THE PREOPERATIVE DIAGNOSIS OF PRIMARY ALDOSTERONISM BY THIN-SECTION COMPUTED TOMOGRAPHY

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ABSTRACT

Primary aldosteronism or Conn's syndrome is characterized by hypertension and hypokalemia resulting from elevated aldosterone. Up to 80% of cases are due to adrenocortical adenoma and the remaining 20% of cases are due to bilateral adrenal hyperplasia. Fewer than 1% of cases are due to carcinoma. The radiologic distinction between adenoma and hyperplasia is important because the treatment for adenoma is adrenalectomy, whereas medical therapy is indicated in hyperplasia. Several techniques have been used to make this distinction including: adrenal venous sampling, adrenal venography, scintigraphy, CT and MR imaging. Adrenal venous sampling and venography are invasive procedures even when done by the most experienced angiographer. Scintigraphy and MR imaging are not widely available. Many studies have advocated computed tomography in the investigation of patients with primary aldosteronism. We present 5 cases of primary aldosteronism due to functioning adrenocortical adenomas correctly diagnosed by thin-slice CT. All adenomas were less than 2 cm. with homogeneous low density.
We propose that CT should be the investigation of choice for patients with clinically suspected primary aldosteronism.

INTRODUCTION

Primary aldosteronism, or Conn's syndrome, is characterized by hypertension, hypokalemia and metabolic alkalosis resulting from the hypersecretion of the adrenal mineralocorticoid aldosterone. It is an unusual cause of hypertension but curable by surgery, as most cases (70-80%) result from single adrenocortical adenoma. The remaining cases result from bilateral adrenocortical hyperplasia and, rarely, adrenocortical carcinoma. Several techniques have been used in the evaluation of primary aldosteronism to distinguish adenoma from hyperplasia so that surgery is performed only in case of an adenoma.[1-7]

We present the value of thin-section CT in the evaluation of 5 patients with primary aldosteronism.

MATERIALS AND METHODS

Five patients with a diagnosis of primary aldosteronism were evaluated by CT examination during the past 4 years. There were 4 women and 1 man, 28-41 years old (mean 35 years). CT scans were obtained on a Hitachi W500 (3 patients) and General Electric 3000 i (2 patients) scanner. Plain and contrast scans with contiguous 5 mm-thick sections were performed in all cases. In one patient, additional contiguous 2 mm-thick sections wer made. Adrenalectomy was performed in all patients.

RESULTS

CT accurately localized the tumors in all cases. Adenoma appeared as a nodule of homogeneous low

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density (Fig. 1,2) with no additional diagnostic information after contrast enhancement. Tumor size ranged from 8-12 mm. Four masses were detected in the left adrenal gland and one in the right adrenal gland. Adenoma was confirmed on pathologic examination in all patients.

DISCUSSION

Accurate preoperative localization of an adrenocortical adenoma is essential for optimal surgical management in patient with primary aldosteronism. Most aldosteronomas are smaller than 2 cm. Previously reported CT sensitivity before, thin-section, high-resolution CT image were available ranged from 58-75%.[1-2] As the spatial resolution of CT scanners has increased, the sensitivity of CT in showing small aldosteronomas has improved.[8-10] Our results show that 5 mm-section CT is highly sensitive in detecting aldosteronoma as the lesions in all 5 patients were smaller than 1.5 cm. In our series there were no false positives. However, we have only 5 cases which is too small to have much statistical power.

Several other techniques, including adrenal vein hormone sampling, ^{131}I-6B-iodomethyl-19-norcholesterol (NP-59) scintigraphy and MR have been used to distinguish an aldosteronoma from hyperplasia. In 1983, Geisinger et al[2] reported that selective adrenal venous sampling for aldosterone level is the most sensitive for detecting aldosteronomas. However, this method is invasive, difficult to perform even by the most experienced angiographer. We have no experience in using this technique.

Ikeda et al[6] reported 100% sensitivity of NP-59 scintigraphy in detection of an aldosteronoma. In fact, NP-59 scintigraphy is not specific for aldosteronama. It is sensitive to detect hyperfuntioning adrenal cortical tumors, particularly in patients with Cushing syndrome.[7] NP-59 scintigraphy is useful in evaluating adrenal masses occuring in the oncologic patient, to distinguish adenoma from metastasis. However, NP-59 is an investigational drug and is not commercially available.

MR signal intensity or relaxation time characteristics are not useful in characterizing adrenal cortical hyperfunctioning lesions.[5,11] Its inability to detect small nodules is also a major limitation. Ikeda et al[6] found MR had lower specificity and accuracy for adenoma identification than either CT or NP-50 scintigraphy.

CT is now widely available, noninvasive, and can be performed on an outpatient basis. With recent improvement in CT technology, detection of small adenomas is now a reliable procedure. Although the number of patients in this study is too small to have statistical significance we suggest that CT should be the investigation of choice for patients with a clinically suspected primary aldosteronism.

ACKNOWLEDGEMENT

We are grateful to Dr. Ezekiel Freed (Northridge Medical Center, LA, USA) for his kindly reviewing the manuscript.

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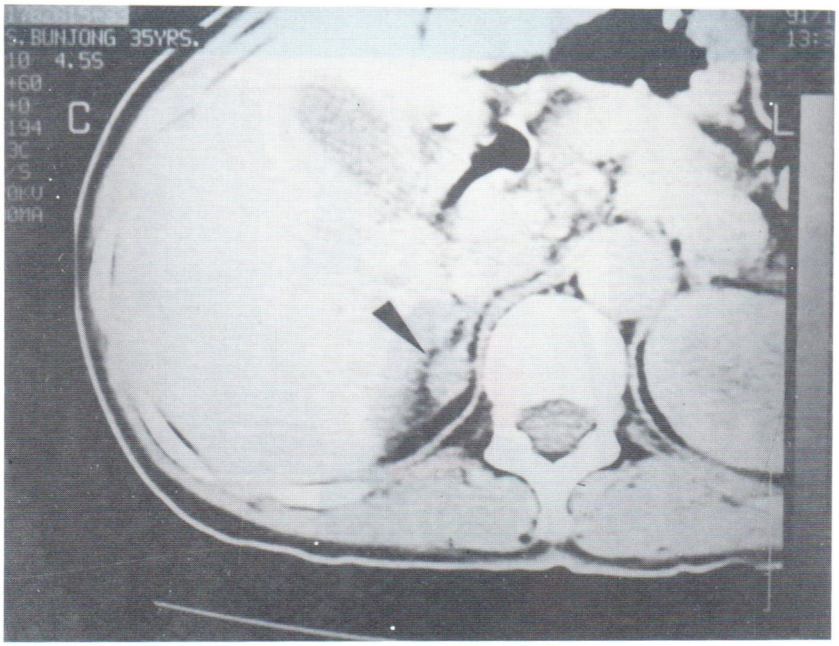

Fig. 1 A 35-year-old woman with hypertension and hypokalemia. Contrast enhancement, 5 mm-thick CT section shows homogeneous low-attenuation right adrenal nodule (arrow head).

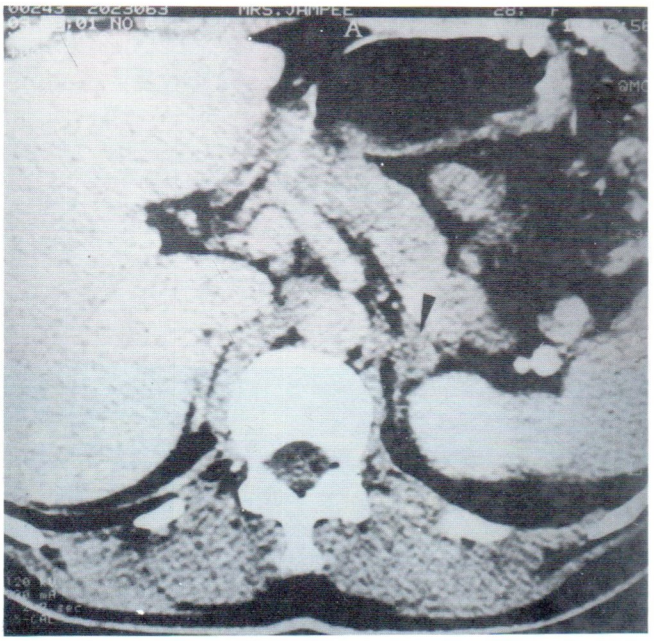

Fig 2. 2 mm-thick sections shows low-attenuation left adrenal nodule (arrow head) in a 28-year-old woman with hypertension and hypokalemia.