A CASE OF RENAL CELL CARCINOMA WITH INTRAHEPATIC VENA CAVAL TUMOR THROMBUS SUCCESSFULLY MANAGED BY SURGERY IN A LONG-TERM CHRONIC HEMODIALYSIS PATIENT WITH LIVER CIRRHOSIS

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A 54-year-old man who had been under hemodialysis therapy for 16 years presented with gross hematuria at our department in February 2005. Imaging findings revealed right renal tumor of 8.2 cm in diameter. In addition, the tumor extended into inferior vena cava at the level of the hepatic vein. There were no findings of distant metastasis. Right radical nephrectomy and thrombectomy were performed on April 2006. Histopathological analysis showed that the tumor was renal cell carcinoma of clear cell type, grade 2. Postoperative course was uneventful, and the adjuvant therapy with interferon α was initiated. He has been free from recurrence for 22 months after surgery.

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Key words : Hemodialysis, Renal cell carcinoma, Thrombectomy

INTRODUCTION

Patients with chronic renal failure who require dialysis therapy develop malignant diseases at a higher risk compared to the healthy population[1)]. Renal cell carcinoma (RCC) is one of the most frequent malignant diseases in patients under long-term dialysis therapy[1,2)].

Extension of the RCC tumor into inferior vena cava (IVC) is occasionally observed in 4% to 19%[2–9)]. Tumor thrombectomy with radical nephrectomy improve the prognosis even though tumor thrombus extends at the level of right atrium[7,10)]. However, this extended surgery results in a high incidence of complications including massive intraoperative hemorrhage, heart failure and infections[3)].

We report a case of RCC with intrahepatic vena caval tumor thrombus in patients under long-term dialysis therapy successfully treated with surgery. This invasive surgery can be safely performed for the patients with high risk of complications with the appropriate perioperative management including surgery.

CASE REPORT

A 54-year-old man had been treated with hemodialysis for 16 years for chronic renal failure. He also suffered from liver cirrhosis resulting from hepatitis-C-virus infection. He presented with gross hematuria lasting for three months at our department in April 2005. Blood tests showed pancytopenia (white blood cell 3,740/mm^3, hemoglobin 10.4 g/dl, platelet 6.0×10^4/mm^3). Hematochemistry showed renal dysfunction (BUN 66.3 mg/dl, creatinine 9.2 mg/dl) and the slight elevation of hepatic enzymes (AST 46 U/l, ALT 50 U/l, alkaline phosphatase 492 U/l, lactate dehydrogenase 240 U/l). Total bilirubin, serum albumin and cholinesterase levels were normal. Blood coagulation test results including prothrombin time, activation prothrombin time, hepaplastin test was within normal limits. Computed tomography (CT) scan and magnetic resonance imaging (MRI) showed a well-enhanced renal mass of 8.2 cm in diameter accompanied with multiple small cysts in right kidney, and a small enhanced lesion was found on the left kidney, but was left untreated this time (Fig. 1a, b). The tumor in the right kidney appeared to penetrate the Gerota's fascia. In addition, the tumor extended into inferior vena cava (IVC) at the level of hepatic vein.

There were no findings of distant and lymphatic metastasis. He was diagnosed as having renal cell carcinoma at the clinical stage of T3bN0M0, stage III. Although his cirrhous liver disease was classified into Child-Pugh class A, gastroenterologist, the anesthesiologist agreed with us on operability. Twenty units of platelets were transfused before the operation.

The operation was performed on April 27, 2005. Chevron and midline incision which was like a Mercedes incision was made. After transecting the right renal artery, the right kidney was dissected around Gerota's fascia. Then, the left renal vein, infrarenal IVC, suprahepatic IVC at infradiaphragma position were secured and clamped. Hepatic hilus was also clamped by using the pringle maneuver. IVC was cut open, and the right kidney with tumor thrombus was excised en bloc with a hepatic ischemic time of 6 minutes. Tumor thrombus was not adhered to IVC wall, thus was removed easily from IVC, and then the longitudinal

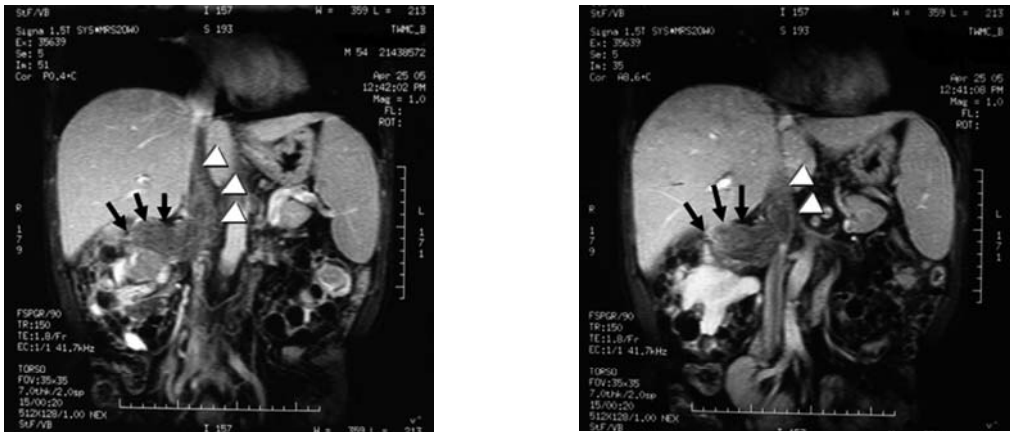


Fig. 1a. Magnetic resonance angiography (MR-angiography) revealed acquired renal cysts and 8.0 × 8.2 × 5.1 cm right renal tumor penetrating the Gerota's fascia (arrow) with infrahepatic vena cava tumor thrombus (arrow head).

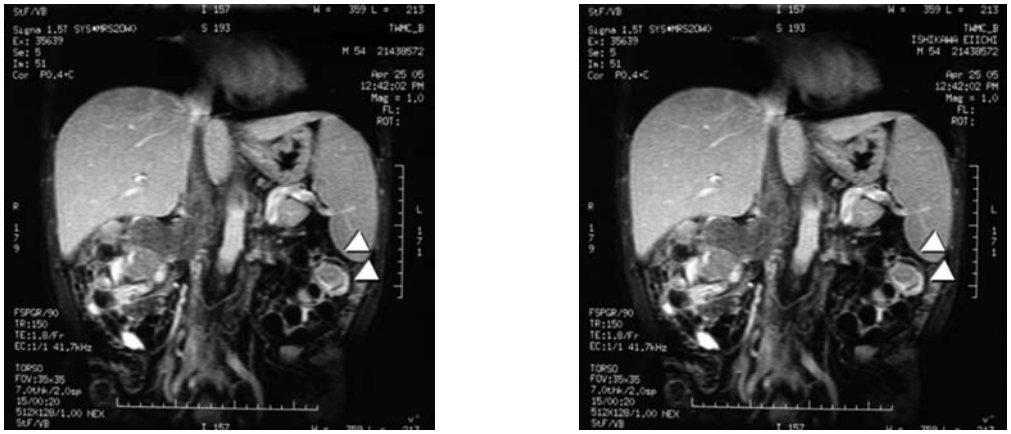
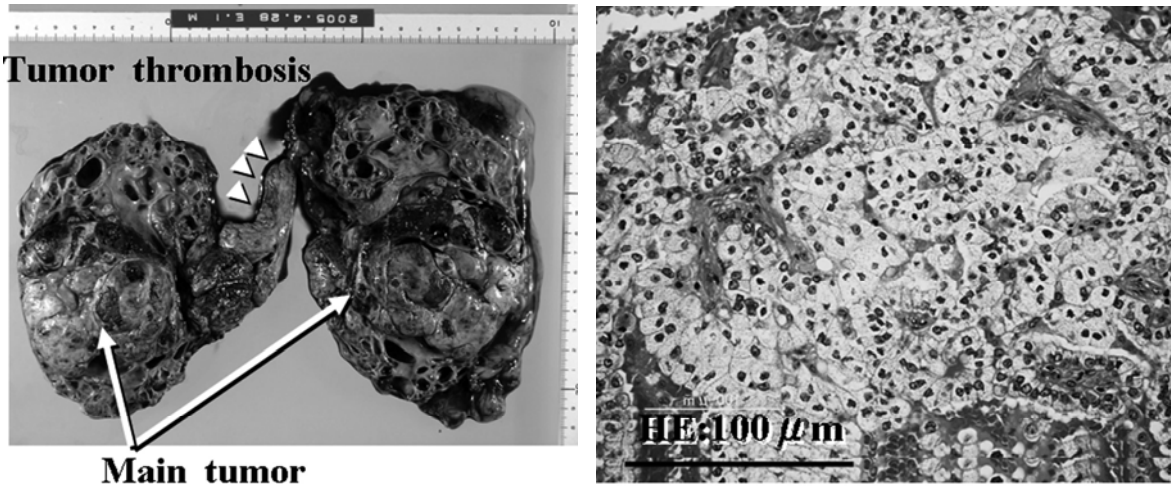


Fig. 1b. MR-angiography showed acquired renal cysts and 2.5 × 3.0 × 2.5 cm left renal tumor (arrow) for the same time.



A B

Fig. 2. (A) Tumor was 70×62×41 mm in diameter (arrow) and had thrombus into infrahepatic vena cava (arrow head). (B) Histopathological findings revealed renal cell carcinoma, multiple, infiltrative type, clear cell subtype (HE stain, ×200).

caval incision was closed. Lymphadenectomy was performed only for paracaval nodes and right renal hilum. Operation time was 368 min. Total blood loss was 1,400 ml, and total fluid infusion was 3,600 ml including total blood transfusion 780 ml.

Histopathologic study showed that the tumor was renal cell carcinoma of clear cell type, pT3b, pN0, stage III (Fig. 2).

After operation, he was in the intensive care unit for one night with no problems in his vital signs, and was returned to the general ward on the day after homodialysis. The postoperative course was uneventful except for paroxymal atrial fibrillation attack, which was treated with antiarrythmic agents. He was discharged on the 14th day after surgery. He had left radical nephrectomy in February 2006 since the left renal mass increased in size. This tumor was also renal cell carcinoma histologically. He has been receiving adjuvant interferon α therapy postoperatively, and has been free from recurrence for 23 months after the first operation.

DISCUSSION

Patients on maintenance dialysis have been documented to have an increased cancer risk, particularly in the urinary system, although an underlying pathogenesis for patients on dialysis with renal tumor has not been well established[13,14]. Investigations in major dialysis hospitals demonstrate that RCC develops in 0.5–1.5% of dialysis patients[15,16]. Such an incidence of RCC appears significantly high, compared with that reported in the general Japanese population where RCC develops in 7.1 out of 100,000 men and 3.1 out of 100,000 women, and age-standardized incidence rates per 100,000 population for men and women were 4.9 and 1.8, respectively[17], although no control study was done.

However, surgery can not be performed in some patients because of advanced age or medical complications due to long-term dialysis despite a clinical diagnosis of RCC. Berg[18] was the first to report nephrectomy and cavotomy to treat RCC with tumor thrombus extending into the IVC.

Aggressive surgical treatment, including tumor thrombectomy, has improved the prognosis in patients with this serious condition, and it is now used at many institutions[5,7,10]. However, there are few reports about surgical treatment including tumor thrombectomy in such long-term dialysis patients. In our case, tumor thrombus in the IVC was assessed without difficulty preoperatively with ultrasonography, abdominal CT, and MR-angiography. The cephalad extension of thrombus into the vessel is confirmed with either cavography or MRI, but MRI is preferred because of its relative noninvasiveness[19]. Especially, MR-angiography is used as a convenient method to diagnose details.

The selection of operative procedure is made on the basis of the level of thrombus extension and whether the IVC is patent. Tsuji et al.[20] suggested that total clamping of the IVC below the orifice of the hepatic veins does not induce hypotension or intestinal congestion.

In our case, although sysolic blood pressure fell to 80 mmHg temporally at clamping of the IVC because of a profound decrease in venous return, it was easily raised to the level of 120 to 140 mmHg during the operation by using a calcium antagonist. In previous series, hemodynamic stability was restored by creating a venovenous bypass from the common femoral vein to the axillary vein, thereby maintaining venous return[21–23]. After all, in our case, hemodynamic stability was obtained with total clamping between the infrarenal suprahepatic segment of IVC; this maintained the systolic blood pressure above 100 mmHg without any adjunctive procedures, such as venovenous bypass or CPB. Tsuji et al.[20] commented that partial normothermic CPB without cardiac arrest was used to enable tumor thrombectomy even in patients in whom thrombus did not extend into the right atrium. Others have used CPB with cardiac arrest and deep hypothermia in patients with level intraatrial thrombus[7,10,24–26]. In our patient, tumor thrombus could be peeled off the IVC wall easily, and direct inspection confirmed the absence of a residual tumor in the vein. No adjunctive procedures, such as venovenous bypass or CPB, was needed.

Radical nephrectomy and excision of tumor extending into the IVC, with IVC resection, are advisable in patients in whom the IVC is occluded by tumor thrombus. Thus our experience indicates that tumor thrombectomy without IVC resection yields acceptable results in patients with a patent IVC. In the series of Tsuji et al.[20] venous reconstruction was done in all patients to prevent venous insufficiency. Also in our case IVC was reconstructed, and no serious postoperative complications occurred. However, IVC reconstruction was not always required, because collateral veins were sufficiently developed to drain the venous return from the lower extremities and pelvic region.

The overall 5-year survival rate in the series of Jibiki et al.[27] was 42%. Their survival rate was higher, thus aggressive surgery including tumor thrombectomy combined with immunotherapy with agents such as interferon has improved the prognosis in advanced RCC with tumor thrombus in the IVC. Thus an aggressive surgical approach is warranted even in patients on hemodialysis if their condions were allowed.

With both surgical treatment and adjuvant immunotherapy, the 5-year survival rate in patients with liver or bone metastasis, or both, was 17%; in patients with liver or lung metastasis the rate was 43%[11]. Lung metastasis had no adverse effect on survival after surgery[12]. Nephrectomy, tumor thrombectomy, and hepatectomy might be indicated in patients at relatively low-risk with liver metastasis, even though the long-term survival rate in these patients is lower than in patients with lung metastasis, and lymph node metastasis is generally the most important prognostic factor[7].

In conclusion, it might be worthwhile to perform

thrombectomy even in patients on hemodialysis if their condition allows. Selection of the surgical strategy for treatment of RCC with thrombus extending into the IVC should be made on the basis of the level of extension, patency of the IVC, and laterality of the carcinoma. The Pringle maneuver should be applied to minimize blood loss from the hepatic vein and prevent hepatic congestion when CPB is used or the suprahepatic portion of the IVC is clamped[20].

Nephrectomy and caval tumor thrombectomy, with or without cavatomy, should be used aggressively, with a less extensive approach and less invasive additional maneuvers in RCC with thrombus extending into the IVC.

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和文抄録

外科的に切除しえた，肝硬変を伴う維持透析患者に発症した右腎癌下大静脈腫瘍塞栓の1例

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症例は54歳，男性．1900年，CGN にて血液透析導入となった．2005年2月に肉眼的血尿が出現．CT にて右腎癌を指摘され，3月9日当科紹介．当科にて施行した CT では直径 7 cm 大の右腎腫瘍とともに下大静脈内の肝静脈流入部まで達する腫瘍塞栓を認めた．右腎腫瘍，下大静脈塞栓，T3bN0M0 stage III の診断で4月28日，根治的右腎摘除ならびに腫瘍塞栓摘除術を施行した．手術時間4時間28分，出血量 1,400 ml，摘出標本は重量 800 g，病理所見は renal cell carcinoma，G2，pT3b であった．術前の凝固系検査は異常を認めなかったが，肝硬変が原因と考えられる出血時間の延長と血小板数の低下を認めたため，周術期は血小板輸血などにて対応した．術後経過は良好で，後出血などの術後合併症もなく，術後18日目に退院した．現在 IFNα 投与にて後療法を施行中であるが，再発を認めていない．透析患者における下大静脈腫瘍塞栓を伴う腎癌に対して外科的治療を施行した症例についての報告例については比較的少なく，文献的考察も含めて報告する．

（泌尿紀要 **54**：229-234，2008）