Case Report

Robot-assisted laparoscopic excision of a retroperitoneal paracaval tumor

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Abstract

During the past few years, robotic surgical systems have been rapidly developed. The progress and advantages of these systems include three-dimensional vision and enhanced ergonomics. These advantages have helped a new generation of minimally invasive surgery to evolve. The da Vinci Surgical System seems to greatly resolve problems (e.g., wide exposure and retraction of peritoneal organs) that are confronted by traditional laparoscopic surgeries for retroperitoneal tumors that are near great vessels. There have been few reported cases concerning laparoscopic excision of retroperitoneal tumors situated between the inferior vena cava, the right renal vessel, and the kidney. We report the use of a robotic surgical system for this type of treatment. A 54-year-old female patient had a hypoechoic lesion near the inferior vena cava and superior to the right renal vessels. It was incidentally found by ultrasound during a health check-up examination. The computed tomography (CT) scan revealed a heterogeneous contrast-enhanced retroperitoneal mass approximately 4.4 cm medial to the right kidney with the inferior vena cava deviated to the left side. The J-Vac drainage tube was removed on postoperative Day 3, and the patient was discharged in a stable condition the following day. The pathology of the tumor was retroperitoneal schwannoma. A re-evaluation was arranged postoperatively for the 15-month ambulatory visit. No local recurrence or distal metastasis was present.

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1. Introduction

During recent years, robotic surgical systems have been rapidly developed. Because of the three-dimensional vision and enhanced ergonomics of the da Vinci Surgical System (Intuitive Surgical Inc., Sunnyvale, CA, USA), a new generation of minimally invasive surgery has evolved. The progress and advantages have allowed many surgical fields to use laparoscopic procedures. A retroperitoneal tumor near the great vessels usually requires a wide exposure and retraction of the peritoneal organs. Robotic surgical systems seem to be the solution for these problems, which are confronted by traditional laparoscopic surgery. We report the use of the da Vinci Surgical System for the laparoscopic surgical treatment of a retroperitoneal tumor located between the inferior vena cava and the right kidney.

2. Case report

A 54-year-old female patient had mitral valve prolapse, normocytic anemia, and idiopathic thrombocytopenia with regular cardiology and hematology follow-up. One hypoechoic lesion that was near the inferior vena cava and superior to the right renal vessels was incidentally detected by ultrasound during a health check-up. The computed tomography (CT) scan revealed a heterogeneous contrast-enhanced retroperitoneal mass approximately 4.4 cm that was medial to the right kidney with the inferior vena cava deviated to the left side (Fig. 1) A and B. There was also occult hematuria with RBC 3-5/HFP. With a
suspected neurogenic tumor or leiomyoma of the inferior vena cava, the patient was referred for surgical intervention. A renal functional study prior to the operation revealed left and right effective renal plasma flows of 355.1 mL/min and 287.3 mL/min, respectively. Robot-assisted laparoscopic excision of the retroperitoneal tumor was performed on October 15, 2010 (Fig. 2) with an operation time of 135 minutes and an estimated blood loss of less than 30 mL. The J-Vac drainage tube was removed on postoperative Day 3, and the patient was discharged in a stable condition the following day. The pathology was retroperitoneal schwannoma. A postoperative re-evaluation was arranged postoperatively for the 15-month ambulatory visit; no local recurrence or distal metastasis was found.

3. Discussion

We reviewed related articles in the PubMed database. There are few reports on the excision of retroperitoneal tumors located near the great vessels. Lehrfeld et al report one case of retroperitoneal mass between the left renal artery and vein. The patient was 64 years old with a tumor approximately 3.5 cm in diameter and a pathology of extra-adrenal benign pheochromocytoma. The bleeding was also minimal, but the
operation time was not mentioned. Another study reports a 50-year-old male Korean patient who had a paravertebral mass lesion abutting the aorta and left psoas muscle at the L4–L5 level of the spine. The da Vinci Surgical System allowed delicate dissection in a limited space. The tumor was completely removed without damage to the surrounding organs and great vessels. Bleeding was minimal. The patient was discharged without a drainage tube on postoperative Day 2.

Retroperitoneal schwannomas are rare tumors and are usually found incidentally through imaging because of vague and nonspecific symptoms. Most previously reported patients had solitary benign tumors, except for a few reports of patients with multiple tumors or recurrence. Very few schwannomas undergo malignant transformation and invade the adjacent viscera, including the colon and kidney. Benign neurogenic tumors are characterized by smooth regular margins, homogeneity, and are well encapsulated. The location of schwannomas was mostly in the pelvis and retroperitoneum. Cystic degeneration may sometimes be noted. The tumors can occasionally cause bony changes in the spine, but otherwise they do not invade or obstruct adjacent structures. These features could distinguish a benign schwannoma from a malignancy.

In traditional laparoscopic surgery, the management of tumors near the great vessel is always a challenge because of the limitations of two-dimensional vision and the range of motion of the conventional laparoscopic instruments. Conversion to open surgery is inevitable if there is an injury to the great vessels with uncontrollable bleeding. However, owing to the robotic system, the excision of these tumors is easy and safe. The features of the da Vinci Surgical System include seven-degrees-of-freedom movement instrumentation and three-dimensional vision. These features are considered safe and feasible for the successful completion of the surgery without injuring the kidney and great vessels or the conversion to open surgery because of massive bleeding.

In conclusion, to perform an operation near the great vessels has always been stressful for conventional laparoscopic surgery and for traditional open laparotomy. A clear operative field and delicate dissections are key points. Owing to benefits of the da Vinci Surgical System, the resection of the tumor in this patient was safely achieved and successfully completed. To our knowledge, this is the first reported case of a robot-assisted laparoscopic excision of a paracaval retroperitoneal tumor in Taiwan.

References