Retroperitoneoscopic partial adrenalectomy for metachronous renal cell carcinoma metastasis to solitary adrenal gland

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Abstract

Metastasectomy is a widely accepted treatment for renal cell carcinoma (RCC) metastasis, and is regarded as the most effective strategy for increasing the rate of cancer-specific survival. However, since bilateral synchronous or metachronous adrenal metastasis of RCC is extremely rare, a standard approach has yet to be established. Partial adrenalectomy may avoid lifelong hormonal supplementation and reduce the risk of Addisonian crisis. A 71-year-old man had a previous history of left nephrectomy and ipsilateral adrenalectomy for metachronous adrenal metastasis. Metachronous contralateral adrenal metastasis was detected 2 years after ipsilateral adrenalectomy, and he underwent retroperitoneoscopic partial adrenalectomy using a vessel sealing device. Although corticosteroid replacement therapy was not prophylactically performed, the patient did not exhibit any symptoms of hypocorticism. Nine months after the surgery, the patient remains well without steroid supplementation, and neither local recurrence nor metastasis has been detected. To the best of our knowledge, this is the first case report of laparoscopic partial adrenalectomy for RCC metastasis. The vessel sealing device was highly effective and suitable for laparoscopic partial adrenalectomy.

Keywords Renal cell carcinoma · Adrenal metastasis · Metachronous · Partial adrenalectomy · Laparoscope

Introduction

Renal cell carcinoma (RCC) accounts for 90–95% of renal tumors and 2% of all adult malignant tumors [1]. Majority of the patients are diagnosed in the early stage and undergo curative surgery. However, approximately 25% of patients develop metachronous metastasis after curative surgery, with <2% presenting with metastasis confined to the adrenal

glands [2]. Despite the development of systemic therapy, such as molecular targeted therapy and immune checkpoint inhibitors, surgical resection is recommended for metachronous adrenal metastasis with or without systemic therapy [3].

Partial adrenalectomy may avoid lifelong hormonal supplementation and reduce the risk of Addisonian crisis in selected patients [4]. Current indications for partial adrenalectomy include bilateral benign adrenal lesions, a solitary adrenal gland, or unilateral tumors in patients with hereditary syndromes, such as von Hippel–Lindau (VHL) disease and multiple endocrine neoplasia type 2A [5]. Partial adrenalectomy for the metastasis of malignant tumors has also been reported [5–8].

We herein present a case of retroperitoneoscopic partial adrenalectomy for metachronous metastasis to a solitary adrenal gland from contralateral RCC.

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Case report

A 71-year-old man with a surgical history of cholecystectomy for cholecystitis via a right subcostal incision visited our hospital for the treatment of prostate cancer. A left renal tumor and left renal venous tumor thrombus were incidentally found in computed tomography (CT) for staging. Under the diagnosis of left RCC (clinical T3a N0 M0), he underwent left nephrectomy via a left subcostal incision, and the left adrenal gland was spared. Four years later, left adrenal metastasis (18 mm) was detected by CT. Systemic molecular targeted therapy (sunitinib) was administered for 4 months; however, the left adrenal metastasis enlarged, and left adrenalectomy was performed via the previous subcostal incision. Although intraabdominal adhesion was severe, the adrenal gland including metastasis was completely removed, and the histopathological diagnosis was metastasis of clear cell RCC. Two years later, right adrenal metastasis (14 mm) located dorsal to the inferior vena cava was detected by CT. The patient requested monitoring without any treatment; however, 3 months later, CT revealed an increase in the size of adrenal metastasis to 21 mm in diameter (Fig. 1), and, thus, retroperitoneoscopic partial adrenalectomy was planned.

Under general anesthesia, the patient was placed in a lateral position, the retroperitoneum was dilated by a balloon dissector through a 2.5 cm skin incision between the tip of the 12th rib and anterior superior iliac spine, and a camera port was inserted. Another two ports were inserted similar to retroperitoneoscopic adrenalectomy. A laparoscopic electrode, vessel sealing device, 10 mm flexible laparoscope, and conventional laparoscopic instruments were used. The inferior vena cava and right renal artery were easily found after

dissection between the psoas muscle and Gerota's fascia. The right adrenal tumor was also easily detected cephalad to the renal hilum. After the adrenal tumor and normal adrenal gland had been dissected from the surrounding tissue, the tumor was resected from the normal adrenal gland using the vessel sealing device (Fig. 2). The central adrenal vein remained intact. The resected specimen was removed using a bag without extending the wound. Detailed intraoperative findings were shown in the supplemental video. The operative time and pneumoperitoneum time were 65 min and 43 min, respectively, and estimated blood loss was 5 ml. The size of the resected tumor was 25 × 20 × 15 mm. The histopathological diagnosis of the resected adrenal tumor was metastasis of clear cell RCC (Fig. 3a, b). No complications were recorded during the postoperative hospital stay of 7 days. Although corticosteroid replacement therapy was not prophylactically performed, the patient did not exhibit any symptoms of hypocorticism. On postoperative day 4, the level of serum cortisol was measured and was within the normal range (Supplemental Table 1). Nine months after surgery, the patient remains well without steroid supplementation, and neither local recurrence nor metastasis has been detected.

Discussion

Metastasectomy is a widely accepted treatment for RCC metastasis, and is regarded as the most effective strategy for increasing the rate of cancer-specific survival. Since bilateral synchronous or metachronous adrenal metastasis of RCC is extremely rare, a standard approach has not yet been established. Partial adrenalectomy may be a preferred option when curative resection is possible, because bilateral total adrenalectomy causes adrenal insufficiency and lifelong hormonal supplementation is needed.

Fig. 1 CT showed a right adrenal tumor located dorsal to the inferior vena cava (arrow: adrenal tumor)

Fig. 2 Intraoperative findings. (*adrenal tumor, **normal adrenal gland, ***inferior vena cava)

Fig. 3 Histopathological images of the tumor. **a** Magnification, $\times 20$. **b** $\times 400$ magnification of the square in **a**

To the best of our knowledge, three cases that underwent partial adrenalectomy for RCC metastasis have been reported in the English literature. Schomer et al. and Ozturk et al. both described cases of synchronous adrenal metastasis for which radical nephrectomy and partial adrenalectomy were synchronously performed [6, 8]. Kumar et al. presented a case that underwent robot-assisted partial adrenalectomy for metachronous metastasis to a solitary adrenal gland, similar to the present case [5]. Surgery was performed by an intraabdominal approach, and the adrenal tumor was transected from the normal adrenal gland using bipolar cautery. In all cases, adrenal insufficiency was prevented. The survival outcome of only one case after partial adrenalectomy for RCC metastasis to an adrenal gland has been reported [6]; adrenal recurrence was not found in the 30 months following surgery, although brain metastasis was detected. Therefore, it currently remains unclear whether partial adrenalectomy is really suitable for RCC metastasis to an adrenal gland [5]. The accumulation of further cases is needed to obtain more evidence.

Brauckhoff et al. reported that cortical function may be preserved in partial adrenalectomy by sparing at least one-third of one gland [9]. Furthermore, a main adrenal vein may not be essential for preserving adrenal function [10]. Endoscopic partial adrenalectomy was recently reported for bilateral adrenal lesions and unilateral tumors in patients with hereditary syndrome or a solitary adrenal gland as described above. A major issue associated with partial adrenalectomy is the control of bleeding from a residual adrenal gland; however, hemostasis has been safely achieved using some devices, such as conventional bipolar cautery, ultrasound dissection, or a vessel sealing device.

The present case was metachronous metastasis to a solitary adrenal gland, and the patient had a previous history of abdominal surgery; therefore, we selected partial adrenalectomy via a retroperitoneal approach. Adhesions were not

present in the retroperitoneal space, and the adrenal tumor and normal adrenal gland were easily found. The main adrenal vein was preserved intact, because the tumor was located distant from the vein. The tumor was easily resected from the normal adrenal gland using the vessel sealing device without bleeding. Therefore, retroperitoneoscopic partial adrenalectomy for RCC metastasis was successfully performed without any complications.

In conclusion, laparoscopic partial adrenalectomy needs to be considered as one of the curative treatment options for RCC metastasis to a solitary adrenal gland because of its minimal invasiveness. To the best of our knowledge, this is the first case report of laparoscopic partial adrenalectomy for RCC metastasis. A vessel sealing device was highly effective and suitable for partial adrenalectomy.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical approval All procedures performed herein involving the patient were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from the patient.

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