Case Report

A case of robot-assisted laparoscopic partial nephrectomy during pregnancy

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Abbreviations & Acronyms
CO_2 = Carbon dioxide
RAPN = robot-assisted partial nephrectomy
RCC = renal cell carcinoma

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Introduction: Malignancy during pregnancy requires consideration of both the mother and fetus. We report a patient with renal cell carcinoma during pregnancy who was treated with robot-assisted partial nephrectomy.

Case presentation: The patient was incidentally found to have a renal mass on abdominal ultrasonography. Definitive diagnosis of cT1aN0M0 RCC was made by enhanced computed tomography. Subsequently, pregnancy was discovered. RAPN was performed without complications. Pathologic examination revealed clear cell RCC. There were no postoperative complications, and the baby was born safely.

Conclusion: RAPN can be safe and effective even during pregnancy. Every pregnant patient requires individualized treatment involving the timing of surgery, the procedure used, and management based on the condition of the mother and fetus, tumor stage, and the experience of the surgical team.

Key words: pregnancy, renal cell carcinoma, robot-assisted laparoscopic partial nephrectomy.

Keynote message

Robot-assisted partial nephrectomy could be performed safely in a patient with RCC during pregnancy.

Introduction

The incidence of cancer diagnosed during pregnancy is 1 in 1000 pregnancies, and 50% of renal masses developing during pregnancy are malignant lesions. Malignancy during pregnancy requires consideration of both the mother and fetus.[1–4] An individualized treatment plan should be formulated based on the patient's condition and fetal development. We report a patient with RCC during pregnancy treated with RAPN.

Case presentation

A 36-year-old female was incidentally found to have a renal mass on abdominal ultrasonography. Definitive diagnosis of RCC was made by enhanced computed tomography, which revealed a 39-mm tumor in the upper pole of the left kidney (Fig. 1a,b). The tumor stage was cT1aN0M0, and RENAL nephrometry score was 7a. One week later, the patient noticed menstrual irregularity and visited a local doctor, who confirmed the presence of a fetal sac, indicating a gestational age of 5 weeks. The patient and her family wished to continue the pregnancy. Treatment options such as surgical therapy, cryotherapy, and delaying surgery until after birth were discussed with the patient, family, and obstetrician/gynecologist. To prioritize maternal treatment, we decided to perform RAPN whose fetus was at 15 weeks 2 days gestational age. We chose the transperitoneal approach based on the tumor size and location. Under general anesthesia, the patient's position was changed to the right lateral position. The da Vinci Xi Surgical System® (Intuitive Surgical, Sunnyvale, CA, USA) with a three-port approach was used with two more ports for assistants. (Fig. 2). We usually use the 4th arm

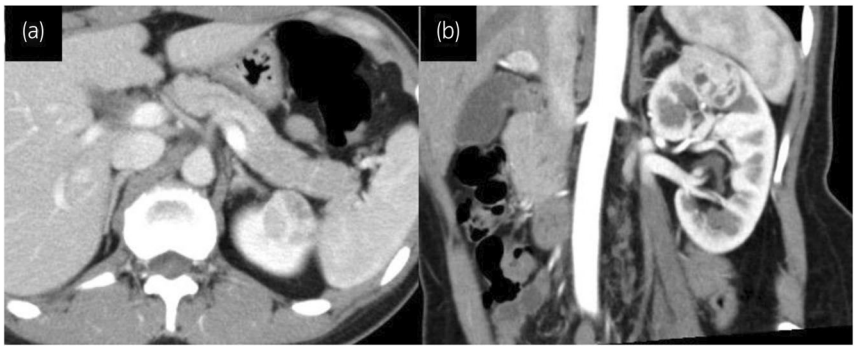

Fig. 1 Enhanced computed tomography revealed a 39-mm tumor on the upper pole of the left kidney. (a) Axial image; (b) coronal image.

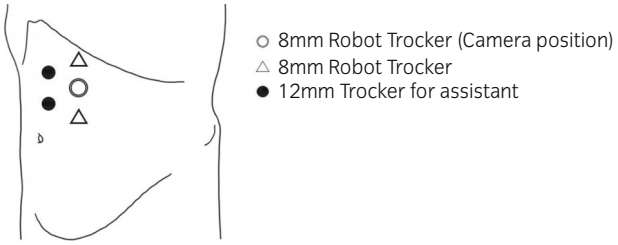

Fig. 2 For robotic partial nephrectomy, three robotic ports and two assistant ports are used.

but did not use it because the uterus was mildly enlarged. CO_2 insufflation pressure was kept at 8 mmHg throughout the surgery. After isolation of the two renal arteries, both renal arteries were clamped, and the tumor was resected. Pre- and postoperatively, the obstetrician confirmed that the fetal heartbeat was good by ultrasonography. Total operative time was 245 min, console time was 153 min, warm ischemia time was 15 min, and estimated blood loss was 50 mL. A total of 5000 units of sodium heparin were injected intravenously over 12 h postoperatively for deep venous thromboprophylaxis. Her postoperative course was uneventful. Pathology revealed clear cell RCC with negative surgical margins. At 6-month follow-up, the patient's serum creatinine level was 0.65 mg/dL (preoperatively: 0.54 mg/dL). The baby was born spontaneously at 39 weeks 4 days, and both mother and baby are healthy.

Discussion

The primary principle of cancer treatment during pregnancy is to provide the best possible treatment for the mother and minimize any disadvantage to the fetus.[5] The mother's condition and wishes should be considered when determining the continuation of pregnancy, and thus, the patient is faced with a major decision.

Surgical resection is the first option for localized RCC. Among 109 cases of RCC in pregnancy reviewed by Xu and Tan, 11.9% of patients were treated with surveillance, 33.9% with radical nephrectomy, 42.2% with partial nephrectomy.[6] Laparoscopic surgery can be safely performed any time during the pregnancy; however, it is preferably performed at 12 to 16 weeks, taking into account the organogenic phase and uterine enlargement.[7,8] If RCC is found in the third trimester of pregnancy, surgical treatment can be performed after delivery. Alternatively, after gestational week 32, when the fetal lungs have matured, delivery can be induced followed by surgical treatment of RCC.[9] The current guidelines of Society of American Gastrointestinal and Endoscopic Surgeons on the use of laparoscopy during pregnancy[8] recommend prophylaxis with pneumatic compression devices used both intraoperatively and postoperatively and early postoperative ambulation. Unfractionated heparin or low molecular weight heparin for prophylaxis in pregnant patients is also recommended for those undergoing extended major operations, regardless of the number of weeks of pregnancy. Pre- and postoperative ultrasonography and Doppler ultrasound are useful for fetal monitoring. During pregnancy, laparoscopic surgery has advantages over open surgery.[8,10] While most reports indicate no significant differences in the effects on the fetus, no clear agreement has been reached with respect to miscarriage rates.[11–13]

CO_2 insufflation of 8–12 mmHg can be safely used for laparoscopy in pregnant patient.[6] One animal study reported a decrease in uterine blood flow, fetal acidosis, and fetal hypoxemia with CO_2 insufflation of 15 mmHg, but no long-term health hazards.[14] Initial abdominal access can be safely performed with an open (Hasson), Veress needle, or optical trocar technique if the position is adjusted according to the height of uterine fundus.[7,8] If the uterine fundus exceeds the umbilicus, the approach should be from the upper abdomen.[15]

RAPN has advantages over laparoscopic partial nephrectomy in terms of lower conversion rate to radical nephrectomy, smaller change in estimated glomerular filtration rate, and shorter hospital stays and warm ischemia times.[16] Only three cases of RAPN in patients with RCC during pregnancy have been reported to our knowledge.[17–19] The two cases performed in the second trimester were by a transperitoneal approach, and CO_2 pressure was kept below 12 mmHg. The retroperitoneal approach was used in one case in the third trimester in consideration of her enlarged uterus. However, in the last trimester of pregnancy, the right-side supine position should be used with caution to avoid hypotension syndrome caused by compressing the inferior vena cava at the uterine ostium. Waiting for the delivery may be the better option if there is any problem by trying the patient in the right-side position before the surgery in the last trimester of the pregnancy. If hypotension syndrome is suspected intraoperatively,

the patient is placed in the left lateral recumbent position as appropriate. Despite few reports on robot-assisted surgery during pregnancy, it can be performed safely by managing the timing of surgery, CO_2 pressure, trocar position, fetal monitoring, and venous thromboembolic prophylaxis.

Conclusion

We experienced a patient with RCC during pregnancy who was successfully treated by RAPN. Every pregnant patient requires individualized treatment that involves the timing of surgery, procedure used, and management based on the condition of the mother and fetus, the tumor stage, and the experience of the surgical team.

Author contributions

Kenji TSUTSUI: Conceptualization; project administration; writing – original draft. Airi Miki: Conceptualization; writing – review and editing. Teppei Wakita: Conceptualization; writing – review and editing. Yuki Horibe: Conceptualization; writing – review and editing. Masaru Tani: Conceptualization; writing – review and editing. Yoichi Kakuta: Conceptualization; supervision; writing – review and editing. Koichi Tsutahara: Conceptualization; writing – review and editing. Tetsuya Takao: Conceptualization; writing – review and editing.

Conflict of interest

None.

Approval of the research protocol by an Institutional Reviewer Board

Not applicable.

Informed consent

Informed consent was obtained from the patient.

Registry and the Registration No. of the study/trial

Not applicable.

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