Small Angiomyolipoma of the Kidney: Sonographic-CT Evaluation

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Small fat-containing intraparenchymal renal lesions, 0.5 to 1.3 cm in diameter, were detected by sonography and computed tomography in six patients. In five of the six cases, the lesions were found serendipitously. None of the patients underwent surgery. Follow-up studies, performed over a period of 6–24 months, showed no change in the size of the lesions. These small fat-containing nodules, hitherto unrecognized by imaging studies, are not an uncommon finding at routine autopsy. Since these lesions do not show growth in the adult population, surgical intervention does not seem to be indicated.

The discovery of a small fat-containing intraparenchymal renal mass on sonography or computed tomography (CT) poses a problem in diagnosis and patient management. In order to understand more fully the nature of these small lesions of the kidney, we reviewed the pathologic literature and found that small nodules of tissue in the renal parenchyma, containing adipose tissue and smooth muscle, are present in about 11% of kidneys removed at routine autopsy [1]. These nodules are usually unilateral and solitary, range from 0.1 to 1.0 cm in diameter, and are seen more commonly in women [2]. While some nodules are composed of only adipose tissue and others of smooth muscle, most contain both [1, 2]. Often these lesions contain a vascular component, consisting of tortuous thick-walled vessels, when the lesion is referred to as an angiomyolipoma, which is indistinguishable from that seen in patients with tuberous sclerosis [1, 2].

This report demonstrates the capability of sonography and CT in the detection of these small islands of fat-containing tissue within the renal parenchyma and discusses the relevance of this finding to clinical practice.

Subjects and Methods

Intraparenchymal small renal lesions, markedly echogenic on the sonogram and smaller than 1.5 cm in diameter, were detected in six patients. The lesions in the right kidney were found during the course of routine sonography of the right upper quadrant of the abdomen performed for suspected gallbladder disease. There were three women and three men, 36–86 years of age. The sonographic examinations were performed with static and real-time ultrasound units. All patients had CT examinations performed on EMI 5005, EMI/Omni 6000, or GE 8800 scanners. The scans were obtained before and after intravenous administration of the contrast medium. Selective arteriography of the left kidney was performed in one patient. Follow-up sonograms or CT (6–24 months) were available in four patients.

Results

The lesions were detected serendipitously in five of the six patients; four were being evaluated by sonography for suspected gallbladder disease (figs. 1 and 2), one with lower urinary tract symptoms. One patient, who had left flank pain

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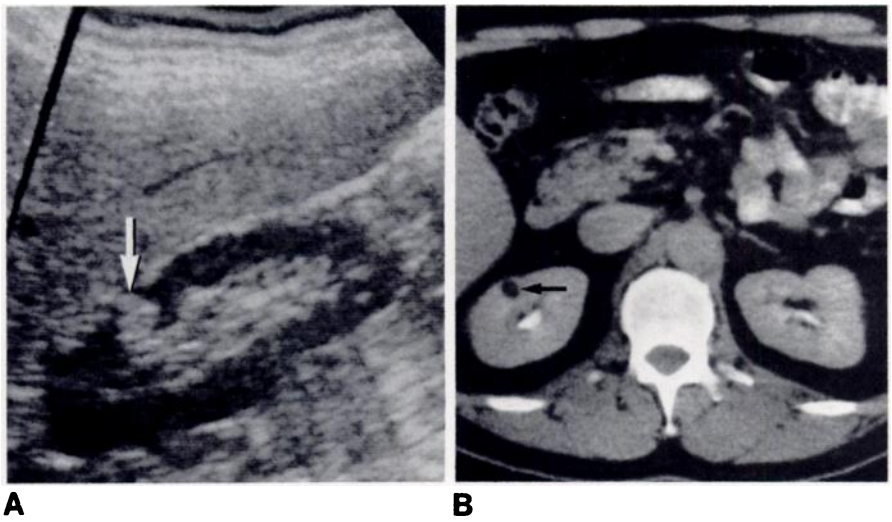

Fig. 1.—46-year-old man with symptoms of gallbladder disease. **A**, Sagittal sonogram of right kidney. Echogenic 1.3 cm lesion (*arrow*) within renal parenchyma. **B**, Contrast-enhanced CT scan confirms presence of fat-containing mass (*arrow*).

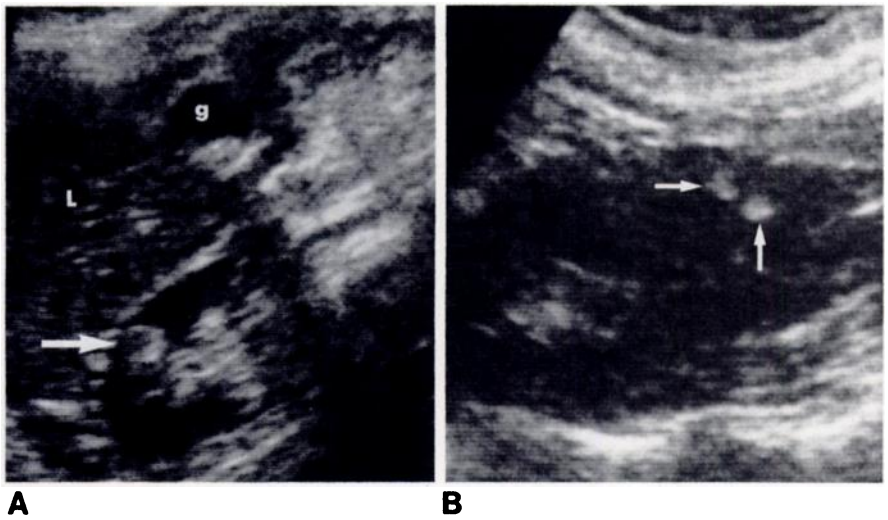

Fig. 2.—51-year-old woman with symptoms of gallbladder disease. Transverse (**A**) and sagittal (**B**) sonograms of right kidney. Three small echogenic intraparenchymal renal lesions (*arrows*). L = liver; g = gallbladder with gallstones.

and hematuria, was found to have a subcapsular hematoma (fig. 3). Initially the cause of the hematoma was unclear, but subsequent follow-up examinations revealed a small angiomyolipoma as the cause for the subcapsular hematoma.

The lesion was solitary in five and multiple in one, in whom a total of four lesions was present. Altogether nine lesions, ranging from 0.5 to 1.3 cm in diameter, were detected by sonography. On CT, the lesions were seen as areas of decreased attenuation measuring fat density. The attenuation values of these lesions, on both contrast and noncontrast scans, ranged from −27 to −100 H (Hounsfield units). There was minimal enhancement after intravenous administration of the contrast medium. Selective arteriography, performed in one patient, failed to clearly identify the lesion.

Follow-up examinations (6–24 months) available in four cases showed no change in the size of the lesions. None of the patients underwent surgery. The patients remain clinically asymptomatic. None had stigmata of tuberous sclerosis.

Discussion

The small lesions described here as angiomyolipomas may represent lipomas, myolipomas, or angiomyolipomas. The true nature of these small nodules can be determined only by histologic examination. The histologic continuum observed in these lesions has led Bennington and Beckwith [2] to suggest that there is basically one entity, the mixed mesenchymal lesion, which in the extreme form may contain only one element, smooth muscle or adipose tissue (fig. 4). These nodules commonly are referred to as hamartomas. However, due to the lack of smooth muscle and fat in the parenchyma of the normal kidney, the term choristoma, as coined by Albrecht (quoted in [2]) is preferable because it

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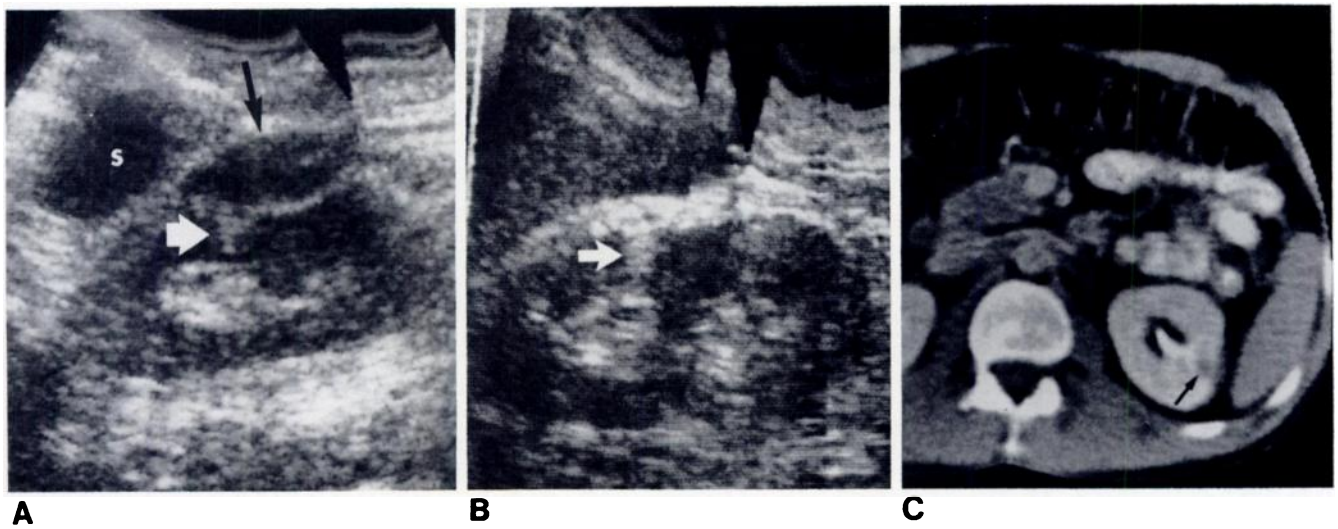

Fig. 3.—35-year-old man with left flank pain and hematuria. **A**, Initial coronal sonogram of left kidney. Subcapsular hematoma (*black arrow*). Small angiomyolipoma (*white arrow*) was not appreciated on this study at this time. Sonogram (**B**) and contrast-enhanced CT (**C**) 21 months after **A** shows resolution of subcapsular hematoma and angiomyolipoma (*arrows*) unchanged in size from **A**.

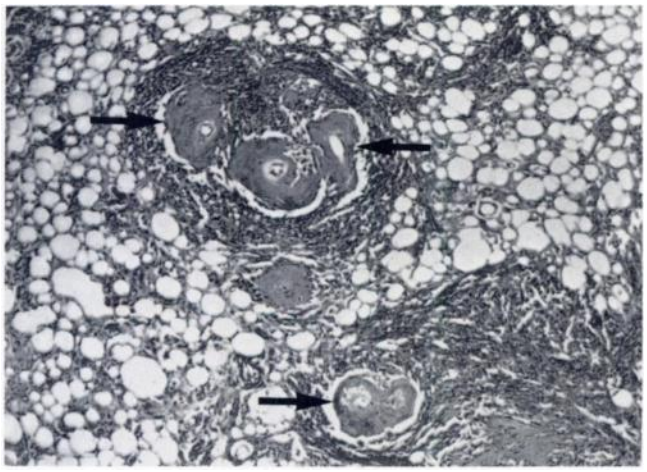

Fig. 4.—Histologic section of typical angiomyolipoma. Note thick-walled vessels (*arrows*) surrounded by smooth muscle and adipose tissue. (Reprinted from [2].)

denotes a tumorlike formation composed of tissues that are displaced to an abnormal position.

The finding of a discrete focus with marked echogenicity against the backdrop of hypoechoic renal cortex facilitates the sonographic detection of a fat-containing intraparenchymal renal lesion. Although highly suggestive, this pattern is not pathognomonic, since a small renal cell carcinoma, on occasion, also may exhibit a similar sonographic pattern [3–6]. Demonstration of fat density on CT, however, establishes the presence of adipose tissue within the lesion. Identification of adipose tissue within an intraparenchymal renal lesion virtually excludes the possibility of carcinoma. Accurate determination of the attenuation values of these small lesions may be difficult because of partial-volume phenomenon. However, in our cases, the attenuation values on both contrast and noncontrast scans remained below −27 H, thus indicating the presence of adipose tissue within the lesions. Although none of the patients showed any significant contrast enhancement, the tumor nodule in the patient with subcapsular hematoma presumably had angiomatous elements. It should be noted also that these lesions may escape detection if they are situated adjacent to normal fat in the perinephric or renal sinus regions. Furthermore, nodules composed of only smooth muscle also may be undetectable, since it is the presence of adipose tissue that enables detection of the lesion by sonography and CT.

Most of these small nodules are detected as incidental findings and probably would not be symptomatic during life. The symptomatic lesions, on the other hand, tend to be much larger and more likely to also contain angiomatous tissue. It is also conceivable that the lesions situated on the cortical surface are more likely to be symptomatic than those that are totally intraparenchymal. The treatment of symptomatic angiomyolipoma of the kidney has been surgical. Partial nephrectomy or tumor resection has been performed on the basis of a firm preoperative diagnosis [7]. Selective tumor embolization has been of value in selected cases [8].

In the patients under discussion, surgery was not performed, since it is known that these small lesions have no known malignant potential and can remain clincially silent. The follow-up data (6–24 months), showing no change in the size of the lesions, suggest that they are not likely to grow in adults. Nonoperative management is suggested.

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