

Laparoscopic Unroofing for Nonparasitic Liver Cyst

Sanchai Kanchanalarp, MD

Vibul Sachakul, MD, FACS

Department of Surgery, Phramongkutklao Army Hospital, Bangkok, Thailand

Abstract

Laparoscopic surgery has been successfully used in fenestration of liver cyst with good results in short-term follow-up. Our limited experience of 6 cases concurs with the impression that this laparoscopic procedure is effective and can be a good alternative to the open surgery for the treatment of liver cysts.

The procedure is minimally invasive, less pain, and cost saving due to short hospital stay. It is most suitable in solitary liver cyst and PLD type I, but would not be beneficial to PLD type 2 patients.

Nonparasitic liver cyst is a developmental anomaly in the hepatobiliary system. It is a rare clinical entity that is diagnosed with increasing use of ultrasonography and CT scan.¹ The cyst contains clear straw-colored fluid and is lined by cuboidal epithelium and its basement membrane surrounded by fibrous tissue. The intracystic pressure is less than parasitic liver cyst.^{1,2} Usually the non-parasitic liver cyst is asymptomatic and does not result in abnormal liver function. The cyst has no bilious content since it is not communicating with the biliary system.³ Non-parasitic liver cyst may be found as solitary, multiple or diffusely in the liver substance, such as in polycystic liver disease (PLD).^{2,3} PLD is a dominant hereditary abnormality in which the liver contains multiple cystic lesions or cysts scattering throughout the liver substance. Ninety three percent of PLD may be associated with renal cysts whereas 34-78 percent of polycystic kidney disease is

associated with liver cyst.^{1,4} Morino et al suggested a classification of PLD into two types (Figure 1).⁵

Nonparasitic solitary cyst is commonly found at the age of 40-60 (averaging 52 years) and PLD occurs more in female. The number of cyst in the liver may actually increase during pregnancy.^{2,4} Most non-parasitic liver cysts are asymptomatic and require no treatment when diagnosed. Most patients will have normal liver functions and hepatic failure rarely occurs. A small number of patients may experience abdominal pain or dyspepsia. Those with large solitary cyst or enlarged polycystic liver may become dyspnic and fatigue upon lying down. Morino, et al reported 35 percent of patients' symptoms were unrelated to the liver cyst they had. This is an important observation because these patients will not benefit from operation upon their liver cysts.⁵

Symptoms of liver cyst usually are from pressure

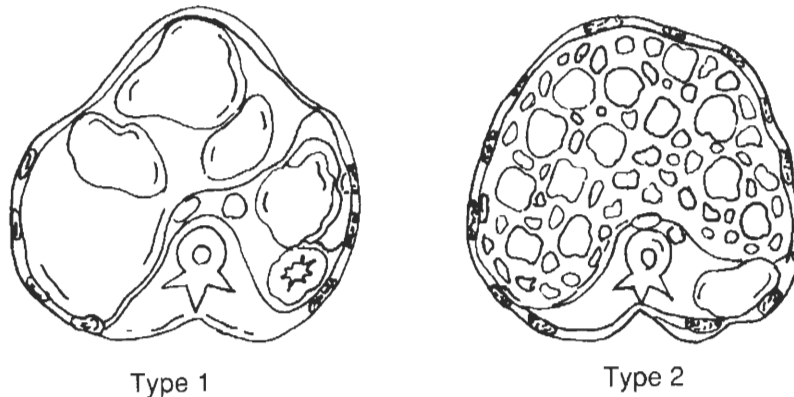


Fig. 1 Morino's classification for PLD

effect upon adjacent organs such as epigastric and right shoulder pain and early sense of fullness after eating. Most patients present clinically with mass in the right subcostal area without pain. Sudden severe abdominal pain may indicate acute torsion, intracystic hemorrhage or intraperitoneal rupture.^{1,2} Complications develop in less than 5 percent in solitary hepatic cyst but occurs approximately 20 percent in polycystic lesions.⁴

The solitary liver cyst appears as a thin-walled unilocular non-echoic lesion under ultrasonographic examination. It features as a homogeneous cyst with its density equal to that of water. Irregularities of cyst wall and septations of the cyst suggest infection, tumor, or trauma of the cyst.

Nonparasitic liver cysts mostly are benign. The chance of having malignant degeneration is rare. Therefore, consideration of surgical treatment for symptomatic relief should have the least of risk and complication. The spectrum of surgical approach varies from percutaneous drainage to liver transplantation.⁶ Current literatures indicate that aspiration of the cyst uniformly fails in relieving symptoms. Partial excision has a failure rate of 61 percent whereas total excision and liver resection are effective.¹

The technique of unroofing represents a method of partial excision of superficially located cysts. Fenestration or deroofting of deeper cysts can be achieved by opening through common walls between the deeper and superficial cysts. This procedure reduces the size of the cyst by releasing its content into the peritoneal cavity and will finally be absorbed.⁷ This type of surgery has been employed in many surgeons for the treatment of solitary liver cyst and PLD in which

sometime combined with liver resection.^{5,8} Table 1 lists the indication and contraindication for the laparoscopic technique.

Recently, the technique of laparoscopic surgery has been successfully used in laparoscopic fenestration of liver cyst with good results in short-term follow-up.^{5,6,9-11}

MATERIALS AND METHODS

From January 1993 to January 2000, six patients underwent laparoscopic unroofing of liver cyst at Phramongkutklao Hospital. They were 2 males and 4 females with their age ranging 53-78 years (mean 62.8 years).

Leading symptoms were epigastric distress and abdominal discomfort. Two patients had previous history of cyst aspiration and one patient had laparoscopic cholecystectomy. There were 3 cases of solitary cyst and 3 cases of polycystic disease of which 2 cases had associated polycystic kidney.

Preoperative Management

The patient was prepared similarly as in the preparation for minimal invasive operation. Preoperative typing and cross matching of blood may be required in certain cases. Preoperative investigation included either ultrasonography or CT scan examination.

Surgical Technique

Figure 2 illustrated steps in performing laparoscopic unroofing of liver cyst. The patient was placed in supine position under general anesthesia. The first

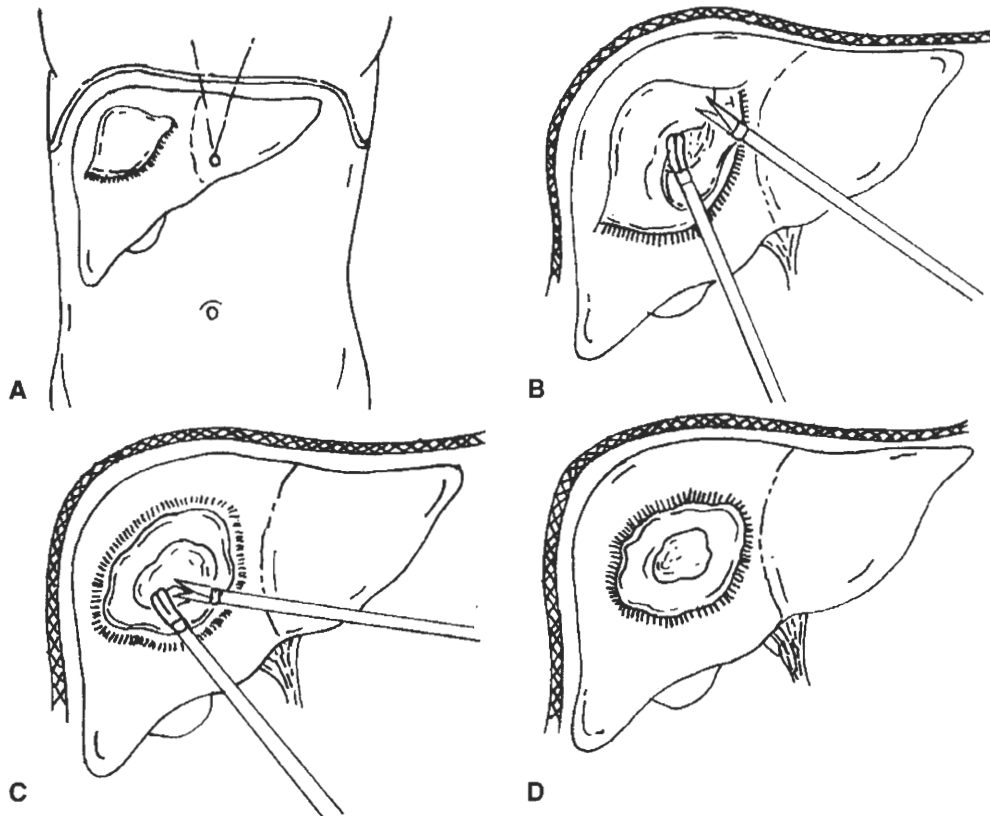


Fig. 2 Illustration to show steps in performing laparoscopic un-roofing of liver cyst.

- A. Placement of instrumentation ports in relation to the liver cyst.
- B. Un-roofing is made with cauterization of cyst wall and the edge of the un-roofing opening.
- C. Fenestration is made through the common wall of cysts into the deeper cyst (Morino's type 1).
- D. Fenestration completed allowing drainage of deeper cyst through the un-roofed outer cyst.

Table 1 Indication and Contraindication for Laparoscopic Unroofing of Liver Cyst.

Indication^{5,8}

1. Highly symptomatic solitary superficial cyst
2. Major cysts in anterior segments of liver (Type I of Morino's classification)

Contra-indication^{1,5,8,12}

1. Previous upper abdominal surgery except in minimal invasive type of surgery
2. PLD with diffuse multiple small cysts (Type II of Marino's classification)
3. PLD with deeply seated cysts or in posterior segments of liver
4. Patient with renal insufficiency
5. Suspicious of cystadenoma or cystadenocarcinoma

port was introduced at the umbilicus with a 10-mm trocar. The cyst outline was assessed before trocar placement. For the large cyst extending to the umbilicus, the trocar was placed between the umbilicus and pubic symphysis with open technique and the Hassan trocar instead of Veress needle in order to avoid inadvertent injury to intra-abdominal organs.

Pneumoperitoneum with CO₂ was instituted keeping the pressure in between 12-15 mmHg. The second and third ports were placed at the level of the cyst margin in the epigastrium and midclavicular or anterior axillary line respectively. In most instance, the surgeon operated with 3 ports by the two-hand technique, but occasionally the fourth instrument port in the left lumbar

Table 2 List of patient who received unroofing of non-parasitic cyst of liver.

Patient No	Sex	Age (yrs.)	CT scan (Cyst diameter)	Operative time (min.)	Hospital stay (days)
1	Male	64	Solitary (14 cm)	90	3
2	Female	53	PLD (12 cm)	60	2
3	Female	55	Solitary (11 cm)	55	2
4	Male	60	PLD (10 cm)	90	2
5	Female	67	PLD (11 cm)	100	3
6	Female	78	Solitary (12 cm)	60	3

region was added. The cyst was first aspirated with a small needle. An opening on the surface of the cyst wall was made and cauterized along the margin of liver parenchyma for hemostasis. The excised part (unroofed piece) of cyst wall was sent for pathologic examination.

In Case 2, following unroofing of the outer large cyst (12 cm), a more deeply seated cyst (Morino's type 1) was also drained through fenestration made in the bulging common wall (Figure 2 C, D)

RESULTS

The largest cyst measured 14 cm in diameter. Mean operative time was 75.83 minutes (55-100 minutes). The average hospital stay was 2.5 days (Table 2). There was no complication in any case. The histology was benign hepatic cyst in all 6 cases.

One case with associated polycystic kidney experienced weight loss and recurrence of symptom at 2 months after surgery. Ultrasonography demonstrated recurrence of the liver cyst but the patient refused re-operation. Another patient was found to have cyst recurrence (5 cm in size) without symptom at 5 years after operation.

DISCUSSION

It must be emphasized that every cyst should be aspirated prior to un-roofing. Cyst containing bilious content should not be opened since that can lead to bile peritonitis or biliary fistula. Such cyst must be excised, if possible, or drained by a Roux-en-Y cysto-enterostomy. Cysts suspicious of cystadenoma or cystadenocarcinoma should have total excision by an open procedure. The size of fenestration made into the deeper cyst should be about 10 per cent of the

common cyst wall and should avoid the area where vessels are present.¹³ Cysts with thickened wall are liable to post fenestration hemorrhage and complete hemostasis must be ascertained at time of unroofing. It is not advisable to use intraperitoneal drain postoperatively. The cameral port at umbilicus is closed with sutures to prevent incisional herniation.^{4,5}

In patients with eosinophilia and/or history of residing or travelling to the Middle East or Latin America should all have serology (Antigen 5) test done to exclude hydatid disease. When the possibility of being a hydatid cyst can not be ruled out by serologic test, preoperative treatment of albendazole 10 mg/kg for one month as a precautionary measure is recommended.¹²

The inner lining of the cyst wall when viewed through the laparoscope shows a smooth glistening whitish surface or forming various shallow fibrous ridges crossing each other without definite pattern. The cyst cavity requires no treatment, but some surgeons advocate electrocoagulation of the inner wall or fill it with omentum.

For cysts situated in the posterior segments of right hepatic lobe, it is difficult to perform the operation in supine position. Positioning the patient in left lateral kidney position with the surgeon standing on the left facing the patient and the addition of the fourth instrument port as previously mentioned would help to facilitate surgical approach and mobilization of the right lobe of liver.¹⁴

Postoperative Complication

There have been no reports of mortality following laparoscopic un-roofing of liver cysts. Morino et al encountered 2 complications in a series of 8 patients. One case developed right pleural effusion and the

other had subcutaneous leaking of peritoneal fluid around the port sites. Effort to widen the unroofing opening to minimize the chance of recurrence may cause injury to vessels or small bile ducts in the cystic septum and result in bleeding or biliary leakage postoperatively.

Postoperative Recurrence

Postoperative recurrence occurs more frequently to patients with PLD. This may be due to the self-limited nature of increased intra-abdominal pressure by the enlarged liver. When this pressure is relieved by the unroofing of a large cyst, the remaining cysts then gradually increase their sizes. Gigot JF, et al found inadequate unroofing as the cause of postoperative recurrence in 9 patients with PLD. Repeating laparoscopic unroofing was successful in only 89 per cent and achieving symptomatic relief in 67 per cent. They suggested few technical considerations to minimize the chance of recurrence. These include adequately widen unroofed opening, appropriate selection of the site for un-roofing, use of argon beam laser to cauterize inside the cyst cavity, use of omental tissue to fill the cyst cavity, and to avoid operating on patients with PLD type 2 in Monino's classification.

References

1. Sanchez H, Gagner M, Rossi RL et al. Surgical management of nonparasitic cystic liver disease. *Am. J Surg* 1991; 161: 113-9.
2. Schwartz SI. Liver. In: Schwartz SI, Shire GT, Spencer FC, eds. *Principle of surgery*. 6 edition. New York: Mc Graw Hill Inc, 1994; 1319-66.
3. Sherlock S. *Diseases of the liver and biliary system*, 8ed. Oxford : Blackwell Scientific Publication 1989, p 633-54.
4. Vauthey JN, Maddern GJ, Kolblinger P, et al. Clinical experience with adult polycystic liver disease. *Br J Surg* 1992; 79: 562-5.
5. Morino M, De Giuli M, Festa V, Garrone C. Laparoscopic management of symptomatic nonparasitic cysts of the liver : Indications and results. *Ann Surg* 1994; 219: 157-64.
6. Libutti SK, Starker PM. Laparoscopic resection of a nonparasitic liver cyst. *Surg Endosc* 1994; 8: 1105-7.
7. Lin TY, Chen CC, Wang SM. Treatment of nonparasitic cystic disease of the liver : A new approach to therapy with polycystic liver. *Ann Surg* 1968; 168: 921-7.
8. Gigot JF, Legrand M, Hubens G, et al. Laparoscopic treatment of nonparasitic liver cysts : Adequate selection of patients and surgical technique. *World J Surg* 1996; 20: 556-61.
9. Albrink MH, McAllister EW, Rosemurgy AS, et al. Laparoscopic management of cystic disease of the liver. *Am Surg* 1994; 60: 262-6.
10. Hauser CJ, Poole GV. Laparoscopic fenestration of a giant simple hepatic cyst. Case report and technical consideration. *Surg Endosc* 1994; 8: 884-6.
11. Zacherl J, Imhof M, Fuegger R, Fritsch A. Laparoscopic unroofing of symptomatic congenital liver cysts. *Surg Endosc* 1996; 10: 813-5.
12. Diez J, Decoud J, Gutierrez L, Suhl A, Merello. Laparoscopic treatment of symptomatic cysts of the liver. *Br J Surg* 1998; 85: 27-37.
13. Way LW, Wetter A. Laparoscopic treatment of liver cyst. *Surg Endosc* 1992; 6: 89-90.
14. Watson DI, Jamieson GG. Laparoscopic fenestration of giant posterolateral liver cyst. *J Laparoendosc Surg* 1995; 5: 255-7.

DISCUSSANT'S COMMENT

Wuttichai Thanapongsatorn

Vajira Hospital, Bangkok

Laparoscopic unroofing of nonparasitic liver cyst is definitely a better approach than an open technique because of its minimal invasiveness. Selection of patients when correctly made according to indications and contraindication should result in good outcome and less complication and recurrence.

I routinely use the semi-open technique to insert the initial 10 mm trocar at umbilicus. A 10 mm 30 degree angle lens is selected for better visualization of the operative field and to facilitate viewing the inside of the cyst after it is unroofed. After the findings are well assessed, additional instrument ports (second and third ports of 5 mm) are made according to the finding of location of the cyst (left of right lobe) and the

planned approaches (anterior, superior, inferior or lateral). Insertion of the second and third ports for two-hand technique is important. They should be placed to the left and right of the laparoscope with less than 90 angle. Patient's position on the operative table is another important consideration especially when the cyst is located in the lateral part of the right lobe of liver.

Our experiences at Vajira Hospital include the use of 10-mm laparoscopic operative ultrasound in planning the appropriate direction of approach especially when the cyst is within the liver and not apparent on the surface as mostly found in the case of PLD. We change the laparoscope to 5 mm to accommodate the operative ultrasound. We also routinely aspirate the cyst for examination of its content before cutting an opening. For excision of cyst wall, we use scissors and cauterization or Harmonic scalpel to accomplish hemostasis. The opening in the cyst wall so created should be as wide as possible or at least not less than the cyst radius or 1 cm as the case may be. In case of cyst less than 2 cm in diameter, we apply argon laser beam or electrocautery to the cyst wall to reduce the recurrence. We do not use drain postoperatively.

This is a good and cost saving procedure for any surgical team with well-equipped instruments.