A 63-year-old female suffered from intermittent dull pain over the left upper quadrant (LUQ) of abdomen for 3 days. Physical examination revealed knocking tenderness over LUQ. She underwent cholecystectomy 2 years previously. Laboratory tests including blood urea nitrogen and serum creatinine were all within normal range. Adrenal hormonal studies including 24-hour urine vanillylmandelic acid, plasma aldosterone and plasma cortisol were all within normal range too. Plain abdominal radiography, ultrasound, CT, and MR imaging of the abdomen were taken for the patient.

Plain abdominal radiographs demonstrated a subtle soft-tissue density in the left suprarenal region, without calcification. Ultrasound examination (LOGIQ 500, GE Medical Systems, Milwaukee, Wis.) using a 3.5 MHz convex transducer disclosed a heterogeneous echogenic lesion measuring 6 × 6 cm, at the upper pole of the left kidney. Nonenhanced CT (Lightspeed Plus, GE Medical Systems, Milwaukee, Wis.) scans showed a low-attenuated mass in the left suprarenal region. Peripheral enhancement of this lesion was found after administration of 100 ml contrast medium (Ultravist, Schering AG, Berlin, Germany).

Hemangiomas of the adrenal gland are extremely uncommon, and most tumors are found incidentally. It affects people between the ages of 50 to 70 years. Women are affected twice as often as men according to the previous reported cases. Bilateral involvement has been reported twice [1]. Histologically, these tumors consist of dilated, endothelial-lined, blood-filled channels within the adrenal parenchyma [2]. At microscopic analysis, hemangiomas are classified as cavernous, capillary, sclerosing types and hemangiopericytoma. We present the CT and MR imaging manifestations of an adrenal hemangioma.

CASE REPORT

A 63-year-old female suffered from intermittent dull pain over the left upper quadrant (LUQ) of abdomen for 3 days. Physical examination revealed knocking tenderness over LUQ. The patient had a history of hypertension with medical treatment for 10 years. She underwent cholecystectomy 2 years previously. Laboratory tests including blood urea nitrogen and serum creatinine were all within normal range. Adrenal hormonal studies including 24-hour urine vanillylmandelic acid, plasma aldosterone and plasma cortisol were all within normal range too. Plain abdominal radiography, ultrasound, CT, and MR imaging of the abdomen were taken for the patient.

Plain abdominal radiographs demonstrated a subtle soft-tissue density in the left suprarenal region, without calcification. Ultrasound examination (LOGIQ 500, GE Medical Systems, Milwaukee, Wis.) using a 3.5 MHz convex transducer disclosed a heterogeneous echogenic lesion measuring 6 × 6 cm, at the upper pole of the left kidney. Nonenhanced CT (Lightspeed Plus, GE Medical Systems, Milwaukee, Wis.) scans showed a low-attenuated mass in the left suprarenal region. Peripheral enhancement of this lesion was found after administration of 100 ml contrast medium (Ultravist, Schering AG, Berlin, Germany).
Germany) intravenously (Fig. 1). MR imaging confirmed that the mass was superior to and separated from the left kidney (Fig. 2). The T1-weighted images (spin echo: TR/TE, 450 ms/14 ms) revealed a heterogeneously low signal intensity mass with a very high intensity at the central portion at the left adrenal region. This lesion became heterogeneously hyperintense in T2-weighted images (fast spin echo: 8571/82.9) with fat saturation. In the chemical shift imaging, no apparent change of the signal intensity could be identified in this lesion in comparison to the opposed phase images with in-phase ones. After administration of 10 ml contrast medium, early and heterogeneous enhancement of the peripheral portion in this lesion (Fig. 3) was identified.

The patient underwent left adrenalectomy. At surgery, a tan-brownish ovoid tumor measuring $5.5 \times 5.0 \times 4.0$ cm$^3$ and weighing 6.0 grams was removed. Histological examination showed the tumor was vascular and well-circumscribed. The bulk of the mass contained variable cystic spaces filled with bloody fluid and red cells. Toward the periphery, numerous small papillary structures containing hyaline cores covered by benign-looking endothelial cells were found, which was characteristic for hemangiomas (Fig. 4). The external surface was generally smooth, with some attached fat tissue and a portion of normal-looking adrenal tissue measuring $2.5 \times 1.2 \times 0.5$ cm$^3$ located inferior to the tumor.

**DISCUSSION**

Hemangiomas are benign tumors, showing a propensity for liver, brain and skin involvement and rarely involve the adrenal glands. Most hemangiomas have been incidental findings since the patient usually has no symptom. The exceptions have been in those cases in which the patient initially presents with a large, palpable, abdominal mass, flank pain, or hypertension of unknown cause.

Rothberg et al. [3] reported round calcification with translucent centers, typical of phleboliths, to be pathognomonic of adrenal gland hemangiomas. Honig et al. [4] reported calcification on plain abdominal films of adrenal hemangiomas were noted in 6 of 7 cases, not all of whom were with phleboliths. We supposed that phleboliths are frequently seen in adrenal hemangiomas but not without exception. Other adrenal tumors that commonly have calcification are carcinoma (30% of case) and adrenal cyst (15%) [5]. Calcification are also occasionally observed in pheochromocytomas, teratomas, and adenomas. At nonenhanced CT scans show a hypoattenuating mass with necrotic areas and peripheral enhancement after intravenous administration of contrast material. Nonenhanced T1-weighted MR images show heterogeneous low signal intensity and nonenhanced T2-weighted MR images show marked high signal intensity except in the central fibrotic areas. The enhancement pattern is the same as that seen at CT [6]. The peripheral signals that enhanced with
Gadolinium (Gd) must be vascular and certainly represent venous sinuses. Enhancement with Gd is the finding most characteristic of a hemangioma [4].

According to the radiological features of this lesion, the differential diagnosis includes: pheochromocytoma, and adrenocortical carcinoma. Pheochromocytoma are catecholamine-producing tumors that arise from chromaffin cells with well enhancement. The typical imaging characteristics of a pheochromocytoma are a round, well-circumscribed and homogeneous soft-tissue mass. At MR imaging, pheochromocytomas are generally hypointense compared with normal liver on T1-weighted images [7]. On T2-weighted images, they are typically very hyperintense to fat [7]. When intravenous contrast material is given, a pheochromocytoma will enhance inhomogeneously [8].

On CT, adrenocortical carcinoma appears as a large mass, often with central necrosis. As a result, the tumor enhances heterogeneously, with the greatest enhancement often at the periphery [9-11]. Ruling out carcinoma in a nonfunctioning adrenal mass preoperatively remains difficult [4].

In conclusion, when we encounter an adrenal mass having the following radiologic features, adrenal hemangiomas should be included in the differential diagnosis. These are phleboliths of adrenal tumors on plain abdominal radiograms or CT scan, a heterogeneously echogenic mass at ultrasound, a low-attenuated tumor with enhancement from its peripheral portion in enhanced CT scan, and a mass hypointense in T1-weighted images and hyperintense in T2-weighted images with enhancement from peripheral area after contrast medium administration. Above all of them, the most important radiological features suggestive of adrenal hemangioma are phleboliths and enhancement from peripheral area after contrast medium administration on CT, and MR images.

**REFERENCES**

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腎上腺血管瘤在電腦斷層攝影及磁振造影之表現：
病例報告

王明宗¹ 曾文盛² 麥志輝² 陳志程¹ 張晉民² 盧納密³

國軍高雄總醫院 放射線科¹
奇美醫學中心 放射線部² 病理部³

腎上腺血管瘤非常罕見，我們報告一病例病理證明為腎上腺血管瘤。超音波看到一混合回音的左腎上腺腫瘤，電腦斷層發現一個周邊顯影而中心低密度的腫瘤。磁振造影確定為一左腎上腺腫瘤，呈現出T1低訊號，T2高訊號且在注射完顯影劑後呈現出周邊高訊號。雖然腎上腺血管瘤非常罕見，當一病人發現有腎上腺腫瘤，有上述影像學的表徵時，應將腎上腺血管瘤列入鑑別診斷。

關鍵詞：腎上腺，電腦斷層；腎上腺，磁振造影；腎上腺，腫瘤；血管瘤