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Scarless surgery for a huge liver cyst: A case report



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ABSTRACT

INTRODUCTION: Symptomatic or complicated liver cysts sometimes require surgical intervention and laparoscopic fenestration is the definitive treatment for these cysts. We performed minimally invasive surgery, hybrid natural orifice transluminal endoscopic surgery (NOTES) without scarring, for a huge liver cyst.

PRESENTATION OF CASE: An 82-year-old female presented with a month-long history of right upper abdominal pain. We diagnosed her condition as a huge liver cyst by morphological studies. She denied any history of abdominal trauma. Her serum CEA and CA19-9 were normal and a serum echinococcus serologic test was negative. Laparoscopic fenestration, using a hybrid NOTES procedure via a transvaginal approach, was performed for a huge liver cyst because we anticipated difficulty with an umbilical approach, such as single incision laparoscopic surgery (SILS). Her post-operative course was uneventful and she was discharged from our hospital three days after surgery. Pain killers were not required during and after hospitalization. No recurrence of the liver cyst or bulging was detected by clinical examination two years later.

DISCUSSION: A recent trend of laparoscopic procedure has been towards minimizing the number of incisions to achieve less invasiveness. This hybrid NOTES, with a small incision for abdominal access, along with vaginal access, enabled painless operation for a huge liver cyst.

CONCLUSION: We report a huge liver cyst treated by hybrid NOTES. This approach is safe, less invasive, and may be the first choice for a huge liver cyst.

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1. Introduction

Most liver cysts are found incidentally during imaging investigations and tend to have a benign clinical course [1]. Some large cysts may be symptomatic and cause complications, such as spontaneous hemorrhage, rupture into the peritoneal cavity or bile duct, infection, and compression of the biliary tree [2]. Venous thrombosis due to compression of the inferior vena cava also may be a life-threatening complication of a huge liver cyst, as we reported previously [3]. Surgical intervention sometimes is required for such complications. A laparoscopic procedure is a safe and definitive treatment for these cysts. We report the fenestration of a huge liver cyst using a novel approach, hybrid NOTES (Natural Orifice Transluminal Endoscopic Surgery). This work has been reported in line with the SCARE criteria [4].

2. Presentation of the case

An 82-year-old female presented with a month-long history of right upper abdominal pain. She had a history of a huge liver cyst and had been treated by aspiration therapy two years previously in another clinic. Her other past history of disease or familial history was unremarkable. She denied any history of abdominal trauma. Physical examination revealed a huge palpable mass in the right upper abdomen, without local tenderness or any peritoneal inflammatory signs.

Serum blood tests showed slight elevations of γ GTP and alkaline phosphatase, 180 IU/l and 485 IU/l, respectively. Total bilirubin, aspartate aminotransferase and alanine aminotransferase were normal. The white blood cell count and C-reactive protein were not elevated. The serum CEA and CA19-9 were normal and a serum echinococcus serologic test was negative. A CT scan showed a huge cystic mass of the liver, which compressed the right ventricle, inferior vena cava and neighbor abdominal organs, including the right side of the kidney (Fig. 1). There was no sign of local wall thickening, septum or a solid part in this huge cyst. The bottom of the lateral segment of the liver was located near the umbilicus due to compression by the cyst.

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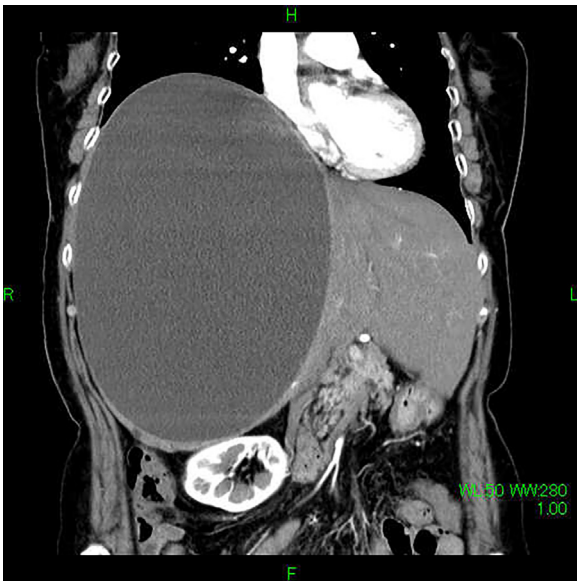


Fig. 1. A CT scan shows a well-demarcated water attenuation of the liver. Partial wall thickening or septum was not seen. The cyst compresses the neighboring organs, such as the right side of the kidney and right atrium.

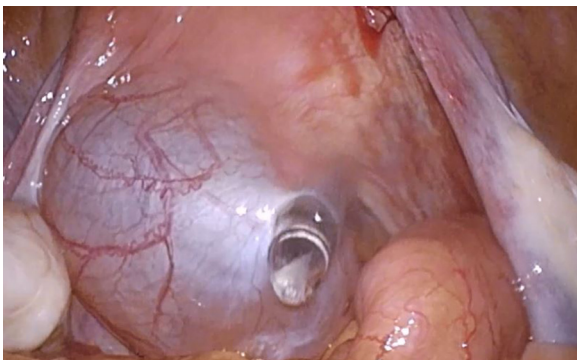


Fig. 2. The 2nd port is inserted into the posterior of the vagina.

We performed fenestration of the cyst using a hybrid NOTES procedure with a transvaginal approach because we anticipated technical difficulty with a trans-umbilicus approach such as single incision laparoscopic surgery (SILS), due to the proximity of the umbilicus and procedure area. Under general anesthesia in the lithotomy position, a 5 mm size port (STEP, Covidien, Tokyo, JAPAN) was inserted into the lower umbilicus using a closed technique. After CO₂ inflation of the peritoneal cavity, an Endo-Relief (Hope Denshi Co., Chiba, JAPAN) was inserted as an assistant instrument, using a 2 mm incision. A 5 mm port (XCEL, Johnson and Johnson, Tokyo, JAPAN) was then inserted into the posterior wall of the vagina under laparoscopic observation (Fig. 2). A 5 mm flexible scope (Olympus, Tokyo, JAPAN) was switched from the umbilical port to the vaginal port and the fenestration maneuver was initiated. Before cutting the cyst wall, the cyst contents, 3700 ml of slightly serous, brownish fluid, were aspirated using a 19 G percutaneous needle. A harmonic scalpel (Johnson and Johnson, Tokyo, JAPAN) was used to cut the cyst wall (Fig. 3). After wide fenestration, the remnant membrane of the cyst wall was ablated using an argon-laser device as we reported previously [3]. The surgical specimen was extracted via the vaginal port site and the port site was closed manually at the vaginal side using absorbable ligatures. The operation time was 191 min and total blood loss was 50 ml. The post-operative course was uneventful and she was relieved immediately of any discomfort. She was discharged from our hospital



Fig. 3. Intra-operative findings of fenestration. A harmonic scalpel was used to cut the cyst wall.



Fig. 4. A CT scan demonstrates no recurrence of the liver cyst two years later.

three days after surgery. Surprisingly, she refused any pain killers during and after hospitalization. An additional treatment was not required after surgery. No recurrence of the liver cyst or bulging was detected by clinical examination two years later at clinic (Fig. 4).

3. Discussion

Hepatic cysts are a common congenital malformation. These cysts are usually small, and even large cysts may remain asymptomatic. If the diagnosis is certain, patients with cysts in the liver do not require treatment unless symptoms develop or a complication occurs. Complications of liver cysts include intracystic hemorrhage [5], rupture [6], infection, and compression of adjacent structures [3]. Several therapeutic options have been reported for these cysts, including needle aspiration with or without injection of sclerosing agents [7], internal drainage with cyst-jejunostomy [8], wide fenestration (unroofing), and varying degrees of liver resection [9]. Generally, cyst-jejunostomy or liver resection requires open invasive procedures. On the other hand, needle aspiration is safe and can be the least invasive procedure. Decompression of the cyst contents can relieve those symptoms attributable to compression. This procedure may be valuable as a diagnostic tool to confirm the cyst contents and provide rapid relief from any discomfort. However, needle aspiration is associated with a high failure rate and rapid recurrence [10].



Fig. 5. Surgical wounds after surgery show the minimal incisions. Only 5 and 2 mm scars are present (⇒).

In this case, aspiration of the cyst contents had been attempted in another clinic 2 years previously but the patient complained of rapid regrowth within a couple of days of the aspiration. Laparoscopic fenestration has been proven to be safe and shown to have a lower recurrence rate, ranging from 0 to 14.3%. The morbidity rate is also acceptable (0–15%) [11,12]. These results indicate that wide fenestration is the definitive treatment for simple and complicated cysts (Fig. 5).

Laparoscopic surgery is a modern technique which has brought a number of advantages to patients, compared to conventional open procedures. These include reduced pain, shorter recovery time, and cosmetic benefits. Because the benefits of laparoscopic surgery have been proven for various fields of surgery, it is now widely indicated. The benefits of laparoscopic surgery, compared to open procedures, have been discussed with respect to cyst fenestration [13]. This meta-analysis concluded that short-term outcomes, such as operative time, hospital stay, intraoperative bleeding and time to return to normal gastrointestinal functions and activity, seemed to be better for laparoscopic fenestration than open procedure.

Recently, a trend of this procedure has been towards minimizing the number of incisions to achieve less invasiveness. Single Incision Laparoscopic Surgery (SILS) and reduced port surgery (RPS) are such approaches. The clinical benefits of these less invasive approaches, such as cosmetic effects and less post-operative pain are attributable to less abdominal damage. A novel surgical concept, NOTES (Natural Orifice Trans-luminal Endoscopic Surgery) has been reported to achieve less invasiveness [14]. This surgery without scars is currently under investigation and there are multiple clinical and technological barriers which impede further progress. One of these barriers is blind access through the first port into the intraperitoneal cavity. Normally, intra-abdominal conditions such as inflammation and adhesions are indistinct before laparoscopic inspection. A blind procedure via a natural orifice may induce complications such as bleeding or organ damage. A hybrid, laparoscopic and natural orifice, procedure may overcome this problem. Conventional umbilical access is easy, safe, and well understood. After insertion of an assistant instrument, a vaginal access port can be inserted easily under laparoscopic observation.

Another aspect is the closure method of the access route of NOTES. Specific closure techniques and instruments are needed for an access route such as the stomach or colon. Technological development should be expected in the near future, however, this remains under investigation. Only one manuscript has reported

liver fenestration by pure NOTES, using a transgastric approach [15]. Endoscopic hemoclips were used to close the gastric hole and the patients were all treated successfully without any undesirable complications. Because endoscopic hemoclips are not able to close the entire layer of the stomach wall, the safety of closure methods does not seem to be equivalent to laparoscopic suturing or closure using laparoscopic staples. The vagina has proved to be the most adequate natural orifice for surgical interventions in the peritoneal cavity. This route can be easily closed manually, which has proven to be simple, safe and with minimal complications. The elasticity of the vaginal wall also presents an additional advantage in that it allows for remove of larger specimens than those extracted via traditional laparoscopic surgery.

Another characteristic of our method is the use of a narrow shafted device, named Endo relief. This unique device can be inserted via an incision of only 2 mm. Therefore, the abdominal injury of port sites comprise only 5 mm in the umbilicus and 2 mm in the right lower abdomen, resulting painless surgery.

We performed a wide fenestration of a huge liver cyst using a hybrid NOTES technique. This method required only 5 mm and 2 mm abdominal damage, other than the vaginal route (Fig. 5). This patient experienced an uneventful post-operative course, without any pain killers. This “scarless surgery” is expected to yield clinical benefits such as cosmetic effects, less post-operative pain and other port related complications. Port related costs might be benefit compared to conventional laparoscopic surgery because of less number of ports. Larger studies are needed to confirm these advantages in the future.

4. Conclusion

We report a huge liver cyst treated using hybrid NOTES. This approach is safe, less invasive, and expected to yield some clinical benefits.

Conflict of interest statement

None.

Funding

None.

Ethical approval

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Author contributions

Dr. Hiroyuki Kashiwagi is the corresponding author and drafted and finalized this manuscript. Dr. Hiroyuki Kashiwagi also performed this surgery. Dr. Masanori Ishii developed the specific instrument named the Endo-Relief and introduced it to this study. Other doctors, Jun Kawachi, Naoko Isogai, Katsunori Miyake, Rai Shimoyama, Ryota Fukai, and Hidemitsu Ogino have cooperated in this manuscript.

Guarantor

Hiroyuki Kashiwagi.

Disclosure statement

We, the authors, disclose that we have not received any payment or services from a third party that are related to this research.

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