Case Report

Resection of Advanced Stage Malignant Retroperitoneal Neoplasms with Tumor Thrombus Extending into the Right Atrium: Report of Four Cases

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Abstract

Surgery for retroperitoneal neoplasms with a tumor thrombus extension into the right atrium is challenging. This study reviewed four surgical cases of advanced stage malignant neoplasms with the tumor thrombus extending into the right atrium. The malignant neoplasms involved the kidney in two patients, and the liver and adrenal gland in one each. The tumor thrombus was removed through a longitudinal cavotomy and right atriotomy in all cases. The inferior vena cava reconstruction was performed by directly closing it in one patient and by pericardial patch suturing in another. Cardiopulmonary bypass was used for all procedures and a Pringle maneuver was used to reduce bleeding from the liver in three. There was no perioperative or hospital death. Two of the four with renal cell carcinoma were alive 7 and 13 months after the surgery. One with hepatocellular carcinoma died of recurrent malignancy after 4 months, while the patient with an adrenal carcinoma remained disease free after surgery. These cases indicate the safety of the present procedure. Although the long-term results are still unknown, there were favorable early results and a lack of perioperative complications. Surgical challenges in resecting an intracardiac extension of retroperitoneal malignancy require close cooperation among the attending urologist, and both gastrointestinal and cardiovascular surgeons.

Key words Tumor thrombus · Cardiopulmonary bypass · Right atrium

Introduction

A surgical resection remains the mainstay of treatment for advanced malignant neoplasms with a right atrium (RA) tumor thrombus extension. There have so far been few reports describing a resection of a tumor thrombus extending into the RA because of the high-risk surgical procedure, perioperative complications, and poor expected outcome. This report retrospectively reviewed the records of patients with advanced stage malignant neoplasms with a tumor thrombus extension into the RA who underwent surgery.

Patients

Four patients (3 males, 1 female; average age 59 years old, range 48–72 years) with retroperitoneal tumors with a tumor thrombus extending into the inferior vena cava (IVC) and RA underwent surgery between April 1997 and November 2007. Malignant neoplasms originated from the kidney in two patients, and liver and adrenal gland in one each. Routine blood tests, chest radiography, ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI) examinations of the chest and abdomen were performed in each case to assess the existence of tumor thrombus, gross lymph involvement, and metastatic disease. The level of tumor extension into the IVC and RA could be precisely determined by contrast enhanced CT (Fig. 1) and MRI findings, while bone scans and brain CT examinations were also conducted. The tumor thrombus was found to have invaded the RA in all four cases. In addition, preoperative examinations showed the two patients with renal cell carcinomas (RCCs) to have distant metastases (lung: n = 2).

Surgical Procedures

Endotracheal intubation was initiated and a transesophageal echocardiography probe was inserted with the patient in a supine position. The malignant tumor was completely mobilized and IVC was accomplished via a
median laparotomy approach. An additional median sternotomy was performed and the IVC below the cavoatrial junction was isolated (Fig. 2A). Systemic heparinization was administered and the ascending aorta and superior vena cava were cannulated, and cardiopulmonary bypass (CPB) was established. The bilateral hepatic vein was snared and/or the portal vein and hepatic artery were clamped using the Pringle maneuver to reduce bleeding from the IVC (Fig. 2B). The tumor thrombus was then removed through a longitudinal cavotomy and a right atriotomy. Furthermore, reconstruction of the IVC was performed by directly closing it in one patient and by suturing it with a pericardial patch in another, while the ligation of the IVC below the level of the hepatic vein was performed without venous reconstruction in two patients who had evidence of a complete IVC obstruction (Fig. 2C).

Results

No intraoperative complications occurred as a result of the surgical technique. The CPB times were 120, 104, 49, and 15 min, while the Pringle maneuvers in three patients required 16, 13, and 5 min. No systemic cooling or cardiac arrest was used. There were no perioperative or hospital deaths. The mean follow-up period was 13 months (range 4–29 months). Of the four patients, two with RCCs were alive 7 and 13 months after the surgery. One patient with hepatocellular carcinoma (HCC) died of recurrent malignancy 4 months after surgery and one with an adrenal carcinoma remained free of recurrence after surgery, but died after 29 months due to another cause.

Discussion

A tumor thrombus extending into the IVC and/or RA is occasionally observed in patients with advanced stage