

Single Incision Laparoscopic Surgery for a Life-threatening, Cyst of Liver

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Most liver cysts are asymptomatic and tend to have a benign clinical course. However, symptomatic or complicated liver cysts sometimes require surgical intervention. The laparoscopic approach is crucial and provides definitive treatment for such cysts. Recently, a trend of laparoscopic procedure has been toward minimizing the number of incisions. We performed single incision laparoscopic surgery (SILS) for a huge liver cyst with chronic heart failure and thrombosis of the inferior vena cava. An 83 year-old female presented with a month-long history of general fatigue and loss of appetite. She had a history of a huge liver cyst with chronic heart failure and this had been treated in another hospital eight months previously. Physical examination revealed a huge mass in the right upper abdomen without local tenderness or any peritoneal signs. A CT scan demonstrated simple liver cysts and compression of the IVC and right ventricle, with IVC thrombosis. After heparinization, we performed needle aspiration for cytology of the largest cyst and improvement of cardiac function. Six days later, we performed wide unroofing by Single Incision Laparoscopic Surgery (SILS). She was moved to a rehabilitation ward two weeks after surgery. No recurrence of the liver cyst was detected two months later.

Key words: liver cyst, Single Incision laparoscopic surgery, unroofing

INTRODUCTION

Most liver cysts are found incidentally during imaging studies and tend to have a benign clinical course [1]. Some large cysts may be symptomatic and cause complications such as spontaneous hemorrhage [2], rupture into the peritoneal cavity or bile duct [3, 4], infection [5], and compression of the biliary tree [6]. Surgical intervention is required sometimes for such complications [7, 8]. We performed single incision laparoscopic surgery (SILS) for a case of life-threatening liver cyst with inferior vena cava (IVC) thrombosis and chronic heart failure.

CASE REPORT

An 83 year-old female presented with a month-long history of general fatigue and loss of appetite. She had a history of a huge liver cyst with chronic heart failure and had been treated by aspiration therapy, with injection of a sclerosing agent, eight months previously in another hospital. 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 signs. Her external jugular veins were dilated on her neck and bilateral leg edema with gait disturbance was observed in the clinic.

Serum blood test showed a hypo-nutritional and anemic condition (total protein: 5.6 g/dl and hemoglobin: 9.1g/dl). The white blood cell count and C-reactive protein were not elevated. Total bilirubin, aspartate aminotransferase and alanine aminotransferase were normal. Fibrin degradation product (FDP) and D-dimer were elevated, indicating hypercoagulabil-

ity of the blood. The serum CEA was normal and CA19-9 was elevated (2827U/ml). A serum echinococcosis serologic test was negative.

A CT scan showed huge cystic mass of the liver, which compressed the right ventricle and inferior vena cava (Fig. 1). There was no sign of local wall thickening, septum or solid part in this huge cyst. IVC thrombosis was continued to the bilateral femoral veins (Fig. 2).

We carried out a fine needle aspiration to confirm the cytology and character of the contents after systemic heparin infusion. The cytology was normal. The CEA and CA19-9 of the contents were elevated (458.3ng/ μ l and 810×10^3 U/ μ l, respectively). We aspirated approximately 2000ml of contents to improve the compression effect on the ventricular systems. Cyst bulging of the upper abdomen disappeared after aspiration, however, the bulging re-appeared 3 days later. We performed unroofing of the huge cyst by single incision laparoscopic surgery (SILS) six days after aspiration. After wide unroofing, the remnant membrane of the cyst wall was ablated using an argon-laser device (Fig. 3). The operation time was 130 minutes and total blood loss was 5 ml. An IVC filter was inserted five days after unroofing. The patient was moved to a rehabilitation ward two weeks after surgery. Pathological diagnosis revealed a simple cyst and CA19-9 was stained immunohistochemically in the cystic wall. Serum CA19-9 was immediately decreasing to normal range after unroofing and no recurrence of the liver cyst or bulging was detected two months later at clinic (Fig. 4). IVC thrombosis was diminished with anticoagulant therapy in same graphical study.

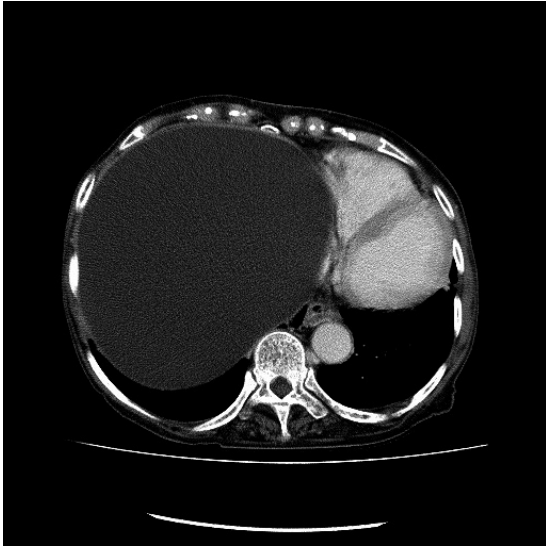


Fig. 1 The CT scan shows a well-demarcated water attenuation of the liver. The wall of the cystic lesion does not enhance following the administration of intravenous contrast. The huge cyst compresses the right ventricle and IVC.

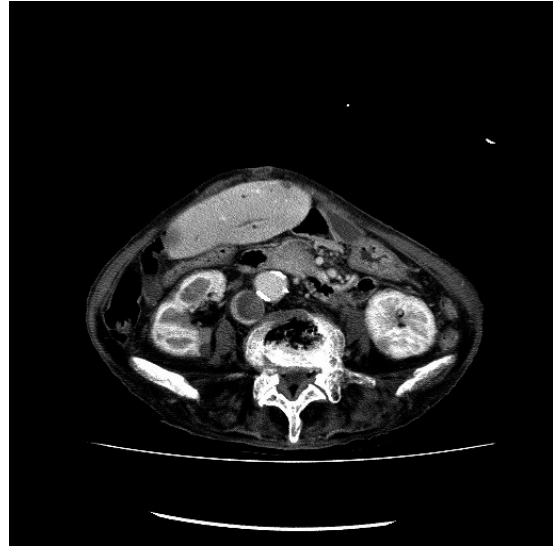


Fig. 2 The CT scan demonstrates IVC thrombosis. This thrombus was continued to the bilateral iliac veins.



Fig. 3 Intra-operative findings after unroofing. The remnant membrane is ablated using an argon-laser device.

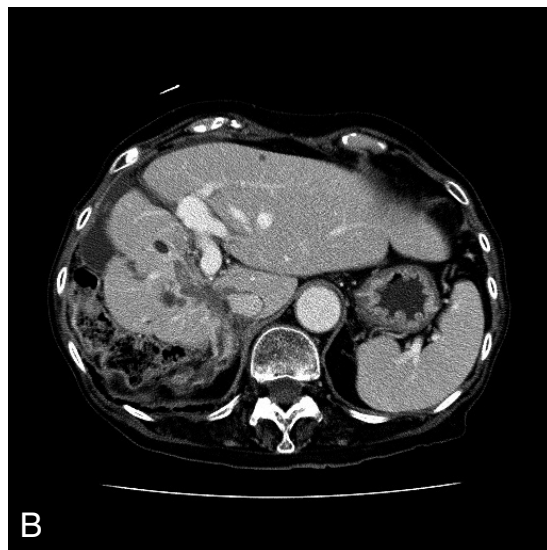


Fig. 4 Surgical wound after surgery (A). The CT scan demonstrates no recurrence of the liver cyst two months later (B).

DISCUSSION

Hepatic cyst is a common congenital malformation and the incidence varies from 0.1% to 4.5% [9]. 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, rupture, torsion, infection, and compression of adjacent structures [10]. Several therapeutic approaches have been described for symptomatic or complicated cysts, including needle aspiration with or without injection of sclerosing agents [11, 12], internal drainage with cystjejunostomy [13], wide unroofing [14, 15], and varying degrees of liver resection [16, 17]. Normally, cyst-jejunostomy or liver resection requires open invasive procedure. On the other hand, needle aspiration is safe and can be the least invasive procedure. Decompression of the cyst contents can relieve the symptoms attributable to the compression. This procedure may be valuable as a diagnostic tool to confirm the cyst contents. Normally needle aspiration is associated with a high failure rate and rapid recurrence [18].

Our case showed re-growth within three days of aspiration. In addition, the patient had had aspiration therapy with sclerosing agents previously in another hospital. Therefore, we decided to perform wide unroofing by laparoscopic surgery. Laparoscopic unroofing has been proven to be safe and shown to have a lower recurrence rate, ranging from 0 to 14.3 percent. The morbidity rate is also acceptable (0 to 15 percent) [19-21]. These results indicate that surgical therapy is the only definitive treatment for simple or complicated cysts.

Laparoscopic surgery is a modern surgical technique which has brought a number of advantages to patients, compared with conventional open procedure. These include reduced pain, shorter recovery time, and cosmetic benefits. Recently, a trend of this procedure has been toward minimizing the number of incisions. One such approach is Single Incision Laparoscopic Surgery (SILS). SILS was described as early as 1992 by Pelosi *et al.* [22] who performed a laparoscopic appendectomy, and in 1997 by Navarra *et al.* [23], who performed a laparoscopic cholecystectomy. Because SILS can be performed using refinements of existing technique and technology, it is spreading widely to conventional laparoscopic fields such as colectomy [24, 25], hysterectomy [26], gastrectomy [27, 28], and nephrectomy [29, 30]. Only one report described liver fenestration for liver cyst using single-port access as same as our method, previously [31]. Although the benefits of SILS over conventional laparoscopic surgery have not been established, this method could be the first choice for symptomatic or complicated liver cysts because of acceptable operation time, blood loss, and clinical outcome. Clinically, cosmetic benefit and less postoperative pain are also expected as advantages of SILS originated from less number of incisions. In addition, tissue trauma and port-related complications such as organ damage, adhesions, bleeding, wound infections and hernias could be decreased. For the

future direction, additional experience and continued investigation are warranted.

REFERENCES

- 1) Fiamingo P, Tedeschi U, Veroux M, Cillo U, Brolese A, Da Rold A, Madia C, Zanus G, D'Amico DF. Laparoscopic treatment of simple hepatic cysts and polycystic liver disease. *Surg Endosc* 2003; 17: 623-626.
- 2) Ishikawa H, Uchida S, Yokokura Y, Iwasaki Y, Horiuchi H, Hiraki M, Kinoshita H, Shirouzu K. Nonparasitic solitary huge liver cysts causing intracystic hemorrhage or obstructive jaundice. *J Hepatobiliary Pancreat Surg* 2002; 9: 764-768.
- 3) Paraskevaides EC, Samarji W, Dehalvi N, Chauhan A. Fatal spontaneous intraperitoneal rupture of hydatid liver cyst. *Br J Clin Pract* 1990; 44: 502-503.
- 4) Yildirgan MI, Basoglu M, Atamanalp SS, Aydinli B, Balik AA, Celebi F, Oren D. Intrabiliary rupture in liver hydatid cysts: results of 20 years' experience. *Acta Chir Belg* 2003; 103: 621-625.
- 5) Kanazawa A, Yoshioka Y, Inoi O, Kubo S, Kinoshita H. Intracystic hemorrhage with spontaneous rupture of liver cyst complicated by infection: a case report. *Osaka City Med J* 2003; 49: 57-60.
- 6) Al Karawi MA, Mohamed AR, Yasawy I, Haleem A. Non-surgical endoscopic trans-papillary treatment of ruptured echinococcus liver cyst obstructing the biliary tree. *Endoscopy* 1987; 19: 81-83.
- 7) Fiamingo P, Tedeschi U, Veroux M, Cillo U, Brolese A, Da Rold A, Madia C, Zanus G, D'Amico DF. Laparoscopic treatment of simple hepatic cysts and polycystic liver disease. *Surg Endosc* 2003; 17: 623-626.
- 8) Yildirgan MI, Basoglu M, Atamanalp SS, Aydinli B, Balik AA, Celebi F, Oren D. Intrabiliary rupture in liver hydatid cysts: results of 20 years' experience. *Acta Chir Belg* 2003; 103: 621-625.
- 9) Wernet A, Sibert A, Paugam-Burtz C, Geffroy A, Pease S, Belghiti J, Vilgrain V, Mantz J. Ethanol-induced coma after therapeutic ethanol injection of a hepatic cyst. *Anesthesiology* 2008; 108: 328-329.
- 10) Gigot JF, Legrand M, Hubens G, de Canniere L, Wibin E, Deweer F, Druart ML, Bertrand C, Devriendt H, Droissart R, Tugilimana M, Hauters P, Vereecken L. Laparoscopic treatment of nonparasitic liver cysts: adequate selection of patients and surgical technique. *World J Surg* 1996; 20: 556-561.
- 11) Blonski WC, Campbell MS, Faust T, Metz DC. Successful aspiration and ethanol sclerosis of a large, symptomatic, simple liver cyst: case presentation and review of the literature. *World J Gastroenterol* 2006; 12: 2949-2954.
- 12) Nakaoka R, Das K, Kudo M, Chung H, Innoue T. Percutaneous aspiration and ethanalamine oleate sclerotherapy for sustained resolution of symptomatic polycystic liver disease: an initial experience. *AJR Am J Roentgenol* 2009; 193: 1540-1545.
- 13) Jain SK, Vindal A, Basra BK, Kaza RC. Cystojejunostomy for non-parasitic hepatic cyst with biliary communication. *Singapore Med J* 2010; 51: e27-e29.
- 14) Monteferrante E, Pitrelli N, Ciarelli F, Colangelo E, Basti M, Nardi M, Liberatore E, Colecchia G. [Laparoscopic deroofing of non parasitic posterolateral liver cyst. Technical considerations]. *Minerva Chir* 2003; 58: 823-825.
- 15) Masatsugu T, Shimizu S, Noshiro H, Mizumoto K, Yamaguchi K, Chijiwa K, Tanaka M. Liver cyst with biliary communication successfully treated with laparoscopic deroofing: a case report. *JSLS* 2003; 7: 249-252.
- 16) Libutti SK, Starker PM. Laparoscopic resection of a nonparasitic liver cyst. *Surg Endosc* 1994; 8: 1105-1107.
- 17) Liu R, Huang ZQ, Zhou NX, Huang XQ, Wang YH, Jiang K, Xiang X. [Operational line of laparoscopic liver resections]. *Zhonghua Yi Xue Za Zhi* 2004; 84: 219-221.
- 18) Aydin U, Yazici P, Onen Z, Ozsoy M, Zeytinlu M, Kilic M, Coker A. The optimal treatment of hydatid cyst of the liver: radical surgery with a significant reduced risk of recurrence. *Turk J Gastroenterol* 2008; 19: 33-39.
- 19) Zacherl J, Scheuba C, Imhof M, Jakesz R, Fugger R. Long-term results after laparoscopic unroofing of solitary symptomatic congenital liver cysts. *Surg Endosc* 2000; 14: 59-62.

- 20) Katkhouda N, Mavor E. Laparoscopic management of benign liver disease. *Surg Clin North Am* 2000; 80: 1203-1211.
- 21) Martin IJ, McKinley AJ, Currie EJ, Holmes P, Garden OJ. Tailoring the management of nonparasitic liver cysts. *Ann Surg* 1998; 228: 167-172.
- 22) Pelosi MA, Pelosi MA, III. Laparoscopic appendectomy using a single umbilical puncture (minilaparoscopy). *J Reprod Med* 1992; 37: 588-594.
- 23) Navarra G, Pozza E, Occhionorelli S, Carcoforo P, Donini I. One-wound laparoscopic cholecystectomy. *Br J Surg* 1997; 84: 695.
- 24) Remzi FH, Kirat HT, Geisler DP. Laparoscopic single-port colectomy for sigmoid cancer. *Tech Coloproctol* 2009.
- 25) Bucher P, Pugin F, Morel P. Single port access laparoscopic right hemicolectomy. *Int J Colorectal Dis* 2008; 23: 1013-1016.
- 26) Song T, Kim TJ, Kim MK, Park H, Kim JS, Lee YY, Kim CJ, Choi CH, Lee JW, Kim BG, Bae DS. Single Port Access Laparoscopic-Assisted Vaginal Hysterectomy for Large Uterus Weighing Exceeding 500 Grams: Technique and Initial Report. *J Minim Invasive Gynecol* 2010.
- 27) Saber AA, Elgamal MH, Itawi EA, Rao AJ. Single incision laparoscopic sleeve gastrectomy (SILS): a novel technique. *Obes Surg* 2008; 18: 1338-1342.
- 28) Saber AA, El Ghazaly TH. Early experience with SILS port laparoscopic sleeve gastrectomy. *Surg Laparosc Endosc Percutan Tech* 2009; 19: 428-430.
- 29) Aron M, Canes D, Desai MM, Haber GP, Kaouk JH, Gill IS. Transumbilical single-port laparoscopic partial nephrectomy. *BJU Int* 2009; 103: 516-521.
- 30) Desai M. Single-port surgery for donor nephrectomy: a new era in laparoscopic surgery ? *Nat Clin Pract Urol* 2009; 6: 1.
- 31) Rene Mantke and Sebastian Wicht. Single-port liver cyst fenestration combined with Single-port laparoscopic cholecystectomy using completely reusable instruments. *Surg Laparosc Endosc Percutan Tech* 2010; 20: 28-30.