Transvaginal extraction of laparoscopic liver resection specimen

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Abstract: The application of laparoscopic surgery via the vagina has been introduced at the beginning of this millennium. Here, we report a case of transvaginal extraction of a laparoscopic hepatectomy specimen. An exophytic liver mass originated from segment VI in a 24-year-old female was excised with laparoscopic technique using four trocars (0.5–1.2 cm sizes). The specimen (11 × 8.5 cm) was removed transvaginally instead of an abdominal incision. To the best of our knowledge, only six similar cases have been previously reported, with a patient age range of 32–74 years. Our case, due to younger age, had high cosmetic expectations. Specific to this case, we aimed a better aesthetic outcomes and better convalescence period and, we achieved these objectives. We believe that patient selection and experience on natural orifice specimen extraction were the keys to the success of the operation. We shared this technique with a video presentation.

Keywords: liver resection, cirrhosis, LigaSure, stapler, Tisseel, natural orifice surgery

Introduction

Laparoscopic liver resection is gaining popularity because of its potential benefits or its comparable success rate with respect to open hepatectomy [1]. It can ensure faster recovery and better cosmetic outcomes than open surgery [1]. Improving surgical techniques and technologies allow successful minor or major laparoscopic liver resections. Natural orifice surgery is a new concept in laparoscopic surgery providing better postoperative convalescence and cosmesis [2]. A combination of these two laparoscopic techniques can potentiate the benefits of minimally invasive surgery. Here, we presented a case of laparoscopic liver resection and transvaginal extraction of the specimen.

Case Presentation

A 24-year-old slim (body mass index = 19 kg/m^2) female presented with a palpable abdominal mass in the right upper quadrant extending to the lumbal area. The mass was hard, immobile but not tender at physical examination. Her hematologic and biochemical profile including liver function tests and tumor markers (alpha-fetoprotein, CA-19-9, and carcinoembryonic antigen) were normal. Contrast-enhanced abdominal computed tomography (CT) image through the liver demonstrated a solid, hypervascular, partially exophytic heterogeneously enhancing mass originating from segment V–VI of liver. The large artery of the mass was a direct branch of the right hepatic artery. The proper hepatic artery was diminutive in size *(Fig. 1)*. Due to excessive shunting, there was engorgement of the middle hepatic vein from the large draining veins arising from the mass *(Fig. 2)*. The dimensions of the mass were 8.4 cm × 6.1 cm and a central scar is also visualized. There was no specific radiological diagnosis. The patient demanded the surgical removal of the mass and we did not perform any percutaneous biopsy. We offered laparoscopic resection and natural specimen extraction if feasible. Details of the procedure were explained and an informed consent was

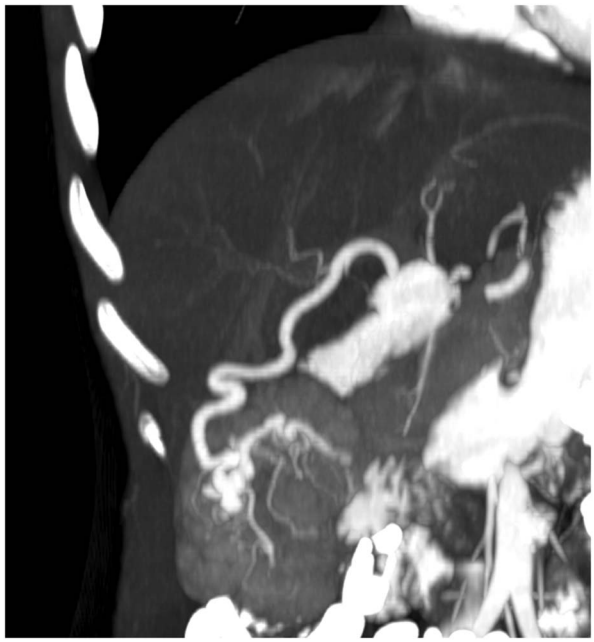

Fig. 1. Computed tomography image of the mass (arterial phase)

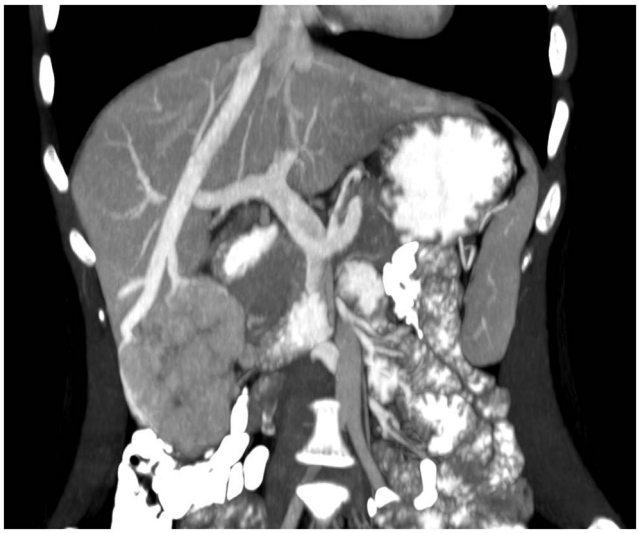

Fig. 2. Computed tomography image of the mass (venous phase)

obtained. She had two children, both delivered via cesarean section. She had no other surgical history.

In supine position (slightly turned to the left), pneumoperitoneum was induced through the left lower abdomen via open technique and a 12-mm trocar was placed. Three more trocars were placed to epigastric (12 mm), left lumbal, and right lower quadrants (both 5 mm). The hypervascular exophytic liver mass was originating from the segment VI without any adhesions to the surrounding organs (Video 1). It was adjacent to the gall bladder and we first performed a cholecystectomy, but the gall bladder was not completely detached from the liver bed for traction. By LigaSure vessel sealing system (5 mm, Medtronic, Minneapolis, MN, USA), we started to transect the liver parenchyma leaving a safe surgical margin from the mass. The main supplying artery was clipped and divided. The second half of the liver transection was completed using two laparoscopic staplers (green cartridge, 60 mm, Ethicon Endo-Surgery, Inc., Cincinati, OH, USA). At the end, we attained a clean cut liver surface and applied Tisseel fibrin sealant (Baxter, Deerfield, IL, USA) to the resection area. Cholecystectomy was completed and both specimens were put in a large laparoscopic bag.

The patient was repositioned to lithotomy and the posterior fornix was opened intracorporeally. The specimens in the bag were removed via the vagina one by one. The colpotomy incision was closed with continuous absorbable sutures through the vagina. Following placement of a vaginal tampon and an abdominal drain to the right upper quadrant, abdominal trocar site incisions were closed after fascial suturing. Total operating time was 360 min with a blood loss of 700 ml.

On day 1, she was comfortable and had considerably less pain. We removed the abdominal drain on day 3 and started oral liquid feeding on day 2. A control abdominal ultrasound relieved an asymptomatic 5×6 cm pelvic and she was discharged on day 5 uneventfully. She required two doses of meperidine (1 mg/kg) and six doses of nonsteroid anti-inflammatory drugs through the all postoperative period. The length of the resected liver specimen was longer than 10 cm *(Fig. 3)*. Histopathology was reported as a large cirrhotic nodule. She was well after 10 months of follow-up.

Discussion

The practice of laparoscopic surgical specimen extraction via the vagina was introduced at the beginning of this millennium [3]. Here, we report a new case of transvaginal extraction of a laparoscopic hepatectomy specimen. To the best of our knowledge, only six cases were reported previously and the ages of the patients ranged between 32 and 74 years [4–8]. Our patient was younger than the previously reported cases and had high cosmetic demands. Specific to this case, we aimed better aesthetic outcome and faster convalescence period. Actually, her early postoperative period (first several hours) with regard to postoperative pelvic pain was higher than what we anticipated based on our previous experience [9–13]. This was possibly due to the large size of the specimen. Fortunately, perineal pain almost completely resolved on day 1 and the patient maintained a comfortable postoperative period afterward.

Natural orifice specimen extraction in laparoscopic surgery avoids extra-abdominal incisions and can ensure less wound-related complications. There are three potential natural orifices for laparoscopic surgery: mouth, anus,

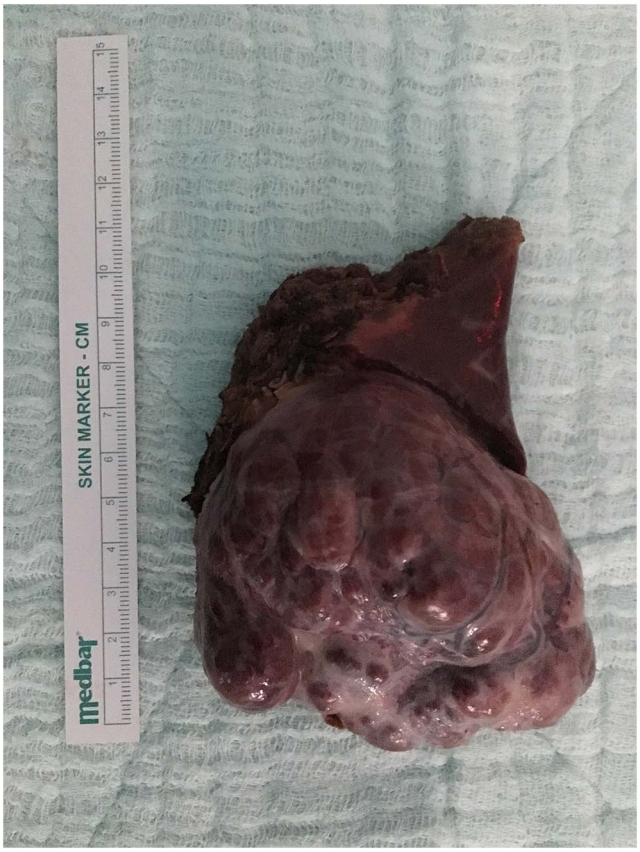

Fig. 3. Resected liver specimen

and vagina. Transanal extraction is almost always used for the colorectal specimen extractions [9]. Transoral extraction is only suitable for small-sized specimens, such as appendix or gall bladder [10]. We previously used transoral route in a patient with a polycystic liver disease who underwent laparoscopic liver cyst fenestration combined with successful transoral specimen extraction [11]. Transvaginal extraction, although limited to female patients, can allow the extraction of larger specimens. No size limit has yet been established for transvaginal specimen extraction and removal of 9 cm in size right hemicolectomy material had been demonstrated [12]. In our case, the width of the resected liver specimen was 8.5 cm, which enabled transvaginal extraction *(Fig. 3)*.

Limitations of transvaginal specimen extraction include narrow vagina, large masses, virginity, and patient acceptance [13]. High demand of aesthetics renders transvaginal specimen extraction a highly attractive option among young adults. In conclusion, we demonstrated that laparoscopic liver resection can be completed with transvaginal specimen extraction. In our opinion, patient selection and surgeon's experience were the key points to consider before deciding to use natural orifice specimen extraction.

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Conflict of interest: The authors declare no conflict of interest.

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Electronic Supplementary Material (ESM)

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ESM1

Video 1. Operation video of the case