Adrenal Scintigraphy With $^{131}$I-19-Iodocholesterol in the Diagnosis of Cushing’s Syndrome Associated With Adrenal Tumor

G. B. Barliev

Medical Academy, Institute of Endocrinology and Gerontology, Radioisotope Laboratory, Christo Michailov 6, Sofia, Bulgaria

Abstract. Seven patients with Cushing’s syndrome secondary to adrenocortical tumors were studied using $^{131}$I-19-iodocholesterol. The diagnosis of all cases were verified histologically. In three cases with adenoma the uptake of the tracer was in the tumor only, while the two patients with adrenocortical carcinoma failed to show adrenal accumulation of the labelled compound.

In two patients there was a hyperplasia-like scintigraphic pattern, while the stimulation and suppression biochemical tests suggested adrenal tumor. One of these cases was verified as a mixed form (adenoma plus hyperplasia), and the tumor bearing gland was significantly larger on the scan which helped the preoperative localization. In the other case, verified as bilateral multiple adrenocortical adenomas, the autonomus function of both adrenals was proved by dexamethasone suppression scanning. It seems reasonable to use the latter as an adjunctive diagnostic procedure in patients where there is a discrepancy between the standard scintiscan and the biochemical indexes of adrenal hyperfunction.

Material and Methods

Seven patients were examined after intravenous administration of 1 mCi per 50 kg of body weight of $^{131}$I-19-iodocholesterol produced by CEA-SORIN. The radiopharmaceutical is a sterile non-pyrogenic solution of $^{131}$I-19-iodocholesterol in an aqueous solution of 0.9% sodium chloride 10% ethanol and 1% tween 80. To suppress the accumulation of radioactivity in the thyroid, Lugol’s solution was given as 5 drops twice daily, for 10 days starting on the day of injection.

The scans were produced between the 6th and the 9th day after injection with Picker Magnascanner 500i, provided with a 12,5 cm focus and 55 hole high energy collimator. The scanning speed was 20-40 cm min$^{-1}$. All scans were taken posteriorly, so that the left adrenal is seen on the left side of each scintigram. The 12th thoracic vertebra was located on the back of the patients and transferred to the dot paper scan.

In one patient, three months after the standard scintiscan, a suppression test was performed by giving dexamethasone, 4 mg orally daily, beginning two days before the radiocholesterol injection and continuing until the adrenal scans were completed. In another patient the scanning was repeated 6 months after the removal of adenoma.

The diagnosis of all cases was verified histologically. The group included three patients with adrenocortical adenoma, one patient with a mixed form (adenoma plus hyperplasia), one patient with bilateral multiple adenomas and two patients with carcinoma.

Introduction

The diagnostic value of adrenal scintigraphy with $^{131}$I-19-iodocholesterol has been proved in patients with Cushing’s syndrome secondary to adrenocorticotropic hormone excess (Anderson and Beierwaltes, 1974; Beierwaltes et al., 1971; Moses et al., 1974), adrenocortical adenoma and carcinoma (Anderson and Beierwaltes, 1974; Jorgensen et al., 1975; Moses et al., 1974; Troncone et al., 1977), and postsurgical adrenal remnants (Schteingart et al., 1972).

In this article our experience in the scintigraphic evaluation of patients with Cushing’s syndrome secondary to adrenocortical neoplasms is summarized.

Results

All three patients with adenoma showed uptake of the tracer in the tumor only. In one of these patients the normal adrenocortical tissue was visualized 6 months after removal of the neoplasm (Fig. 1).

The patient with the mixed form showed bilateral visualization of the adrenal glands on the scan, the tumor bearing gland being relatively larger (Fig. 2). The scintigraphic image was interpreted as “bilateral asymmetrical hyperplasia”, but there was no response to either ACTH-stimulation or dexamethasone suppression, so that the most reasonable preoperative diagnosis appeared to be adrenocortical tumor. At
operation an adenoma was found in the right adrenal. The histological examination revealed an adenoma developing in a hyperplastic gland.

The scintigraphic images of the patient with multiple bilateral adenomas are presented in Fig. 3. The standard scintiscan showed "bilateral hyperplasia", but the stimulation and suppression biochemical tests suggested adrenocortical tumor. Dexamethasone suppression scanning showed that both adrenals intensely absorbed the tracer. At operation, multiple cortical adenomas, some of them large, were found in both adrenals.

Both patients with adrenocortical carcinoma failed to show adrenal uptake of the labelled compound.