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# Adrenal Myelolipoma

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## Abstract

Adrenal myelolipoma, a benign tumor composed of adipose tissue and myeloid elements, ranks as the second most common primary adrenal tumor, but it is rarely diagnosed due to its asymptomatic tendency. This case study presents a 41-year-old female with a complex medical history, including prior diagnoses of endometrial cancer and osteosarcoma, in conjunction with multiple other comorbidities. The patient initially presented with severe right lower quadrant abdominal pain, leading to the discovery of an enlarging right adrenal mass. Given her complex medical history and the growing right adrenal mass, a partial adrenalectomy was carried out on the right side and the neoplasia was diagnosed as an adrenal myelolipoma . This case underscores the clinical challenges posed by adrenal myelolipomas, especially in patients with numerous comorbidities, and the need for individualized management.

## Introduction

Myelolipoma is a rare, benign neoplasm originating in the adrenal cortex. This tumor consists of a combination of fat and myeloid tissue, placing it within the category of mesenchymal and stromal tumors of the adrenal cortex, according to the latest World Health Organization classification for endocrine tumors[1]. While myelolipoma is the second most common primary adrenal incidentaloma, representing 6–16% of adrenal incidentalomas, its diagnosis is relatively rare, mainly due to the high percentage of asymptomatic cases[2-8]. However, the number of reported cases has significantly risen, partly due to the increased use of imaging modalities and the distinctive presence of macroscopic fat[4]. It affects both sexes equally, is typically diagnosed between the ages of 50 and 70, and is unilateral in approximately 95% of cases[2,3]. Generally, the prognosis for these benign tumors is favorable; nevertheless, when these neoplasms exceed 6 cm in size, complications can arise due to mass effect and may rupture and hemorrhage[4,5]. In addition to being found renally, extra-adrenal myelolipomas can be found in different sites, including the kidneys, bones, thorax, nasal cavity, eyes, and extradural sites[2].

## Case Presentation

### Clinical History

A 41-year-old female with a complex medical history, including prior diagnoses of endometrial cancer and osteosarcoma in remission, along with several other comorbidities such as diabetes, hypertension, asthma, post-traumatic stress disorder, anxiety, and depression, presented to the emergency department with severe right lower quadrant abdominal pain that worsened when sitting upright. The pain was described as pulling and burning. Imaging revealed a 2.6 x 2.4 cm nodule originating from the right posterior adrenal gland that was noted to have increased in size since a previous scan in 2016. Additionally, a 2.0 x 1.4 cm lateral left adrenal nodule with internal macroscopic fat was identified. Given the growing right adrenal mass, the patient was evaluated for partial or total adrenalectomy. Patient opted for a right-sided, partial adrenalectomy. Upon gross examination and histopathological analysis, the resected growth was diagnosed as an adrenal myelolipoma.

### Structures

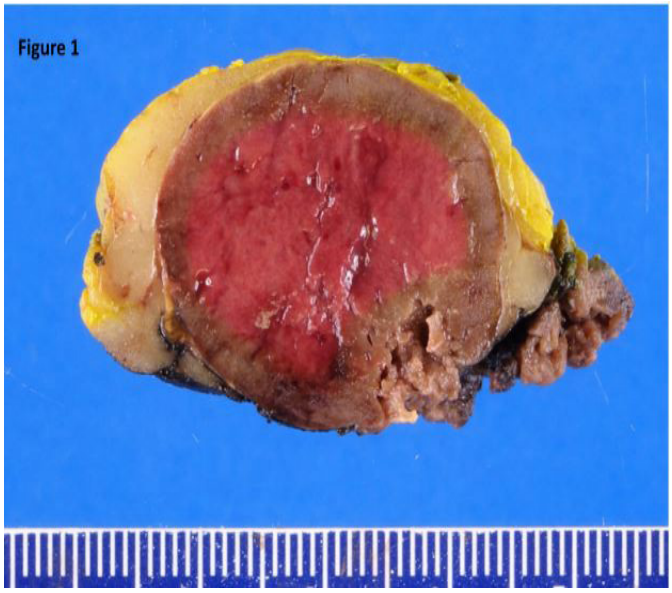


***Figure 1:*** *Gross specimen from right partial adrenalectomy.*

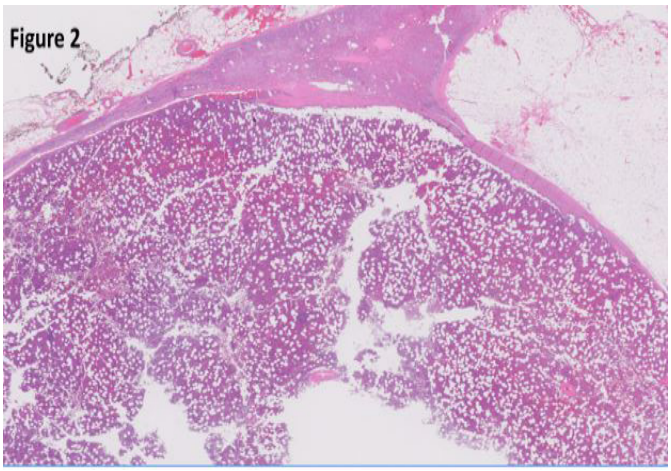


***Figure 2:*** *GLow-power hematoxylin and eosin stain showing mature fat, hematopoietic stem cells, and residual adrenal gland cortex.*

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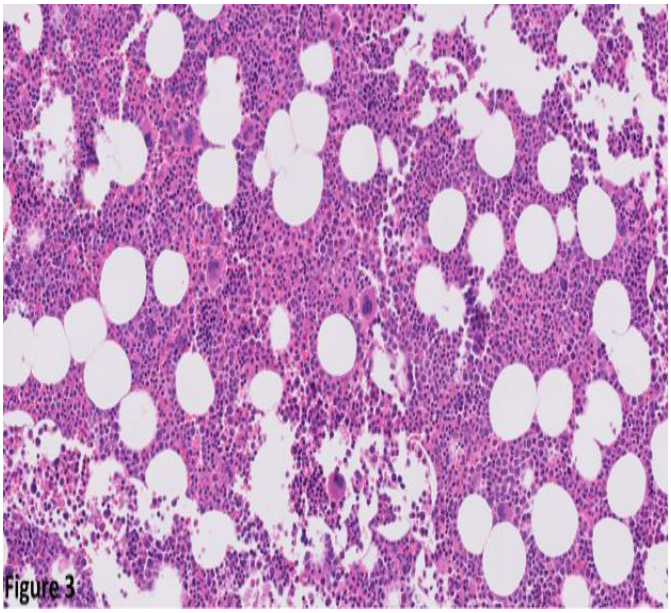


***Figure 3:*** *Hematoxylin and eosin stain displaying hematopoietic stem cells, mature fat, and increased megakaryocytes.*

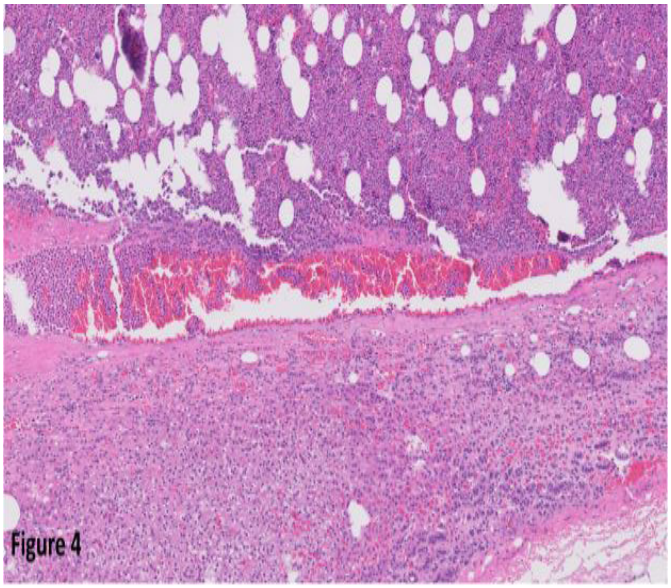


***Figure 4:*** *Hematoxylin and eosin stain exhibiting the clear distinction between myelolipoma and the normal rim of adjacent adrenal cortex.*

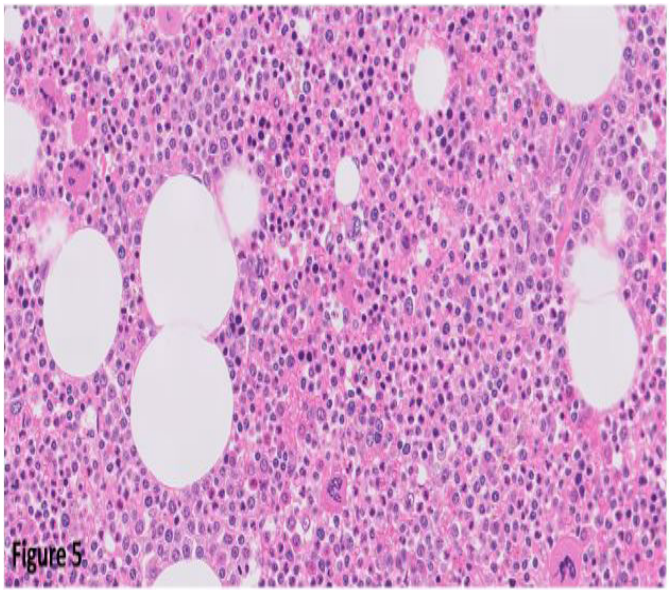


***Figure 5:*** *HHematoxylin and eosin stain showing mature adipose tissue, hematopoietic stem cells, and increased megakaryocytes.*

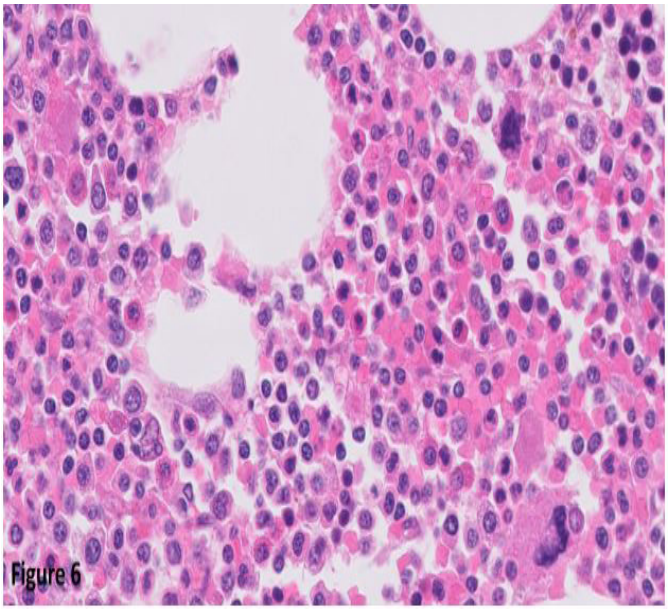


***Figure 6:*** *High-power hematoxylin and eosin stain displaying trilineage hematopoiesis with increased megakaryocytes.*

## Discussion

Macroscopically, myelolipomas present as encapsulated or well-demarcated lesions Figure 1[2]. As seen in Figures 2-6, these neoplasms are usually comprised of mature adipocytes and trilinear hematopoietic cells, resembling normal bone marrow and extramedullary-hematopoiesis (EMH) seen in chronic hematopoietic disorders[2]. In contrast, extramedullary hematopoiesis lacks a distinct border and does not necessarily contain fat[9]. The exact pathogenesis of myelolipoma remains uncertain. Some patients develop myelolipomas in the context of untreated congenital adrenal hyperplasia or ectopic adrenocorticotropin (ACTH) overproduction linked to lung carcinoma, suggesting a potential hormonal influence[4,10,11]. Various hypotheses, including metaplastic changes and genetic alterations, have also been proposed[2,5]. Imaging techniques play a vital role in diagnosis. Ultrasound typically reveals a well-defined, hyperechoic, and heterogeneous mass, often with calcifications. Computed tomography (CT) shows round, hypodense, and heterogeneous masses with characteristic fat density, while magnetic resonance imaging (MRI) demonstrates hyperintense fat signals on T1 and T2 weighted sequences with well-delineated and diverse tumor morphologies[1-3]. Additional CT or MRI scans are often required to provide a more comprehensive diagnostic evaluation due to the limited information obtainable through ultrasound alone[2]. Myelolipomas typically manifest as round to elliptical masses with an average diameter of 10.2 cm[2]. Those exceeding 10 cm in diameter are classified as giant myelolipomas, accounting for approximately 35.7% of cases, although publication bias may influence this reporting[5]. Macroscopically, they display yellow adipose tissue and reddish-brown hematopoietic tissue, with hemorrhages observed in 19% of cases[3,4]. Microscopically, myelolipomas exhibit dense adipose tissue alongside abundant trilineage hematopoietic elements, including erythroid and granulocytic/lymphoid components, as well as megakaryocytes Figures 5,6[1-4]. In rare instances, myelo lipomatous foci may coexist with adrenocortical adenomas or ganglioneuromas. Associations with adrenocortical hyperplasia or carcinoma, osseous metaplasia, calcification, black-pigmented adenoma, and hibernoma have also been reported[2,5,12-15]. Management of adrenal myelolipoma is individualized based on factors such as size, symptoms, and hormonal activity[1-4,10,11]. Most myelolipomas are incidental findings that require no treatment if they are asymptomatic and well-defined on imaging[2-4]. Surgical resection becomes necessary

in larger tumors with significant growth or hormonal activity. Laparoscopic adrenalectomy is a safe and effective approach, even for giant myelolipomas[2-5]. The need forhormonal evaluation depends on the clinical presentation, and follow-up ultrasonography may be considered for giant myelolipomas[2-6]. In instances of myelolipoma rupture, transcatheter arterial embolization can be employed to control retroperitoneal bleeding[2,5,16].

## Conclusion

Although generally benign and asymptomatic, adrenal myelolipoma has the potential to cause diagnostic and management challenges, particularly in patients with a complex medical history. Timely diagnosis and appropriate treatment decisions are crucial to prevent complications associated with tumor mass effect. The case discussed in this paper highlights the importance of individualized patient care and the multifactorial consideration of comorbidities when managing similar cases. The increasing prevalence of adrenal myelolipomas necessitates ongoing research to refine diagnostic strategies and treatment guidelines for these rare neoplasms.

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