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原　　著

Surgical Excision of Adrenal Masses; A Ten-Year Experience

Masafumi Kogire, Jun Tamura, Ken Yanagibashi, Fuyuki Izumi, Akio Sugiyama, Jun Ida, Akira Mori, Nobuo Baba, Hiroki Ogawa, and Shiro Sakanashi

Department of Surgery, Otsu Red-Cross Hospital, Otsu, Shiga, Japan

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Abstract

We reviewed the records of 13 patients with adrenal masses operated on over a ten-year period to clarify clinical characteristics of adrenal tumors. Tumors were found incidentally in seven of nine patients with primary adrenal tumors (78%); however, three of these seven patients (43%) proved to have shown symptoms related to adrenal hyperfunction when re-evaluated. Other adrenal tumors (metastatic in three patients and inflammatory in one) were found without any symptoms referable to the tumors. In nine of 13 patients (69%), tumors were discovered by computerized tomography (CT). All patients with primary tumors have been gotten free of disease postoperatively. In contrast, although all three patients with metastatic adrenal tumors underwent resection of all known disease tissue, they died of the recurrence of malignancies within 10 months. This study suggests that a number of functional adrenal tumors are possibly left undiagnosed until found incidentally, and that CT is the most powerful tool to detect adrenal tumors. Our data did not support surgical intervention in cases of metastatic adrenal tumors.

Introduction

The recent development and the wider application of imaging techniques such as computerized tomography (CT) and ultrasound have led to the discovery of increasing numbers of adrenal masses [1-3]. A variety of diseases are presented as adrenal masses. Primary tumors, benign or malignant, appear in the adrenal gland, and some of these tumors are hormonally active. The adrenal gland is a common site of metastatic tumor spread. In addition, adrenal involvement by infections such as tuberculosis and histoplasmosis has been associated with a granulomatous reaction resulting in enlargement of the adrenals[4]. The aim of this communication is to report a series of patients with adrenal masses operated on over a ten-year period at Otsu Red-Cross Hospital, and to clarify clinical characteristics of the adrenal tumors.

Key words: Adrenal gland, tumor, surgery, metastasis, computerized tomography.
索引用語: 副腎，腫瘤，手術，転移，CT.
Present address: Department of Surgery, Otsu Red-Cross Hospital, 1-1-35 Nagara, Otsu, Shiga 520, Japan.

Patients and Methods

The charts of all patients who underwent surgical exploration of the adrenal glands during the period from September 1984 to August 1994 at the Otsu Red-Cross Hospital, an 850-bed tertiary care hospital with all major services in Shiga, Japan, were reviewed. Information obtained included clinical symptoms, biochemical evaluation, radiological characteristics, histological diagnoses of surgical specimens, operative details, and postoperative complications.

Results

There were eight male and five female patients with a mean age of 57.9 years (range 17 to 83 years). Nine patients had primary adrenal tumors. Histological diagnoses of these tumors were cortical adenoma in five patients, cortical carcinoma in one patient, and pheochromocytoma in three patients (Table 1). Three patients had metastatic adrenal tumors after operations for the primary disease (gastric cancer, colonic cancer, and esophageal cancer). All of the three patients had demonstrable disease elsewhere; one patient had localized extension into the pancreas and spleen, and liver metastases confined to the lateral segment of the left lobe, and two patients had metastases in the paraaortic lymph nodes. Bilateral adrenal tumors found in one patient proved to be due to granulomatous infection caused by histoplasmosis.

In two of the nine patients with primary tumors, adrenal masses were discovered in the course of examinations for adrenal diseases because of the clinical symptoms suggestive of aldosteronism. In seven patients (78%), primary adrenal tumors were found incidentally during radiological work-up of an unrelated problem; however, symptoms referable to either adrenocortical or adrenal medullary hypersecretion were identified in three (two pheochromocytomas and one cortisol-producing cortical carcinoma) of the seven patients after the discovery of adrenal tumors (Table 1). All of the metastatic adrenal tumors were found by a regular check for liver metastases. In one patient with granulomatous infection by histoplasmosis, adrenal tumors were detected during diagnostic procedures for an unrelated disease. The imaging techniques that discovered adrenal tumors were CT scanning in nine patients (69%), ultrasound in two, arteriography in one, and scintigraphy in one (Table 1). CT examination failed to detect an adrenal tumor only in one patient, while ultrasound failed in seven patients.

Eleven patients (85%) underwent operation with anterior abdominal approach through a transverse epigastric incision. Thoracoabdominal approach was used in two patients. In contrast to primary adrenal tumors, surgical resection of metastatic adrenal tumors in three patients resulted in prolonged operating time and much blood loss (Table 1), because these three patients underwent resection of all known metastatic lesions in addition to unilateral adrenalectomy. Two patients with primary adrenal tumors and one patient with granulomatous infection by histoplasmosis underwent concomitant resection of the unrelated malignancy. There were no operative deaths or complications except for wound infection in one patient. A mean follow-up of 2 years (range 4 month to 8 years) was performed. No patient with primary adrenal tumors showed any evidence of disease after operation. In contrast, although all of three patients with metastatic adrenal tumors underwent resection of all known disease, they died of the recurrence of malignancies within 10 months after operation.

Table 1 Characteristics of patients with adrenal tumors

Patient	Age (Yr)	Sex	How discovered	Clinical symptoms[a]	Size (cm)	Pathology	Operation	
							Time (min)	Blood loss (g)
1	49	F	CT scan	Yes	1.6, 1.4[b]	Cortical adenoma (aldosterone-producing)	133	98
2	45	F	Scintigraphy	Yes	1.5	Cortical adenoma (aldosterone-producing)	115	188
3	71	F	CT scan	No	2.4	Cortical adenoma (cortisol-producing)	80	64
4	57	F	Ultrasound	Yes	6.0	Cortical carcinoma (cortisol-producing)	430[c]	1129
5	62	M	CT scan	No	3.0	Cortical adenoma (nonfunctioning)	323[c]	610
6	68	M	CT scan	No	2.3	Cortical adenoma (nonfunctioning)	100	98
7	73	M	CT scan	Yes	3.3	Pheochromocytoma	128	118
8	48	M	Ultrasound	No	2.2	Pheochromocytoma	189	230
9	17	F	Angiography	Yes	4.0	Pheochromocytoma	126[d]	90
10	83	M	CT scan	No	6.5, 5.5[b]	Histoplasmosis	270[c]	750
11	64	M	CT scan	No	8.0	Metastatic carcinoma	573	6729
12	50	M	CT scan	No	2.5	Metastatic carcinoma	480	1584
13	66	M	CT scan	No	6.2	Metastatic carcinoma	405[d]	2340

CT=computerized tomography; [a] clinical symptoms referable to either adrenocortical or adrenal medullary hypersecretion were identified before (patients #1 and 2) or after (patients #4, 7, and 9) the discovery of adrenal masses; [b] bilateral adrenal glands were involved; [c] concomitant resection of the unrelated malignancy was per formed; [d] thoracoabdominal approach was used.

Discussion

Although the numbers of cases were small, our study revealed some characteristics of adrenal tumors. In our series, primary adrenal tumors were found incidentally in seven patients (78% of the patients with primary adrenal tumors). However, three of these seven patients had symptoms related to adrenal hyperfunction when re-evaluated. Another report from Japan also demonstrated that more than a third of incidental adrenal tumors that were surgically excised proved retrospectively to be functional[1]. These findings suggest that a number of functional adrenal tumors might be left undiagnosed until they are found incidentally, and emphasize the importance of suspecting adrenal tumors based on the careful evaluation of clinical symptoms.

In the present study, CT scanning was the most powerful tool for detecting adrenal tumors. Our findings are consistent with those of a previous report in which CT was found to be the most sensitive localizing investigation for all categories of adrenal pathology with a sensitivity of 98%[5]. Ultrasound is a non-invasive and inexpensive localizing method that can be performed repeatedly. However, the ability to detect abnormalities, especially those in the left adrenal gland[1], with ultrasound differs considerably among operators, which renders ultrasound less sensitive than CT as shown in our series and in previous reports[1,4].

In most cases in this series, anterior approach through a transverse epigastric incision was used,

because we have adopted this approach in many abdominal operations and are therefore much more familiar with this method compared to the posterior approach[6,7]. There was only one postoperative complication in this study. SCHWARZ and SCHMIDT[5] reported that the surgical approach did not seem to affect the complication rate or the postoperative hospital stay, suggesting that the experience of the surgeon, along with the pathology of the adrenal glands, is a principal factor to decide the type of incision.

Metastases to the adrenal gland from a distant primary carcinoma have frequently been seen at autopsy. Furthermore, CT scanning and ultrasound have made the premortem diagnosis of metastatic adrenal tumors much more common. BRANUM et al.[8] reported that eight of 10 patients with metastatic melanoma localized to one or both adrenal glands were clinically disease-free after resection of the adrenal disease, recommending surgical intervention for metastatic adrenal tumors. In contrast, three patients with metastatic adrenal tumors underwent operation with poor prognosis in our series, although all of these patients underwent resection of all known disease. The sites and the types of primary tumors (gastrointestinal tract carcinoma vs. melanoma) may explain the discrepancy between our data and those reported by BRANUM et al.[8].

In summary, the present study demonstrated that a number of functional adrenal tumors are possibly left undiagnosed until they are found incidentally, and that CT scanning is the most powerful tool to detect adrenal tumors. Our data did not support surgical therapy for metastatic adrenal tumors if there are demonstrable metastases elsewhere.

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和文抄録

副腎腫瘤の臨床的検討

大津赤十字病院外科
小切 匡史，田村 淳，柳橋 健，泉 冬樹，杉山 昌生
井田 純，森 章，馬場 信雄，小川 博暉，坂梨 四郎

副腎腫瘤の臨床的特徴を明らかにするために過去10年間に当科で手術された13例を検討した．原発性腫瘍9例中2例は臨床症状より原発性アルドステロン症を疑われ副腎腫瘍を発見されているが，残りの7例（78%）は偶然腫瘍が発見された，いわゆるincidentalomaであった．しかしながら，retrospectiveにみるとこの7例中3例（43%）で副腎機能亢進によると考えられる症状を呈していた．転移性腫瘍3例，histoplasmaによる肉芽腫1例は全て無症状であった．13例中9例（69%）はCTにより，2例は超音波，1例は血管造影，1例はscintigraphyによりそれぞれ病変を発見され，CTで副腎腫瘤を指摘できなかったのは1例のみであった．13例中11例は経腹的に，2例は開胸開腹で手術されたが，術後合併症は1例に創感染を認めたのみであった．原発性腫瘍例は全例術後再発を認めていないが，転移性腫瘍の3例は全例，術後10ヶ月以内に再発死した．以上の結果は機能性副腎腫瘍でも偶然発見されるまで診断されない場合が多いことを示唆しており，臨床症状を注意深く検討し常に副腎腫瘍の可能性を考慮にいれることが肝要であると考えられる．また，今回の結果よりCTが副腎腫瘤の診断において重要な位置を占めるものと考えられた．なお，転移性副腎腫瘍に対する手術療法は今回の検討ではそれを積極的に支持する結果は得られず，今後さらに検討を要する問題と思われる．