorsed intermittent right flank pain, chronic excessive sweating, palpitations, headaches and non-exertional intermittent left-sided chest pain. Non-contrast CT scan demonstrated an increase in the size of the mass to 9.4 cm over a 3-

month timeframe (Fig. 1C and D), with an average attenuation of 23 Hounsfield units. Functional workup was unremarkable and revealed serum levels of ACTH 17.7 pg/mL (normal 10–60), cortisol 10.2 mcg/dL (normal 6–23), DHEA 241 µg/dL (normal 65–380), total normetanephrines 5 pg/mL (normal 18–111), and total metanephrines 51.9 pg/mL (normal 12–60). Per Endocrine Society guidelines, a low-dose dexamethasone suppression test and late-night salivary cortisol were ordered but unfortunately never completed. A contrast-enhanced MRI was obtained for further characterization of the mass and revealed heterogenous signal, internal enhancing septations, and an absence of fat on both in- and out-of-phase imaging (Fig. 2). No other primary tumors were identified.

Given the rapid interval growth of the mass, its large size >5cm, radiographic heterogeneity, and symptoms—features concerning for ACC—a right open radical adrenalectomy was performed via a subcostal incision. A percutaneous biopsy was not pursued given the potential risks and its low likelihood of influencing management. The mass was removed uneventfully and fully intact with no evidence of invasion into the kidney or liver (Fig. 3A and B). The patient tolerated the surgery well and was discharged home on post-operative day 1.

Final histopathologic assessment confirmed a 10.5 x 10 x 4.1 cm AG with negative margins (Fig. 3C). Given the benign diagnosis, no routine imaging surveillance was pursued, though a Genetics consultation was recommended in light of his young age and rarity of his entity. The patient continues to do well one year post-operatively.

* Corresponding author. The Brady Urological Institute, Johns Hopkins University School of Medicine, 600 North Wolfe Street, Park 213, Baltimore, MD, 21287, USA.

E-mail address: nsingla2@jhmi.edu (N. Singla).

<https://doi.org/10.1016/j.eucr.2022.102181>

Received 14 June 2022; Received in revised form 19 July 2022; Accepted 31 July 2022

Available online 11 August 2022

2214-4420/© 2022 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

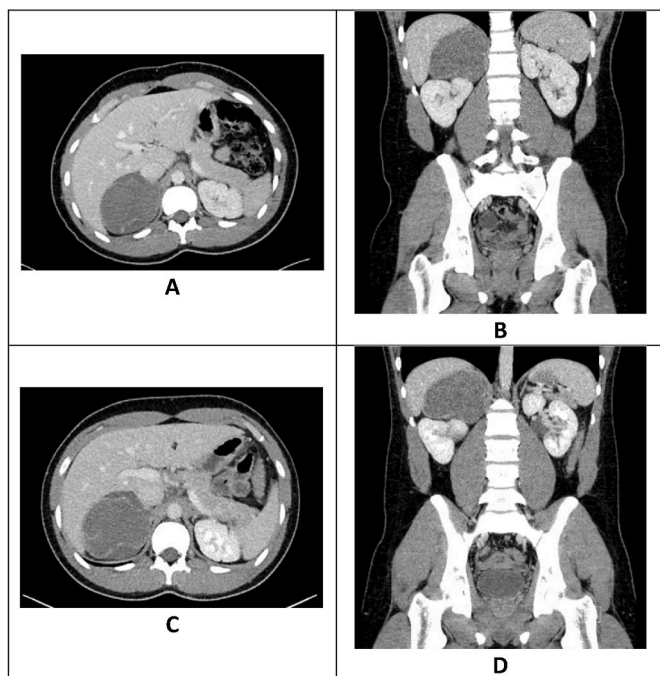


Fig. 1. Contrast-enhanced CT Scan of the abdomen and pelvis in (A) axial and (B) coronal views at initial presentation, demonstrating a right adrenal mass measuring 6.4 cm. Contrast-enhanced CT Scan of the abdomen and pelvis in (C) axial and (D) coronal views 3 months later, showing interval enlargement of the mass to 9.4 cm.

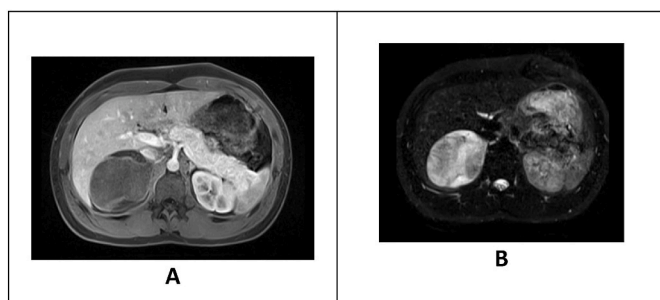


Fig. 2. MRI of the abdomen and pelvis in (A) T1- and (B) T2-weighted axial views.

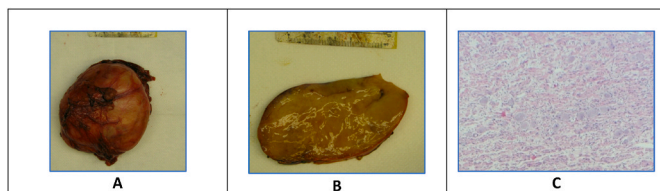


Fig. 3. Pathology photographs of excised specimen. (A) Gross photograph of specimen uncut, (B) gross photograph in cross section, and (C) histopathologic appearance.

3. Discussion

More than half of adrenal incidentalomas are benign and/or hyperfunctioning adenomas. Three to 5% of all adrenal adenomas produce excessive glucocorticoids (Cushing syndrome), resulting in central obesity, hypertension, abdominal striae, moon facies and buffalo hump appearance. Aldosterone-secreting adenomas (Conn Syndrome) are

almost always benign, comprising only 1% of all incidentally diagnosed adrenal masses. These patients suffer from hypertension, headaches, polyuria and symptoms associated with potassium wasting. Less commonly adrenal adenomas can secrete excessive sex steroids, though these more often occur in the setting of ACC than its benign adenoma counterpart.^{2,3}

The differential diagnosis for other adrenal incidentalomas also includes pheochromocytomas, myelolipomas, oncocytomas, adrenal metastases, and ACC. Pheochromocytomas are usually benign but may exhibit malignant potential and can cause headaches, palpitations, tremors, blood pressure variations, and panic attacks due to systemic catecholamine secretion.^{2,3} They are typically diagnosed by a characteristic appearance on MRI together with biochemical evaluation. Adrenal metastases are the most common cause of adrenal malignancy and account for up to 7.5% of all adrenal masses.^{2,3} Clinicians should remain suspicious for adrenal metastases in the setting of a prior history of malignancies, especially those arising from breast, lung, kidney, multiple myeloma, and lymphoma.

ACC was the leading differential diagnosis in our index patient's case herein, given the radiographic features, size, and rapid growth of his adrenal mass. ACC is a rare malignancy with incidence of 0.7–2 per 1 million, diagnosed incidentally 42–44% of the time.^{2,3} Radiographic features suggestive of ACC include irregular borders, irregular enhancement with higher attenuation on non-contrast CT, calcifications, necrosis, and cystic degeneration.² At diagnosis, ACCs are larger than adenomas on average, most greater than 5 cm.³

In contrast to ACC, AG is a rare benign tumor composed of ganglion and Schwann cells that originates from neural crest cells that may grow to large sizes.³ While classically benign, there are rare reports of malignant transformations of AG.⁴ Exceedingly uncommon and difficult to diagnose on imaging alone, AGs compromise only 0.2%–0.4% of all adrenal masses.⁵ More broadly, ganglioneuromas usually occur in patients less than 40 years of age, with 21% of them arising from the adrenal gland. Other sites of origin include the posterior mediastinum, retroperitoneum, or rarely the pelvis and neck.^{1,3} Ganglioneuromas have been associated with familial predispositions, Turner syndrome, and multiple endocrine neoplasia. However, in a retrospective cohort study by Dages et al., these genetic associations were rarely found.⁵ This same cohort study and systematic review demonstrated that these tumors were primarily unilateral, had an average diameter of 5.8 cm, unenhanced CT attenuation of >20 HU, calcifications, and lobulated shape.⁵ Most AG are managed surgically, as tissue sampling is paramount to confirming the diagnosis, and as such the natural history of expectant management of AGs remains largely undescribed.³

4. Conclusion

Patients are usually asymptomatic from AGs, which are commonly discovered incidentally on imaging obtained for unrelated indications, as in our patient. These tumors have a propensity to grow extremely large, also seen in our patient, but despite the rapid growth, do not generally invade into adjacent organs or vasculature. Diagnosis of AGs without histologic confirmation remains difficult, and nearly all AGs are treated with surgical resection. Following resection, prognosis is excellent given their benign nature. Our young patient with a rapidly growing AG did very well clinically following surgical resection of his AG.

References

1. Sandru F, Dumitrascu MC, Petca A, et al. Adrenal ganglioneuroma: prognostic factors (review). *Exp Ther Med.* 2021;22(5):1338.
2. Bancos I, Prete A. Approach to the patient with adrenal incidentaloma. *J Clin Endocrinol Metab.* 2021;106(11):3331–3353.

3. Kutikov A, Crispen PL, Uzzo RG. Chapter 106: pathophysiology, evaluation, and medical management of adrenal disorders. In: *Campbell-Walsh-Wein Urology*. Elsevier. twelfth ed. 2021:2354–2404.
4. Qing Y, Bin X, Jian W, et al. Adrenal ganglioneuromas: a 10-year experience in a Chinese population. *Surgery*. 2010;147(6):854–860.
5. Dages KN, Kohlenberg JD, Young Jr WF, et al. Presentation and outcomes of adrenal ganglioneuromas: a cohort study and a systematic review of literature. *Clin Endocrinol*. 2021;95(1):47–57.