Case Reports and Reviews

Case Report

Adrenal Myelolipoma: Clinicopathological Spectrum Across Three Cases

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Abstract

***Background**: Adrenal myelolipoma is a rare, benign neoplasm of the adrenal cortex characterized by a mixture of mature adipose tissue and hematopoietic elements, including erythroid, myeloid, and megakaryocytic lineages. Typically asymptomatic and non-functional, these tumors are often discovered incidentally during imaging for unrelated conditions. Larger lesions, however, may present with symptoms due to mass effect or hemorrhage.*

Case presentations:

***Case 1:** A 56-year-old female with a history of gastroesophageal reflux disease (GERD) presented with hematemesis. Abdominal CT revealed a left adrenal nodule, which was monitored for 18 months. Due to growth and abdominal discomfort, she underwent left adrenalectomy. Histopathology confirmed a benign adrenal myelolipoma.*

***Case 2:** A 47-year-old male with abdominal pain and hematuria was found to have a large right adrenal mass on CT. Despite an elevated aldosterone-to-renin ratio, the lesion was not hormonally functional. Right adrenalectomy was performed, and histology confirmed myelolipoma.*

***Case 3:** A 57-year-old male undergoing routine health screening was incidentally found to have two well-defined lesions in the left adrenal gland on abdominal ultrasound and CT. Both lesions were resected, and histopathology revealed benign adrenal myelolipomas.*

***Conclusion:** Adrenal myelolipomas are rare benign tumors that are often incidentally discovered during imaging. While they are typically non-functional and asymptomatic, larger or symptomatic lesions require surgical resection. Early diagnosis, careful imaging interpretation, and histopathological examination are crucial for ensuring appropriate management and distinguishing these tumors from other adrenal pathologies.*

Introduction

Myelolipoma is a rare, benign neoplasm of the adrenal cortex, first described by Gierke in 1905 [1]. While most commonly found in the adrenal glands, myelolipomas have also been reported in other locations such as spleen, kidney, mediastinum, bone, thorax, and eyes [2]. These tumours are composed of mature adipose tissue and hematopoietic cells, often from all three blood cell lineages—erythroid, myeloid, and megakaryocytic [3]. Typically, adrenal myelolipomas are asymptomatic and non-functional tumours, often discovered incidentally during imaging for unrelated conditions [4]. However, Larger lesions can cause symptoms or complications due to mass effect [5]. Adrenal myelolipomas are most commonly diagnosed in adults during the 5th and 6th decades of life, with no significant gender preference [6].

This report presents three cases of adrenal myelolipoma in our institution, highlighting the clinical and pathological features of this rare condition.

Case One

A 56-year-old female with a history of long-standing gastroesophageal reflux disease (GERD) presented with hematemesis. Gastroscopy and abdominal computed tomography (CT) were performed as part of her work-up. The CT scan incidentally identified an indeterminate left adrenal nodule measuring 3.3 x 2.9 x 2.8 cm, primarily composed of low-density tissue, suggestive of fatty components (Figure 1). Further endocrinologic evaluation revealed no evidence of adrenal cortical or medullary functional abnormalities. The patient was placed on surveillance for 18 months. During this period, the lesion increased in size, and she developed non-specific left-sided abdominal discomfort. Differential diagnosis included adrenal cortical carcinoma, pheochromocytoma and adrenal adenoma. A decision was made to proceed with left adrenalectomy to rule out malignancy.

On gross examination, the adrenal gland measured 8.0 x 3.8 x 2.8 cm and weighed 20.2 grams. The adrenal gland was golden yellow in color with a slightly thickened cortex and a

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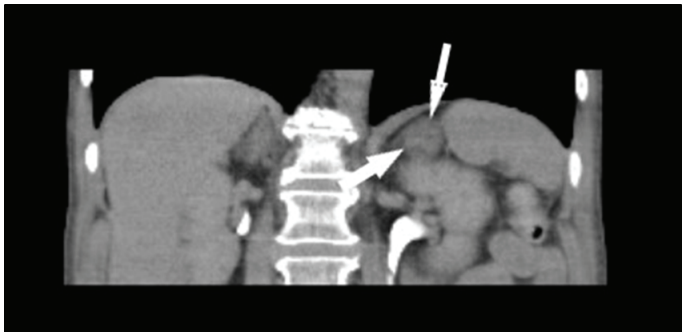

***Figure 1**. Axial section of the CT Scan showing the left adrenal myelolipoma*

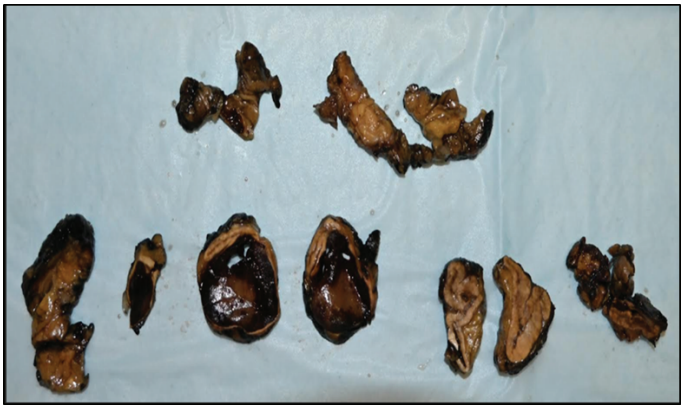

***Figure 2**. The cut surface showed pale yellow fat mixed with reddish-brown friable tissue*

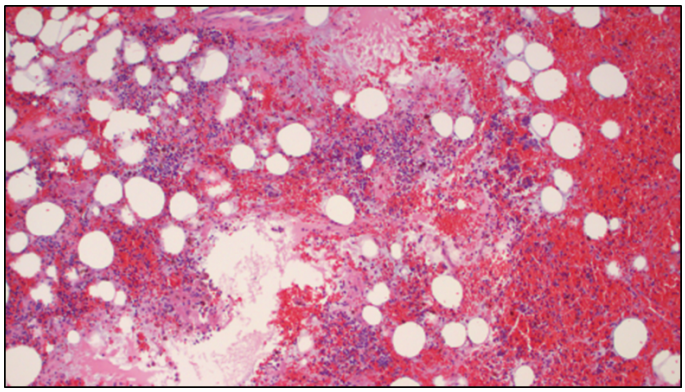

***Figure 3**. Hematoxylin and eosin-stained images of the adrenal tumor (200x)*

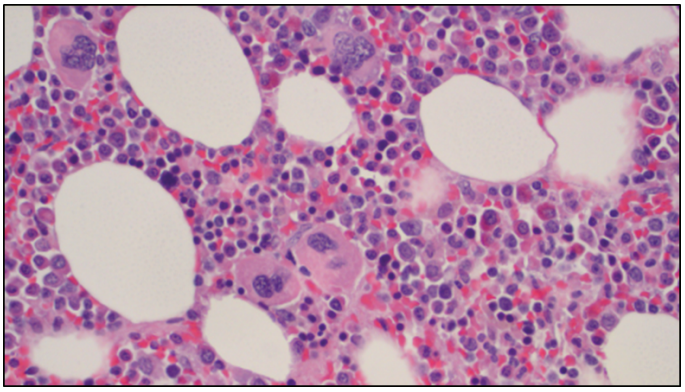

***Figure 4**. Hematoxylin and eosin-stained images of the adrenal tumor showing mature adipocytes mixed with erythroid cells, myeloid cells and a megakaryocyte (400x)*

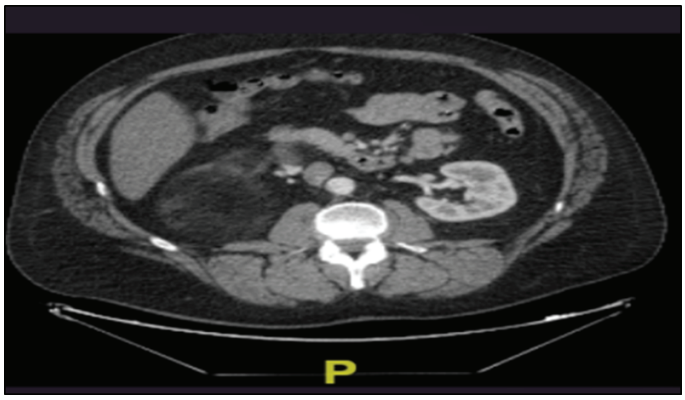

***Figure 5**. Axial section of the CT Scan showing the right adrenal myelolipoma*

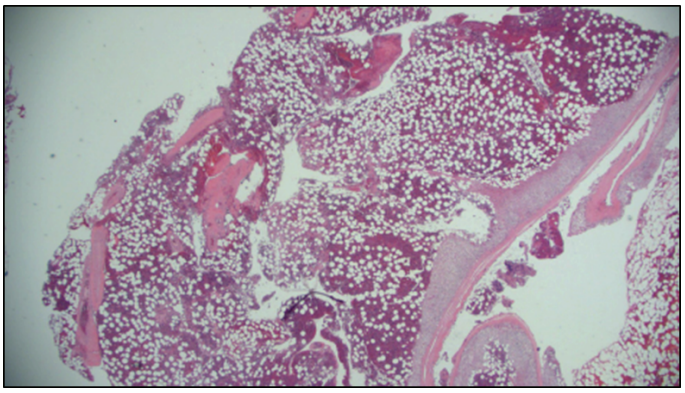

***Figure 6**. Hematoxylin and eosin-stained images of the adrenal tumor (20x)*

nodule. The encapsulated nodule measured 3.4 x 2.9 x 2.4 cm, appeared cystic, and was filled with blood.

The cut surface revealed pale yellow fat mixed with reddish-brown, friable tissue (Figure 2). Microscopic examination showed a well-circumscribed lesion containing mature adipocytes and extramedullary trilineage hematopoietic cells with complete maturation and no atypia (Figures 3-4). Areas of hemorrhage were also noted. The diagnosis was myelolipoma of the left adrenal gland.

Following surgery, the lesion was confirmed as benign and non-functional, and no further therapy was required. This management approach is consistent with the treatment of non-functional, benign adrenal myelolipomas, where complete surgical excision is curative and additional treatments are unnecessary.

Case Two

A 47-year-old male presented with abdominal pain and hematuria. A CT scan revealed a right adrenal mass measuring 13.7 cm in its greatest dimension with the right kidney displaced inferiorly (Figure 5). There was no evidence of the

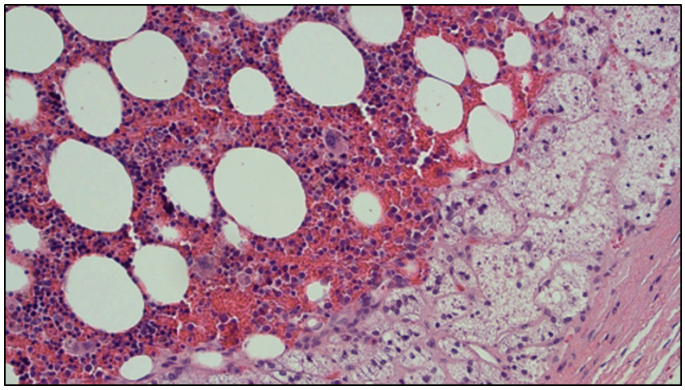

***Figure 7**. Hematoxylin and eosin-stained images of the adrenal tumor (100x)*

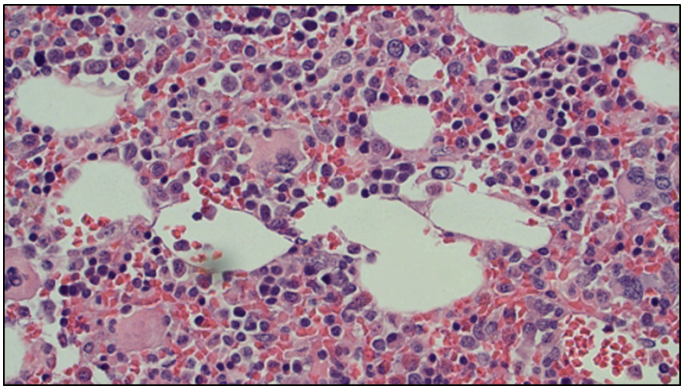

***Figure 8**. Hematoxylin and eosin-stained images of the adrenal tumor showing mature adipocytes mixed with megakaryocytes, myeloid and erythroid cells (400x)*

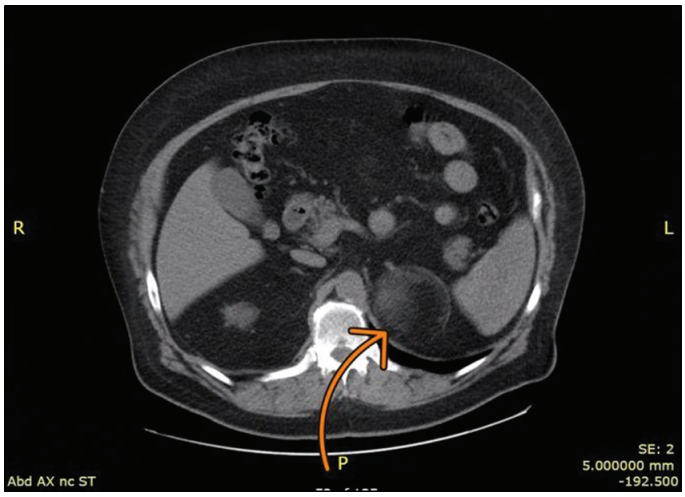

***Figure 9**. Axial section of the CT Scan showing the larger left adrenal myelolipoma*

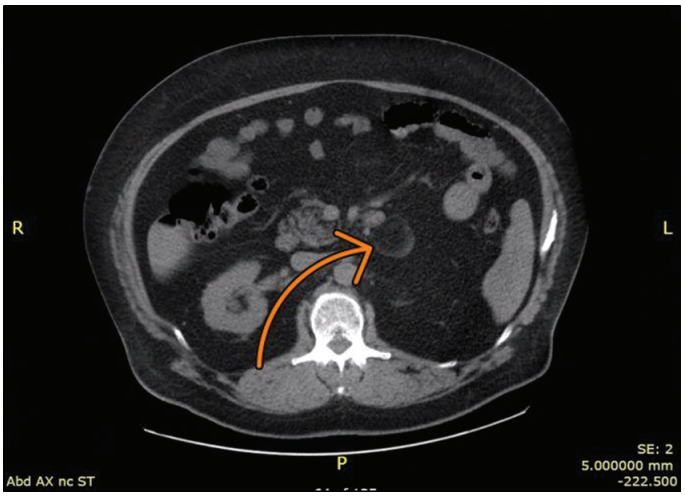

***Figure 10**. Axial section of the CT Scan showing the smaller left adrenal myelolipoma*

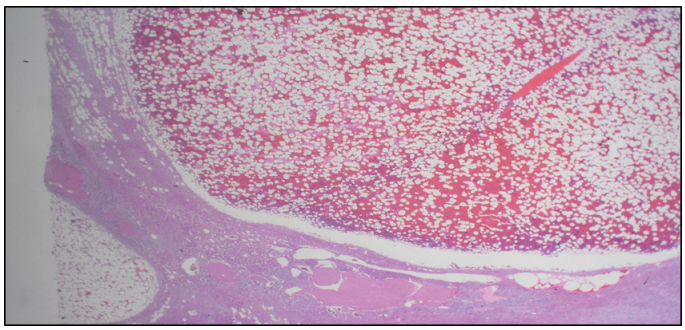

***Figure 11**. Hematoxylin and eosin-stained images of the adrenal tumor (20x)*

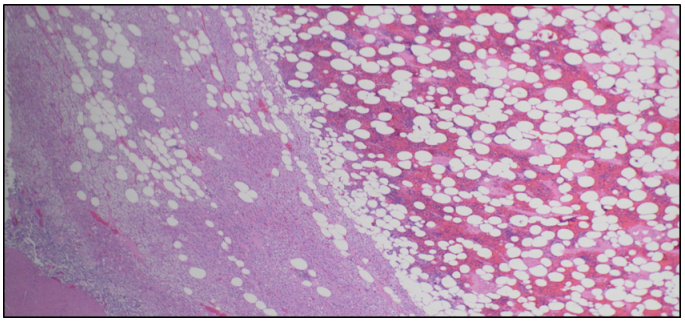

***Figure 12**. Hematoxylin and eosin-stained images of the adrenal tumor (40x)*

lesion extending beyond the normal adrenal tissue, nor were there features of metastatic disease. The patient had an elevated aldosterone-to-renin ratio, but he did not have symptoms of pheochromocytoma, such as headache and palpitations. Given the patient's symptoms and the size of the mass, the decision was made to proceed with right adrenalectomy.

Gross examination showed an adrenal gland measuring 19.0 x 13.5 x 7.0 cm and weighing 805 grams. The mass itself, measured 13 x 10 x 10 cm, had an intact capsule and displayed a yellow, fatty cut surface. Microscopic examination revealed a well-circumscribed proliferation of mature adipose tissue and extramedullary trilineage hematopoietic cells with full maturation and no atypia (Figures 6-8). A subsequent diagnosis of myelolipoma of the right adrenal gland was made. The patient's symptoms improved post-operatively, and no further treatment was necessary.

Case Three

A 57-year-old male underwent a routine annual health assessment required by his employer. As part of the evaluation,

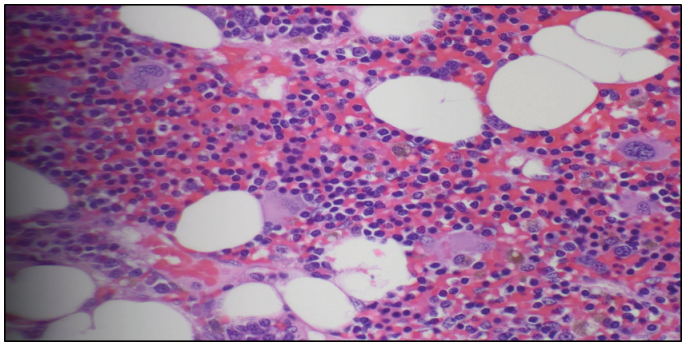

***Figure 13**. Hematoxylin and eosin-stained images of the adrenal tumor (400x)*

an abdominal ultrasound was performed, which incidentally revealed a retroperitoneal mass. The patient was asymptomatic and had no history of abdominal pain, fullness, weight loss, or endocrine-related symptoms. Subsequent contrast-enhanced computed tomography (CT) of the abdomen identified two well-defined, fat-containing lesions in the left upper quadrant, both arising from the left adrenal gland. The superior lesion measured 7.9 × 7.3 × 7.8 cm (Figure 9), and the inferior lesion measured 4.6 × 4.2 × 3.5 cm (Figure 10). The imaging characteristics were suggestive of adrenal myelolipomas, although well-differentiated liposarcomas were also considered in the differential diagnosis, given the size and imaging heterogeneity. A magnetic resonance imaging (MRI) study of the abdomen demonstrated two distinct lesions arising from the left adrenal gland. The cranial lesion measured 7.3 × 6.6 cm, and the caudal lesion, located more anteriorly, measured 3.96 × 3.4 cm. Due to low clinical suspicion for hormonal dysfunction, an endocrinologic evaluation was conducted, confirming the absence of both adrenocortical and adrenomedullary functional abnormalities. Based on the large lesion size and radiologic concern for potential malignancy, the patient was referred to the surgical team, and a left adrenalectomy was undertaken for definitive diagnosis and management.

On gross examination, the resected left adrenal gland measured 12.7 × 6.7 × 6.0 cm and weighed 422 grams. The external surface was smooth and intact. On sectioning, the cut surface was predominantly golden yellow, consistent with cortical tissue, and demonstrated a thickened cortex containing two well-circumscribed nodules. The first nodule measured 7.5 × 7.5 × 6.3 cm, appeared tan-yellow with a central red-brown rim. The second nodule measured 4.2 × 3.3 × 2.8 cm, was tan-red with an orange rim, and both were sharply demarcated from the surrounding adrenal parenchyma. Microscopic examination showed both nodules were morphologically similar, with well-circumscribed lesions containing a mixture of mature adipocytes interspersed with hematopoietic elements showing trilineage maturation—erythroid, myeloid, and megakaryocytic lineages—all exhibiting normal maturation without cytologic atypia or dysplasia (Figures 11-13). The intervening adrenal cortex showed no evidence of hyperplasia or malignancy. Based on these histopathologic features, a diagnosis of adrenal myelolipoma was made.

Discussion

Adrenal myelolipomas are rare, benign tumours composed of mature adipose tissue and hematopoietic cells, as seen in the photomicrographs from these cases [3,6]. Although most frequently found in the adrenal glands, they have been reported in other organs such as the spleen, kidney, mediastinum, and eyes [2]. The tumors are generally non-functional and asymptomatic as described in our cases one and three, unless the tumor grows large enough to cause mass effects or complications like hemorrhage similar to case two [5,7]. Adrenal myelolipomas are most commonly diagnosed in the 5th and 6th decade as seen in our first and third patient , though the second case falls outside this age range. These tumors are usually unilateral similar to all our identified cases, commonly on the right side, and their size can range from a few millimeters to over 40 cm [3]. While bilateral adrenal myelolipomas are rare, a condition known as multicentric adrenal myelolipoma which is the occurrence of two distinct myelolipomas within the same adrenal gland is extremely rare [8]. Our third case has 2 distinct lesions involving the left adrenal gland which is an unusual finding similar to a case reported by Asil et al [8] .

While adrenal myelolipomas are typically non-functional, occasional cases may exhibit hormonal activity or be associated with adrenal hyperplasia or other adrenal conditions [3,7,9]. Endocrine abnormalities are rare but have been clinically documented. An elevated aldosterone-to-renin ratio, as noted in Case two, has been reported in some instances, though the mechanism is not well understood [9].

The pathogenesis of adrenal myelolipomas is not fully understood. One theory suggests a metaplastic origin, where chronic stress, hormonal stimulation, or degenerative changes in the adrenal cortex may trigger the differentiation of adrenal cortical precursor cells, leading to the formation of both adipose and hematopoietic elements [2,4]. Genetic factors, such as those associated with neurofibromatosis, may play a role; however, most cases are sporadic [3,5]. There is also an association with metabolic disorders, including obesity, hypertension, and endocrine dysfunction, though the clinical significance of these associations remains unclear.

Computed Tomography or Magnetic Resonance Imaging are the diagnostic modalities of choice, with CT being more sensitive, demonstrating typical imaging features of adrenal myelolipomas, such as low-density areas indicative of fat, which aid in distinguishing them from other adrenal masses, including pheochromocytomas, metastases, and carcinomas [3,4]. For example, in Case 1, the low-density areas in the left adrenal mass strongly suggested its adipose content, consistent with myelolipoma. However, in larger tumors, heterogeneity from hemorrhage or necrosis can complicate imaging interpretations [10,11].

The definitive diagnosis of this entity is only achieved through histopathological examination of the surgical specimen [12]. Grossly, Myelolipomas range in color from pale yellow to deep red or brown and often show areas of soft yellow fatty tissue on cut surfaces. Histologically, adrenal myelolipomas are characterized by a mixture of mature adipocytes and hematopoietic cells. The main histopathological differentials include extramedullary hematopoiesis, lipomatous adrenal tumors, and retroperitoneal liposarcoma. While the presence of hematopoietic components is a defining feature, distinguishing myelolipoma from extramedullary hematopoiesis can sometimes be challenging, especially in cases associated with hematologic disorders. Additionally, some myelolipomas may have scant hematopoietic components and can be misdiagnosed as lipomas [13]. Therefore, adequate sampling and careful

microscopic examination is imperative for an accurate diagnosis.

Management strategies depend on the tumor size and symptoms. Lesions smaller than 5 cm are usually managed with surveillance, while larger or symptomatic tumors are resected due to the risk of complications like hemorrhage or rupture [9,10]. Surgical intervention, as in both presented cases, is especially indicated when malignancy cannot be excluded [7,9]. Adrenal myelolipoma is often a condition with an excellent prognosis, therefore adjunct therapy or long-term follow-up is not required [12], as similarly documented in our cases. The increasing use of high-resolution imaging has contributed to earlier detection and improved management of adrenal myelolipomas [6,11].

In these three cases, we highlighted the clinical and histological features of adrenal myelolipoma, emphasizing its diagnostic challenges and the importance of correlating imaging, histopathology, and clinical presentation. While often an incidental and benign finding, awareness of adrenal myelolipoma is essential for pathologists and clinicians to avoid misdiagnosis and ensure appropriate management. Additionally, clinicians should remain vigilant about complications such as hemorrhage or mass effect, particularly in larger tumors [10].

Conclusion

Adrenal myelolipomas are rare, benign tumours often detected incidentally. While most cases are asymptomatic, larger or symptomatic lesions may require surgical intervention. The increasing use of advanced imaging and familiarity with their clinical presentations has facilitated improved diagnosis and management. These cases further underscore the importance of adequate sampling and careful microscopic examination in the diagnosis of this rare entity.

References

1. Gierke E. Über Knochenmarksgewebe in der Nebenniere. Zeiglers Beitr Pathol Anat. 1905;7:311–24.
2. Decmann Á, Perge P, Tóth M, Igaz P. Adrenal myelolipoma: a comprehensive review. Endocrine. 2018;59(1):7-15.
3. Calissendorff J, Juhlin CC, Sundin A, Bancos I, Falhammar H. Adrenal myelolipomas. Lancet Diabetes Endocrinol. 2021;9(11):767-775.
4. Gupta S, Zingade A, Baviskar M, Ashtaputre KS. A Rare Presentation of Extramedullary Hematopoiesis as an Adrenal Mass: A Case Report. Cureus. 2024;16(2):e54598.
5. Alhassan L, Nasser H, Ali MA, Sagher HG, Al-Janabi MH. Hemorrhagic giant adrenal myelolipoma discovered incidentally: a case report. J Surg Case Rep. 2024;2024(3):rjae169.
6. Rkik M, Fadil Y, Elidrissi O, Dakir M, Debbagh A, Aboutaieb R. Geant adrenal myelolipoma: A case report with literature review. Urol Case Rep. 2020;35:101541.
7. Azizan N, Myint O, Wynn AA, et al. A clinically silent tumour of adrenal myelolipoma: a case report. Int J Surg Case Rep. 2020;72:63-5.
8. Asil K, Ersavas M, Aksoy E. Multicentric Adrenal Myelolipomas: Case Report. J Med Cases. 2015; 6(2): 91-94.
9. Pokrovskaya A, Tarzimanova A, Vetluzhskaya M, et al. Rare case of symptomatic adrenal myelolipoma. BMJ Case Reports CP. 2021;14:e245181.
10. Liu H-P, Chang W-Y, Chien S-T, et al. Intra-Abdominal bleeding with hemorrhagic shock: A case of adrenal myelolipoma and review of literature. BMC Surg. 2017;17:74.
11. Moradi G, Zarei D, Issaiy M. Concurrent adrenal and extra-adrenal myelolipoma: A case report. Int J Surg Case Rep. 2024;116:109398
12. Duarte Regalado CS, Guzmán Mejía JI, Gutiérrez Uvalle GE, Vargas Rodríguez AE, González Ledo J. A Case Report and Literature Review of Adrenal Myelolipoma. Cureus. 2023;15(8):e43240. doi: 10.7759/cureus.43240.
13. Zhanghuang C, Long N, Yang Z, Xie Y. Bilateral adrenal giant medullary lipoma combined with disorders of sex development: a rare case report and literature review. Front. Oncol. 13:1210679. doi: 10.3389/fonc.2023.121067