Case Report: An incidentaloma that catches your eye - adrenal myelolipoma

The Harvard community has made this article openly available. Please share how this access benefits you. Your story matters

Citation
D’Addosio, Rosanna, Joselyn Rojas, Valmore Bermúdez, Flor Ledesma, and Kyle Hoedebecke. 2017. “Case Report: An incidentaloma that catches your eye - adrenal myelolipoma.” F1000Research 6 (1): 1140. doi:10.12688/f1000research.11766.1. http://dx.doi.org/10.12688/f1000research.11766.1.

Published Version
doi:10.12688/f1000research.11766.1

Citable link
http://nrs.harvard.edu/urn-3:HUL.InstRepos:34375228

Terms of Use
This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA
CASE REPORT

Case Report: An incidentaloma that catches your eye - adrenal myelolipoma [version 1; referees: 2 approved]

Rosanna D'Addosio1, Joselyn Rojas2,3, Valmore Bermúdez3,4, Flor Ledesma1, Kyle Hoedebecke5,6

1Department of Public Health, School of Medicine, University of Zulia, Maracaibo, 4002, Venezuela
2Division of Pulmonary and Critical Care Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, MA, 02115, USA
3Endocrine and Metabolic Diseases Research Center, School of Medicine, University of Zulia, Maracaibo, 4002, Venezuela
4Research group Altos Estudios de Frontera (ALEF), The Simón Bolívar University, Cúcuta, Colombia
5WONCA Polaris - USA, Bangkok, 10500, Thailand
6Yongsan Health Clinic, Seoul, 96205, Korea, South

Abstract

**Background:** Adrenal incidentaloma refers to the incidental finding of a tumor in the adrenal gland, where nonfunctional forms are the most common variant. Myelolipoma is a rare (0.08-0.4%) occurrence characterized by adipose and hematopoietic tissue. The aim of this case report is to describe the diagnosis and appropriate management of a myelolipoma in an asymptomatic patient, which was originally considered an incidental hepatic hemangioma prior to being identified as a giant adrenal adenoma.

**Case description:** The patient was a 54 year old obese female with a recent diagnosis of diabetes type II and dyslipidemia with recent ultrasound imaging suggestive of a hepatic hemangioma. An MRI was performed revealing a 7x6cm lesion in the right adrenal area indicating a giant adrenal adenoma. An adrenalectomy was performed without complications. The pathology report identified a myelolipoma.

**Discussion:** The incidence of myelolipoma has recently increased due to advances in radiological techniques. Its etiology is unclear and the most accepted theories support a myeloid cell metaplasia in the embryonic stage as a result of stress, infections, or adrenocorticotropic hormone or erythropoietin stimulus. Contributing components may include bone morphogenetic protein 2 and β-catenin, as well as the presence of the chromosomal translocation (3, 21) (q25; p11). Despite its benign nature, the association with other adrenal lipomas must be ruled out. A biochemical evaluation is essential for detecting subclinical states, such as Cushing syndrome and pheochromocytoma.

**Conclusion:** Adrenal myelolipomas are rare benign tumors that are generally asymptomatic. Uncertainty still exists surrounding their etiology. Surgical management depends on hormone production, tumor size, high risk features on imaging and patient consent. Additional information is needed to better understand myelolipomas, their etiology, and clinical management. Incidentalomas may confuse the physician and patient. Ensuring proper multidisciplinary management based on the clinical guidelines of endocrinology allowed a satisfactory resolution of this case.

**Open Peer Review**

**Referee Status:** ✔ ✔

| Invited Referees | version 1 published | report | report |
|------------------|---------------------|--------|--------|
| 1 Jose Manuel Ramirez Aranda, Autonomous University of Nuevo Leon, Mexico |
| 2 Jesus Zacarias Villarreal-Perez, Autonomous University of Nuevo Leon, Mexico |
| 3 Ana Nunes Barata, UCSP Buraca, Portugal |

**Discuss this article**

**Comments (1)**
Corresponding author: Kyle Hoedebecke (khoedebecke@gmail.com)

Author roles: D'Addosio R: Conceptualization, Data Curation, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; Rojas J: Conceptualization, Data Curation, Investigation, Writing – Original Draft Preparation; Bermúdez V: Conceptualization, Formal Analysis, Resources, Writing – Original Draft Preparation; Ledesma F: Conceptualization, Project Administration, Resources, Writing – Original Draft Preparation; Hoedebecke K: Project Administration, Supervision, Writing – Original Draft Preparation

Competing interests: No competing interests were disclosed.

How to cite this article: D'Addosio R, Rojas J, Bermúdez V et al. Case Report: An incidentaloma that catches your eye - adrenal myelolipoma [version 1; referees: 2 approved] F1000Research 2017, 6:1140 (doi: 10.12688/f1000research.11766.1)

Copyright: © 2017 D'Addosio R et al. This is an open access article distributed under the terms of the Creative Commons Attribution Licence, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Grant information: The author(s) declared that no grants were involved in supporting this work.

First published: 18 Jul 2017, 6:1140 (doi: 10.12688/f1000research.11766.1)
Introduction

The term incidentaloma is derived from “incidental tumor,” describing a mass discovered on imaging by pure chance. When discussing adrenal incidentalomas (AIs), this refers to a finding of a visible adrenal mass greater than 1 cm in diameter found on imaging performed for other medical causes. In general, adrenal tumors are detected in 0.4% of abdominal ultrasounds and occur with ten times greater frequency in those with a positive cancer history. Exclusion criteria for AIs include patients who present with manifestations of adrenal dysfunction and those with extra-adrenal cancers in the process of stratification.

Advances in modern diagnostic methods have produced a greater prevalence of AIs, especially due to advances in CT and MRI technology. Incidental adrenal masses are found in 2–4% of abdominal CT scans and the frequency increases in correlation with the patient’s age, adding 0.2% in the third decade of life, up to 7% in those greater than 70 years old. Among these, non-functional adenomas remain the most frequent (60–85%), while a minority present as functional adenomas (5–16%). Of functional masses, 6% consist of pheochromocytomas, 5% are subclinical Cushing Syndrome, 5% are adrenal carcinoma, 2% prove to be a metastasis, and the rest belong to other etiologies, such as myelolipomas, hematomas, cysts, or lymphomas.

Nevertheless, the retroperitoneal location increases the difficulty of detection during a standard physical exam. This often leads to the late diagnosis of such tumors only when clinical systemic manifestation is present—in the case of functional incidentalomas—or the compromise of the adjacent tissues secondary to abnormal gland growth. According to endocrinology guidelines, both hormonal and radiographic evaluation must be performed in order to rule out subclinical states. In general, masses ≥4 cm are removed surgically, independent of functionality. Furthermore, all functional tumors and those with malignant characteristics undergo an adrenalectomy under endocrinologic supervision. Non-functional adenomas, small myelolipomas, and benign asymptomatic cysts do not require surgical intervention.

With this in mind, providers must remember two primary questions, first asking “Is the mass hormonally active?” as this differentiates between functional and nonfunctional masses. Additionally, asking “Are there malignant characteristics?” proves equally important. This is determined by the radiologic imaging that look for heterogeneity, poorly delimited borders, the presence of necrosis, hemorrhage, calcification, or an attenuation coefficient greater than 20 Hounsfield Units.

This case report describes a giant right upper quadrant incidentaloma in an asymptomatic patient that was initially thought to be a hepatic hemangioma, due to its size and location, which was later confirmed to be an adrenal tumor.

Case Report

A 54 year old asymptomatic female patient was seen by her family physician in Maracaibo, Venezuela, for her annual health exam in January 2014 in a primary care center. She had no complaints, except for recent unintended weight gain. Her past medical and surgical history are notable for a left breast lumpectomy (1973), a salpingectomy (1994), a hysterectomy without oophorectomy for NIC III (2005), and a left unilateral oophorectomy for ovarian torsion (2007). The patient used no medications and has no known allergies, and denied tobacco, alcohol, or drug use. The patient is monogamous and happily married. Her family history is notable for a sister who died of Hodgkin Lymphoma.

On physical exam, the patient was afebrile with normal vital signs. Her weight was 92.5 kg, 1.74 meters tall, with a BMI of 30.6. She appeared well hydrated with moist mucous membranes. She had an acrochordons, or signs of virilization.

Laboratory results showed a normal complete blood count, mixed dyslipidemia, fasting blood glucose levels >125 mg/dl (normal range, 70–100 mg/dl) on more than two occasions, and HOMA-IR index >2.5 (normal index, ≤ 2.5) (Table 1); meeting the diagnostic criteria for type 2 diabetes mellitus (DM2) and metabolic syndrome.

Table 1. Results of laboratory exams.

| Laboratory          | October 2013 | November 2013 - January 2014 (initial treatment) | April 2014 (treatment control - pre-operative) |
|---------------------|--------------|-------------------------------------------------|------------------------------------------------|
| Cholesterol - Total | 264.30 mg/dl | 247 mg/dl                                       | 121.30 mg/dl                                     |
| HDL - C             | 53 mg/dl     | 41 mg/dl                                        | 36 mg/dl                                        |
| LDL - C             | 164,64 mg/dl | 165 mg/dl                                       | 67.64 mg/dl                                     |
| Triglycerides       | 236 mg/dl    | 204 mg/dl                                       | 86 mg/dl                                        |
| Creatinine          | 0.6 mg/dl    | 0.7 mg/dl                                       | 0.8 mg/dl                                       |
| Uric Acid           | 6.9 mg/dl    | 5.0 mg/dl                                       | 4.2 mg/dl                                       |
| Urea                | 23 mg/dl     | 21 mg/dl                                        | 29 mg/dl                                        |
| AST                 | 19.28 UI/L   | 9 UI/L                                          | 21.92 UI/L                                      |
| ALT                 | 17.00 UI/L   | 10 UI/L                                         | 21.11 UI/L                                      |
| Blood Glucose       | 148,80 mg/dl | 129 mg/dl                                       | 94.35 mg/dl                                     |
| Fasting Insulin     | 11.50 uIU/ml | 129 mg/dl                                       | 11.50 uIU/ml                                    |
| Postprandial Insulin| 103.30 uIU/ml|                                                 |                                                 |

*HOMA-IR = [Basal Insulin (IU/ml) × GA (mg/dL)/405]
syndrome. Initial recommendations were lifestyle changes, including 30 minutes walks five days a week, and a nutritionist consult. Additionally, pharmacotherapy, sitagliptin/metformin (Janumet®, 50/1000mg) 1 tab daily, ezetimibe/simvastatin (Vytorin®, 10/40 mg) 1 tab daily, gemfibrozil (Lipontal®, 900 mg) 1 tab daily, and orlistat (Xerogras®, 120 mg) 1 cap daily, was initiated.

Simultaneously, a right upper quadrant ultrasound was ordered showing slight hepatic steatosis, as well as a round space occupying lesion with well-defined hyperechoic borders measuring 5.6×7.3 cm in segment V of the right lobe suggestive of a hemangioma. Of note, a bilateral non-obstructive nephrolithiasis was observed (Figure 1). Due to these findings, the patient was referred to a local hospital diagnostic center for imaging studies, a triphasic hepatic MRI was performed as part of an additional workup. This identified a 7.0×6.0 cm right adrenal space occupying lesion suggestive of a large adrenal adenoma (Figure 2). A hormone profile was performed with normal results - classifying this mass as a non-functional adenoma. Lack of reagents in local laboratories caused that the patients moved to Avila Clinic in Caracas (Capital of Venezuela) (Table 2). The work up was completed with a serologic evaluation to rule out fungal infection with negative results for mycoplasma IgM (0.15; normal range: 0.00 – 0.90).

In April 2014, a right subcostal adrenalectomy was performed in a level three hospital so as to ensure the presence of an intensive care unit due to the potential bleeding risk. The pathology report described a 4×7×6 cm adrenal mass with a grey-yellow surface covered partially with a thick grey capsule with brown areas with a hemorrhagic and yellow adipose center. The microscopic evaluation showed an external layer of clear cortical cells of the adrenal granulosa; a center made of mature adipocytes and all three hematopoietic cell lines without calcifications or fibrosis. The final diagnosis was determined to be an adrenal myelolipoma (Figure 3).

The patient experienced no post-surgical complications. She has subsequently completed regular physical activity and continues with

![Image](https://via.placeholder.com/150)

**Figure 1. Abdominal ultrasound of the patient.** A hyperechogenic 5.6 × 7.3 cm image is observed in segment V of the right hepatic lobe suggestive of an incidental hemangioma.

![Image](https://via.placeholder.com/150)

**Figure 2. Triphasic abdominal MRI showing a right 7.0 x 6.0 cm adrenal incidentaloma.** Left panel, longitudinal cut; right panel, transverse cut. Performed using SIEMENS Magneton Essenza 1.5 TESLA.

| Adrenal cortex                                                                 | Zona reticularis                          | Hormone          | Result                          | Zona fasciculata                          | Hormone          | Result                          |
|--------------------------------------------------------------------------------|-------------------------------------------|------------------|---------------------------------|-------------------------------------------|------------------|---------------------------------|
| Testosterone - Total                                                           | 0.09 ng/ml (VN: 0.06-0.82)                | Urine cortisol occasional | 12.30 ug/dl (VN: 0.20-50.00)    |                                            |                  |                                 |
| Free Testosterone                                                              | 0.79 pg/ml (VN: 1.20-6.60)                | Cortisol (am)     | 5.50 ug/dl (VN:5-25)            |                                            |                  |                                 |
| DHEA-S                                                                         | 76.60 ug/dl (VN: 35,40-256,30)            | Cortisol (pm)     | 4.21 ug/dl                      |                                            |                  |                                 |
| Androstenedione                                                                | 1.10 ng/ml (VN: 0.85-10,00)              |                  |                                 |                                            |                  |                                 |
| Adrenal medulla (in urine)                                                     | **Catecholamines**                        |                  |                                 | **Metanephrines**                         |                  |                                 |
| Adrenaline                                                                     | 13 mcg/24 hrs (VN: < 20)                 | Metanephrine/Urine | 43.0 mcg/L                      |                                            |                  |                                 |
| Dopamine                                                                       | 706 mcg/24 hrs (VN: <600)                | Metanephrine/24 hrs | 166.0 mcg/24 hrs (25,0-312.o)    |                                            |                  |                                 |
| Noradrenaline                                                                  | 10 mcg/24 hrs (VN: < 90)                 |                  |                                 |                                            |                  |                                 |

24 hr urine collection: **3.377 ml/24 hrs and **3.860.0 ml/24 hrs
Adrenal myelolipoma is a rare encapsulated benign tumor described first in 1905 by Gierke \(^1\) and later named by the French pathologist Charles Oberling in 1929 \(^2,3\). These tumors are metabolically inactive - or nonfunctional - and composed of adipose and hematopoietic cells originating from the adrenal stroma. They are predominantly asymptomatic and tend to be discovered incidentally \(^13-15\).

The incidence of these tumors is between 0.08–0.4% \(^12\), although they comprise 15% of the AIs discovered due to advances in radiographic imagery \(^13\). They frequently present between the fifth and seventh decades of life without a predominance in either sex - though there is a greater incidence in the right adrenal gland \(^13\). Though the adrenal location predominates, there have been discoveries in other locations with a preference for the presacral region, and less frequently in gastric, hepatic, ganglionic lymphatics, cranium, and spleen locations \(^46\). These statistics are in accordance with this case report.

The etiology for adrenal myelolipoma is not clear with numerous theories being proposed. Some suggest a metaplasia of the adrenal and myeloid cells that migrated during embryogenesis, extramedullary hematopoiesis, and embolization of osseous medulla elements \(^7\). This metaplasia may occur as a response to necrosis, stress, infections, or prolonged adrenocorticotropic hormone (ACTH) stimulation \(^11,14\). For example, Al-Bahri \(^15\) reported a case of a large bilateral myelolipoma in a 39 year old male with a history of congenital adrenal hyperplasia secondary to a 21-α hydroxylase deficiency treated with steroids starting in childhood. This was later stopped during adolescence with a subsequent myelolipoma development - supporting the theory that ACTH stimulation causes adrenocortical metaplasia. Finally, giant myelolipomas usually are associated with hematologic disorders, like hereditary spherocytosis, thalassemia, and falciform anemia, as a response to adrenal stimulation from erythropoietin \(^16\).

Recent cytogenetic analyses propose that myelolipomas are out-of-place masses of myeloid cells. Mitsui \(^17\) et al. described an extremely rare case with the presence of osseous tissue with cells similar to osteoblasts \(^17\). Upon immunohistochemical analysis, there were positive results for bone morphogenetic protein 2 (BMP2), which acts as an inductor for osseous formation and the β-catenin that intervenes in the signal pathway. This finding can help give insight into myelolipoma tumorigenesis.

Researchers have also identified (3,21)(q25;p11) chromosomal translocations in patients with myelolipomas and hematological neoplasias \(^18\). Because of this, some consider myelolipomas as variants of multiple endocrine neoplasias \(^19\), while others recommend that they be grouped with other tumors, such as lipomas, teratomas, liposarcomas, or angiomyolipomas \(^20,21\). Despite its benign characteristics, the pathological studies and immunohistochemical evaluation (not performed due to lack of reagents) was recommended, because of the patient’s personal and family history that increased risk for malignant results.

Though these tumors are nonfunctional \(^13,15,25\), there may be the coexistence of myelolipoma with hyperplasia in any of the three adrenal cortical zones \(^26,27\). For these cases, treatment is adrenalectomy (just as in any case of myelolipomas >6cm) independent of its functionality, due to the risk of intratumoral necrosis, hemorrhage from rupture or compression of adjacent structures due to mass effect \(^7\). Alternatively, nonfunctional tumors ≤4cm with benign characteristics are recommended to be periodically monitored with radiological and biochemical evaluations. For masses between 4 and 6cm, the surgical intervention should be based on presenting characteristics, growth rate, and the patient’s preference \(^29\).

It is estimated that 20% of AIs will have subclinical hormone production and these patients represent an at-risk population with greater risk of metabolic disorders and cardiovascular disease \(^7,19\). In the present case, the patient’s hormone values were within normal parameters - ruling out subclinical states, including Conn’s Syndrome (hyperaldosteronism), Cushing Syndrome or pheochromocytoma. Nevertheless, the presence of myelolipoma is associated with obesity, DM2 and dyslipidemia warranting pharmacological intervention \(^29\). This was further emphasized through a retrospective review of 34 AIs in patients of both sexes over the age of 50, where over half suffered from hypertension, 20.6% had DM2, and 37% had obesity. Of these, 80% were histopathologically confirmed to be adenomas with one being a myelolipoma \(^29\).

As strengths, we can point out the collaboration between different levels of medical attention and the shared effort of the family and the patient to travel to another state to complete this medical Care. Despite the Venezuelan medical assistance crisis, a relatively quick resolution of the case was achieved. Lastly, we emphasize the compliance with the protocol for proper management of adrenal tumors.

The limitations include the inability to perform the hormonal profile and determine whether the tumor was functional or not. Additionally, the choice of imaging could have been better.
Specifically, the use of MRI instead of CT is not the first choice for the diagnosis of the myelolipoma; however, this occurred because the initial diagnosis was directed towards a hepatic hemangioma.

Conclusions
Adrenal myelolipomas are rare benign tumors that are generally asymptomatic, whose size ranges from a few millimeters to over a dozen centimetres. Much uncertainty exists surrounding the etiology of these masses with continued debate in the current literature on whether or not they are true neoplasms or manifestations secondary to a reactive process\(^{56}\). In general, surgical management depends on hormone production, tumor size, high risk features on imaging and patient consent. Yet additional studies and information are needed to better understand myelolipomas, their etiology, and clinical management.

Lastly, this case demonstrates how family physicians can manage various aspects of patient care through the facilitation of medical treatments, surgical interventions, and ensuring a proper multidisciplinary approach based on the endocrinology clinical guidelines.

Consent statement
Written informed consent was obtained from the patient for the publication of the patient’s details and accompanying images.

Author contributions
RD contributed to the conception of the article. JR, VB, FL and RD contributed to the design of the work. FL and JR contributed to the acquisition of data. RD prepared the first draft of the manuscript. VB provided expertise in endocrinology. KH translated from Spanish to English. RD, JR, VB and KH participated in the revision of the manuscript draft and agreed on the final content.

Competing interests
No competing interests were disclosed.

Grant information
The author(s) declared that no grants were involved in supporting this work.

References

1. Nikiema Z, Yaméogo AA, N’Goran K, et al.: [Enormous adrenal incidentalomas: the role of medical imaging about two cases]. Pan Afr Med J. 2012; 13: 74. Published Abstract | Free Full Text
2. Papieska L, Cichoń A, Sankowski AJ, et al.: Adrenal incidentaloma imaging - the first steps in therapeutic management. Pol J Radiol. 2013; 78(4): 47–55. Published Abstract | Publisher Full Text | Free Full Text
3. Musella M, Conzo G, Milone M, et al.: Preoperative workup in the assessment of adrenal incidentalomas: outcome from 282 consecutive laparoscopic adrenalectomies. BMC Surg. 2013; 13: 57. Published Abstract | Publisher Full Text | Free Full Text
4. Chervin R, Herrera J, Juri A, et al.: Mesa 1: Incidentaloma Suprarrenal. Rev Argent Endocrinol Metab. 2009; 48(4): 55–64. Reference Source
5. Oliveira Caiafa R, Salvador Izquierdo R, Buñesch Villalba L, et al.: [Diagnosis and management of adrenal incidentalomas]. Radiologia. 2011; 52(6): 516–30. Published Abstract | Publisher Full Text
6. Cho YY, Suh S, Joung JY, et al.: Clinical characteristics and follow-up of Korean patients with adrenal incidentalomas. Korean J Intern Med. 2013; 28(5): 557–64. Published Abstract | Publisher Full Text | Free Full Text
7. Gac P, Cabané P, Klein E, et al.: Giant adrenal myelolipoma. Rev Chir Clin. 2012; 64(1): 25–31. Publisher Full Text
8. Andrade C, Espírito Santo Paulo R, Teixeira A: Giant adrenal incidentaloma in young patient. Rev Col Bras Cir. 2000; 27(5): 352–354. Publisher Full Text
9. Kim J, Bae KH, Choi YK, et al.: Clinical Characteristics for 348 Patients with Adrenal Incidentaloma. Endocr Metab (Seoul). 2013; 28(1): 20–25. Published Abstract | Publisher Full Text | Free Full Text
10. Zeiger MA, Thompson GB, Duh GY, et al.: The American Association of Clinical Endocrinologists and American Association of Endocrine Surgeons medical guidelines for the management of adrenal incidentalomas. Endocr Pract. 2009; 15(suppl1): 1–20. Published Abstract | Publisher Full Text
11. Wani NA, Kosar T, Rawa IA, et al.: Giant adrenal myelolipoma: Incidentaloma with a rare incidental association. Urol Ann. 2010; 2(3): 130–3. Published Abstract | Publisher Full Text | Free Full Text
12. Nabi J, Rafiq D, Authory FN, et al.: Incidental detection of adrenal myelolipoma: a case report and review of literature. Case Rep Urol. 2013; 2013: 789481. Published Abstract | Publisher Full Text | Free Full Text
13. Gac P, Cabané P, Klein E, et al.: Giant adrenal myelolipoma. Rev Chir Clin. 2012; 64(3): 292–6. Publisher Full Text
14. Benitez G, Obrepein F, García E, et al.: Mieliolipoma de glándula suprarrenal: Reporte de un caso. RPM. 2005; 28(1): 23–6. Reference Source
15. López Martín L, García Cardoso J, Gómez Muñoz J, et al.: Mieliolipoma suprarrenal: Aportación de un caso y revisión de la literatura. Arch Esp Urol. 2010; 63(10): 880–3. Reference Source
16. León González O, Pol Herrera P, López Rodríguez P, et al.: Myelolipoma, a rare surgical lesion of the adrenal gland. Rev Cubana Cir. 2012; 81(3): 254–9. Reference Source
17. Castillo Lario M, Carro Alonso B, Gimeno Peribáñez M, et al.: Giant right adrenal myelolipoma. Arch Esp Urol. 2006; 59(9): 911–3. Publisher Full Text
18. Joy PS, Manak CP, Nashed NS, et al.: Giant Adrenal Myelolipoma Masquerading as Heart Failure. Case Rep Oncol. 2014; 7(1): 182–7. Published Abstract | Publisher Full Text | Free Full Text
19. Al Bahri S, Tariq A, Lowenbritt B, et al.: Giant Bilateral adrenal myelolipoma with congenital adrenal hyperplasia. Case Rep Surg. 2014; 2014: 728198. Published Abstract | Publisher Full Text | Free Full Text
20. Barman S, Mandal KG, Mukhopadhyay I: Adrenal myelolipoma: An incidental and rare benign tumor in children. J Indian Assoc Pediatr Surg. 2014; 19: 236–8. Published Abstract | Publisher Full Text | Free Full Text
21. Mitsui Y, Yasumoto H, Hiraki M, et al.: Coordination of bone morphogenetic protein 2 (BMP2) and aberrant canonical Wnt/\(\beta\)-catenin signaling for heterotopic bone formation in adrenal myelolipoma: A case report. Can Urol Assoc J. 2014; 8(1–2): E104–E107. Published Abstract | Publisher Full Text | Free Full Text
22. Ketelsen D, Von Weyhern CH, Horger M: Diagnosis of bilateral giant adrenal myelolipoma. J Clin Oncol. 2010; 28(33): 6767–9. Published Abstract | Publisher Full Text
23. Pareja Megía MJ, Barrero Candau R, Medina Pérez M, et al.: [Giant adrenal myelolipoma]. Arch Esp Urol. 2005; 58(4): 362–5. Published Abstract
24. Yildiz BD: Giant Extra-Adrenal Retroperitoneal Myelolipoma With Incidental Gastric Mesenchymal Neoplasias. Int Surg. 2015; 100(6): 1018–20. Published Abstract | Publisher Full Text | Free Full Text
25. Ansis-Ul-Islam M, Qureshi AH, Zaidi SZ: Adrenal myelolipoma in a young male - a
rare case scenario. J Pak Med Assoc. 2016; 66(3): 342–4.
PubMed Abstract

26. Campos Arbulú AL, Sadava EE, Kerman J, et al.: [Giant adrenal myelolipoma. Right laparoscopic adrenalectomy], Medicina (B Aires). 2016; 76(4): 249–50. PubMed Abstract

27. Su HC, Huang X, Zhou WL, et al.: Pathologic analysis, diagnosis and treatment of adrenal myelolipoma. Can Urol Assoc J. 2014; 8(9–10): E637–40. PubMed Abstract | Publisher Full Text | Free Full Text

28. Ramirez M, Misra S: Adrenal myelolipoma: To operate or not? A case report and review of the literature. Int J Surg Case Rep. 2014; 5(8): 494–6. PubMed Abstract | Publisher Full Text | Free Full Text

29. Yalagachin GH, Bhat BK: Adrenal incidentaloma does it require surgical treatment? Case report and review of literature. Int J Surg Case Rep. 2013; 4(3): 192–4. PubMed Abstract | Publisher Full Text | Free Full Text

30. Chervin RA, Danilowicz K, Pitto F, et al.: [A study of 34 cases of adrenal incidentaloma]. Medicina (B Aires). 2007; 47(4): 341–50. PubMed Abstract
Open Peer Review

Current Referee Status: ✔ ✔

Version 1

Referee Report 31 July 2017

doi:10.5256/f1000research.12710.r24335

Ana Nunes Barata
ACES Amadora, UCSP Buraca, Lisbon, Portugal

This case provides an extensive and comprehensive background and description of a case of an adrenal myelolipoma. As this is not a common condition, sharing the knowledge on a rare case may facilitate other practitioners to reach the correct diagnosis. It also includes description of relevant differential diagnosis as well as treatment.

Is the background of the case’s history and progression described in sufficient detail?
Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?
Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?
Yes

Is the case presented with sufficient detail to be useful for other practitioners?
Yes

Competing Interests: No competing interests were disclosed.

I have read this submission. I believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Referee Report 25 July 2017

doi:10.5256/f1000research.12710.r24338

José Manuel Ramírez Aranda 1, Jesús Zacarías Villarreal- Perez 2
1 School of Medicine, Family Medicine Department, Autonomous University of Nuevo Leon, Monterrey, Mexico
School of Medicine, Endocrinology Department, Autonomous University of Nuevo Leon, Monterrey, Mexico

I think the case report fulfills diagnostic criteria for Adrenal Incidentaloma as Kim and Zeiger et al. rightfully have pointed it out. The clinical case was well studied according to accepted guidelines. I consider that the manuscript is well written. Perhaps the only thing that would call my attention is in the Discussion section since it seems to me unnecessarily extensive, but it depends on journal requirements and policies.

One suggestion in the abstract: Use Arabic number to describe the type of Diabetes.

Is the background of the case's history and progression described in sufficient detail?
Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?
Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?
Yes

Is the case presented with sufficient detail to be useful for other practitioners?
Yes

Competing Interests: No competing interests were disclosed.

Referee Expertise: JMRA - family physician; JZVP - endocrine disorders

We have read this submission. We believe that we have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Discuss this Article

Version 1

Reader Comment 30 Jul 2017

Tanja Pekez-Pavlisko, Private Practice, Croatia

I think that article is very good written. Case is very well documented. This case can be helpful to other physicians. Question one: do we need such a number of investigations (mentioned in the discussion) regarding so rare tumor. Question two: is it necessary so aggressive hypolipemic therapy. Question three: do we need as a family doctor and does patient need lab tests regarding insulin?

Competing Interests: No
