



Mature Cystic Teratoma of the Adrenal Region: A Rare Suprarenal Lesion Mimicking an Adrenal Mass

Subashini H¹, Aravind Sekar¹, Purnima Verma², RN Naga Santhosh Irrinki² and Rakesh Holla^{2*}

¹Department of Histopathology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

²Department of General Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India

***Corresponding Author:** Rakesh Holla, Department of General Surgery, Postgraduate Institute of Medical Education and Research, Chandigarh, India.

DOI: 10.31080/ASMS.2026.10.2297

Received: August 10, 2026

Published: October 09, 2026

© All rights are reserved by **Rakesh Holla, et al.**

Abstract

Mature teratomas are germ cell tumors (GCT) typically arising in gonadal locations, with extragonadal occurrences being rare, particularly in the suprarenal region in adults. We report a case of a 52-year-old female who presented with abnormal uterine bleeding and was incidentally found to have a left suprarenal mass on imaging. Computed tomography (CT) revealed a well-defined lesion measuring $4.9 \times 4.6 \times 5.7$ cm with soft tissue attenuation, while PET-DOTANOC demonstrated a non-somatostatin receptor expressing lesion. Hormonal evaluation, including serum cortisol, dehydroepiandrosterone sulfate (DHEAS), and metanephrines, was within normal limits, suggesting a non-functioning adrenal mass. The patient underwent surgical excision, and intraoperatively a cystic lesion measuring 5×4.5 cm was identified in the left suprarenal region, adherent to the posterior abdominal wall. Aspiration yielded purulent material. Histopathological examination revealed a cyst lined by respiratory-type epithelium with the presence of mesodermal derivatives, including mature hyaline cartilage, adipose tissue, and smooth muscle bundles, consistent with a mature cystic teratoma. No immature or malignant components were identified.

This case highlights the rarity of suprarenal mature teratomas in adults and their potential to mimic adrenal neoplasms clinically and radiologically. Accurate diagnosis relies on histopathological evaluation, underscoring its importance in the management of atypical adrenal masses.

Categories: General Surgery, Pathology.

Keywords: Adrenal; Adrenal Cyst; Adrenal Mass; Cartilage; Endodermal Derivative; Mature Cystic Teratoma

Introduction

Adrenal cystic lesions are uncommon entities, with an estimated incidence ranging from 0.06% to 0.18% in autopsy series, although their detection has increased with the widespread

use of advanced imaging techniques [1]. These lesions comprise a heterogeneous group and are broadly classified into endothelial cysts, pseudocysts, epithelial cysts, and parasitic cysts, each with distinct histogenesis and clinical implications [2-4]. Most adrenal

cysts are asymptomatic and are often discovered incidentally during imaging performed for unrelated conditions, posing a diagnostic challenge in differentiating benign cysts from cystic adrenal neoplasms [5].

Teratomas are GCT composed of tissues derived from one or more germ cell layers; ectoderm, mesoderm, and endoderm. While they most commonly arise in the gonads, extragonadal teratomas are rare and typically located along the midline, including the mediastinum, retroperitoneum, and sacrococcygeal region [6,7]. Primary teratomas arising in the adrenal or suprarenal region are exceedingly rare, particularly in adults, with only a limited number of cases reported in the literature [8]. Their pathogenesis is attributed to aberrant migration of primordial germ cells during embryogenesis [6].

Clinically and radiologically, adrenal teratomas often mimic other adrenal masses, including adenomas, pheochromocytomas, or cystic lesions, due to overlapping imaging characteristics [9]. Functional hormonal abnormalities are typically absent, further complicating preoperative diagnosis. Imaging modalities such as computed tomography and magnetic resonance imaging may demonstrate cystic components, fat density, or calcifications; however, these findings are not always definitive [10]. Consequently, histopathological examination remains the gold standard for diagnosis, demonstrating mature or immature tissues derived from different germ layers [3,8].

We report a rare case of a mature cystic teratoma in the suprarenal region in a middle-aged female, which clinically and radiologically mimicked a non-functioning adrenal mass. This case highlights the diagnostic challenges associated with atypical adrenal cystic lesions and underscores the importance of histopathological evaluation in establishing the final diagnosis.

Case Presentation

A 52-year-old female presented to the outpatient department with complaints of abnormal uterine bleeding persisting since 2022. There were no associated symptoms suggestive of endocrine dysfunction, such as hypertension, palpitations, weight gain, or features of virilization. Her past medical history was unremarkable. General physical examination did not reveal any significant abnormality. During evaluation, CT of the abdomen

revealed a well-defined left suprarenal mass measuring $4.9 \times 4.6 \times 5.7$ cm, demonstrating soft tissue attenuation of approximately 61 Hounsfield units. The lesion appeared indeterminate on imaging, raising suspicion for an adrenal neoplasm. To further characterize the lesion, a PET-DOTANOC scan was performed, which demonstrated a non-somatostatin receptor (SSTR) expressing lesion, thereby reducing the likelihood of a neuroendocrine tumor.

A comprehensive hormonal evaluation was carried out to assess for functional adrenal pathology.

Laboratory investigations, including serum cortisol, DHEAS, serum metanephrines, and urinary metanephrines, were all within normal limits. Serum vitamin D levels were also within the reference range. These findings supported the diagnosis of a non-functioning adrenal mass. The patient subsequently underwent surgical excision of the lesion. Intraoperatively, a 5×4.5 cm cystic mass was identified in the left suprarenal region, which was densely adherent to the posterior abdominal wall. On aspiration, purulent material was obtained, raising the possibility of an infected cystic lesion.

Gross examination of the resected specimen revealed a cystic structure adherent to adrenal tissue (Figure 1A). Histopathological examination demonstrated a cyst lined by respiratory-type pseudostratified ciliated columnar epithelium (Figure 1D). The cyst wall showed the presence of mesodermal derivatives, including mature hyaline cartilage, adipose tissue, and smooth muscle bundles (Figure 1C). Notably, no ectodermal components were identified, and there was no evidence of immature or malignant elements. Based on these morphological features, a final diagnosis of mature cystic teratoma of the suprarenal region was rendered.

Discussion

Adrenal cystic lesions are rare and encompass a heterogeneous group of entities, including endothelial cysts, pseudocysts, epithelial cysts, and parasitic cysts [2-4]. Their reported incidence in autopsy series ranges from 0.06% to 0.18%, although detection has increased significantly with widespread use of cross-sectional imaging [1,11]. Despite improved imaging modalities, distinguishing benign cystic lesions from neoplastic processes remain challenging, particularly in lesions with atypical radiological features or larger size [5,9,12].

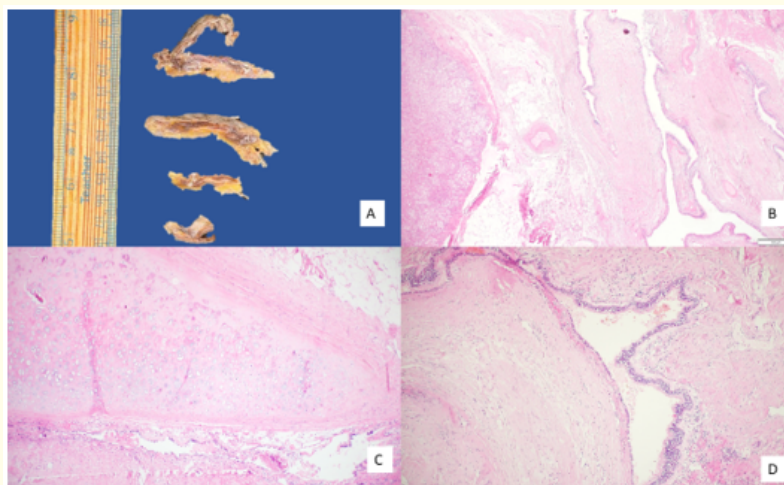


Figure 1: Histopathological features of suprarenal mature cystic teratoma. A) Gross image of the adrenal gland showing a unilocular cystic lesion within the adrenal parenchyma. (B) Low-power photomicrograph demonstrating the cyst with adjacent normal adrenal cortex (left side) (H&E, 4×). (C) Section showing mature hyaline cartilage within the cyst wall (H&E, 10×). (D) High-power view revealing the cyst lining composed of ciliated pseudostratified columnar (respiratory-type) epithelium (H&E, 40×).

Teratomas are GCT composed of tissues derived from one or more embryonic germ layers. While commonly encountered in gonadal locations, extragonadal teratomas are uncommon and typically arise along midline structures such as the mediastinum, retroperitoneum, and sacrococcygeal region [6,7]. Primary teratomas in the adrenal or suprarenal region are exceedingly rare, particularly in adults, with only a limited number of cases described in the literature [8,13]. Their pathogenesis is attributed to aberrant migration of primordial germ cells during embryogenesis [6,13].

Clinically, adrenal teratomas are often asymptomatic and are most frequently detected incidentally, as in the present case. When symptomatic, they may present with abdominal pain, fullness, or complications such as infection or rupture [8,14]. Functional hormonal activity is typically absent, and most reported cases demonstrate a non-functioning biochemical profile, consistent with our findings [4].

Radiologically, adrenal teratomas may exhibit mixed cystic and solid components, fat attenuation, and calcifications, which can provide clues to diagnosis. However, such classical features are not always present, and lesions may appear as indeterminate masses, mimicking adrenal adenomas, pheochromocytomas, myelolipomas, or cystic neoplasms [9,10,12]. In our case, the

absence of fat or calcification and lack of SSTR expression on PET-DOTANOC contributed to the diagnostic uncertainty.

The differential diagnosis of cystic adrenal lesions includes pseudocysts, endothelial cysts, epithelial cysts, parasitic cysts, and cystic degeneration within adrenal tumors [2-4,12]. Adrenal pseudocysts, the most common type, lack epithelial lining and are often associated with prior hemorrhage [5]. Endothelial cysts are lined by vascular or lymphatic endothelium, while epithelial cysts demonstrate cuboidal or columnar lining. In contrast, teratomas are characterized by the presence of tissues derived from multiple germ layers, which is the defining diagnostic feature [6,8,13]. Histopathological examination remains the gold standard for definitive diagnosis. Mature teratomas are composed of well-differentiated tissues such as skin, respiratory epithelium, cartilage, adipose tissue, and muscle [8,13]. In the present case, the cyst was lined by respiratory-type epithelium with underlying mesodermal elements, including cartilage, adipose tissue, and smooth muscle bundles. Although classical teratomas contain derivatives of all three germ layers, the presence of tissues from more than one germ layer is sufficient for diagnosis in the absence of immature elements [6]. The absence of immature or malignant components confirms the benign nature of the lesion. Surgical excision remains the treatment of choice and is both diagnostic

and curative [4]. Complete resection is recommended due to the potential risk of complications and rare malignant transformation [8,14]. The prognosis of mature cystic teratomas is excellent following complete excision.

Conclusions

Suprarenal teratomas are extremely rare entities that can closely mimic adrenal neoplasms both clinically and radiologically. This case emphasizes the importance of including teratoma in the differential diagnosis of cystic suprarenal lesions and highlights the crucial role of histopathology in establishing the final diagnosis.

Bibliography

1. Foster DG. "Adrenal cysts. Review of literature and report of case". *Archives of Surgery* 92.1 (1966): 131-143.
2. Neri LM and Nance FC. "Management of adrenal cysts". *American Surgery* 65.2 (1999): 151-163.
3. Erickson LA, et al. "Cystic adrenal neoplasms". *Cancer* 101.7 (2004): 1537-1544.
4. Lam KY and Lo CY. "Adrenal lipomatous tumours: a 30 year clinicopathological experience at a single institution". *Journal of Clinical Pathology* 54.9 (2001): 707-712.
5. Gatcombe HG, et al. "Primary retroperitoneal teratomas: a review of the literature". *Journal of Surgical Oncology* 86.2 (2004): 107-113.
6. Choyke PL, et al. "Primary extragonadal germ cell tumors of the retroperitoneum: differentiation of primary and secondary tumors". *Radiographics* 13.6 (1993): 1365-1375; quiz 1377-1378.
7. Song JH, et al. "The incidental adrenal mass on CT: prevalence of adrenal disease in 1,049 consecutive adrenal masses in patients with no known malignancy". *AJR American Journal of Roentgenology* 190.5 (2008): 1163-1168.
8. Kuo EJ, et al. "Adrenal Teratoma: a Case Series and Review of the Literature". *Endocrine Pathology* 28.2 (2017): 152-158.
9. Sebastiano C, et al. "Cystic lesions of the adrenal gland: our experience over the last 20 years". *Human Pathology* 44.9 (2013): 1797-1803.
10. Calissendorff J, et al. "Adrenal cysts: an emerging condition". *Nature Reviews Endocrinology* 19.7 (2023): 398-406.
11. Bhatti A, et al. "Mature (benign) cystic retroperitoneal teratoma involving the left adrenal gland in a 22-year-old male: a case report and literature review". *Case Report on Oncology Medicine* 2013 (2013): 610280.
12. Gautam A, et al. "Mature Cystic Teratoma of the Right Adrenal Gland in a Pediatric Patient: A Case Report". *Clinical Case Report* 14.1 (2025): e71780.
13. Pradeep PV, et al. "Adrenal cysts: an institutional experience". *World Journal of Surgery* 30.10 (2006): 1817-1820.
14. Otal P, et al. "Imaging features of uncommon adrenal masses with histopathologic correlation". *Radiographics* 19.3 (1999): 569-581.