

Laparoscopic Management of Hepatic Cysts

Elesiário Marques Caetano-Júnior, MD, Marcelo Moura Linhares, MD, PhD, Délcio Matos, MD, PhD, Vladimir Schraibman, MD, Jacques Matone, MD, and Sarhan Sidney Saad, MD, PhD

Abstract: The present study describes the technique and evaluation of postsurgical results, hospital stay, and follow-up of patients who underwent hepatic cyst surgical treatment by laparoscopic access. Twelve patients presenting liver cystic disease were included in this research. Clinical conditions, laboratorial and radiologic examinations, surgical technique, complications, and postoperative follow-up were discussed. In our series, the morbidity rate was 25%. No mortality was observed in the postoperative period. Conversion to open surgery was necessary in 1 case, owing to hemorrhage. No recurrence was found and patients remain asymptomatic in their current follow-up. Laparoscopic resection of hepatic cyst proved to be efficient in the regression of the cysts and resulted in disappearance of symptoms.

Key Words: laparoscopic surgical procedure, therapeutics, liver, cysts

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Hepatic cysts are considered rare lesions, usually identified during laparotomy or after necropsy. Owing to the improvement in imaging modalities and the widespread use of ultrasound and computed tomography (CT) scan as a screening tool, these lesions are found more frequently nowadays, mostly asymptomatic, with an overall incidence of 4.7%.^{1,2}

Nonparasitic liver cysts are a result of congenital anomalies affecting the intrahepatic and extrahepatic biliary system, providing different grades of cystic dilations. Embryogenesis of the biliary tree development may be responsible for those cystic dilations.^{3,4} On the other hand, polycystic liver disease is hereditary, and its inheritance is typically autosomal dominant, widely expressed. It is frequently associated with congenital renal malformations, whereas cysts are also encountered in the pancreas, lungs, spleen, and central nervous system.^{5–7} Nonparasitic hepatic cysts are not only

represented by a single liver cyst but also by multiple cysts, as well as diffuse polycystic liver disease.

The etiology of the cysts is controversial, as many classifications have been proposed. The distinction between true cysts and pseudocysts is usually recognizable. Pseudocysts are related to traumatic lesions or to neoplasm growth, whereas true hepatic cysts may be nonparasitic or parasitic. The latter is generally a consequence of an *Echinococcus granulosus* infection.^{8,9}

Hepatic cysts are usually asymptomatic and not associated with defects in hepatic function. They are incidentally found during occasional laparotomy or laparoscopy, necropsy, and even during routine ultrasound or CT scan. However, if they grow, they may become symptomatic. Symptoms depend on the size and location of the cysts, mainly during the fourth to sixth decades of life. There may be vague upper abdominal pain, right upper quadrant palpable mass, postprandial fullness, dyspnea, and vomiting.^{9–11}

Laboratorial liver function enzymes are only abnormal if biliary compression is present. Hepatic cyst infection may occur if a communication between the biliary tree and the cyst is present.^{9,12}

As a benign lesion, asymptomatic hepatic cyst requires no treatment, regardless of the size. Nevertheless, surgical management should be indicated if the cyst becomes symptomatic (growth, infection), after a blunt or penetrating trauma or if neoplasia is suspected. Percutaneous aspiration can be performed. However, with high recurrence rates and increased infection risk as well as limited short-term success, this technique is reserved for patients in whom surgical therapy is counter indicated.¹³

Current surgical therapy involves intraoperative cysts aspiration, cyst unroofing, Roux-en-Y cyst jejunostomy, partial or complete resection, and liver transplantation. Patients presenting cystadenocarcinoma and squamous cell carcinoma of the cyst may develop metastasis, despite complete surgical resection of the primary lesion.^{14,15}

Laparoscopic unroofing as a surgical management technique for hepatic cyst was first described in 1991.¹⁶ The promising initial results, together with the lack of prospective studies concerning laparoscopic management of hepatic cysts, motivated this research.

The aim of this study was to analyze the technical feasibility of laparoscopic treatment for single and

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Reprints: E. M. Caetano-Júnior, MD, Rua Pedro de Toledo, 980, Cj. 152/153. CEP 04039-002, São Paulo, Brazil (e-mail: marbet@uol.com.br).

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multiple nonparasitic hepatic cysts and to evaluate prospectively, postoperative and long-term outcomes.

PATIENTS AND METHODS

Between February 1994 and February 1999, 12 female patients presenting single or multiple symptomatic hepatic cysts were selected for laparoscopic treatment. Preoperative investigation involved laboratorial examination concerning hepatic function, ultrasonography, and abdominal CT scan. No serologic test for parasitic infection was carried out preoperatively.

Operative Technique

After general anesthesia, the patient was positioned in the inverted-Y position with the surgeon between the legs and the assistants at the sides. Trendelenburg reverse position of 30 degrees was achieved.

A transverse infraumbilicus skin-stab incision was made and the pneumoperitoneum was initiated with Veress needle, with subsequent introduction of a 0-degree videolaparoscope using a 10 mm trocar. Abdominal pressure was kept at 14 mm Hg. Basic port placement was according to cyst location, under direct vision. A 10 mm trocar was inserted in the midline, 2 cm subxiphoid and a left subcostal 5 mm trocar positioned right or left, depending on the cyst's location. Whenever necessary for concomitant procedures, an optional port was required.

Cysts were fenestrated and fluid was aspirated using a laparoscopic needle, so as to empty the cyst and to evaluate the macroscopic aspect of the fluid. It was sent for biochemical, microbiological, and cytologic analysis. After emptying the cyst, the wall was dissected and opened with scissors to thoroughly examine the cystic cavity for the presence of indentations indicating neoplastic changes.

The unroofing of the cysts was achieved using laparoscopic scissors and careful hemostasis of the cyst edge was performed with electrocautery. Polygalactin suture was applied in cases of septal bile duct injury caused by cystic wall incision. Hepatic cyst cavity was then instilled with saline and hemostasis was reassured. The cystic wall was excised and placed in a puncture-resistant bag and brought out from the abdominal cavity through the enlarged umbilical port. Routine placement of a low-cost Penrose drain through the trocar port was carried out at the completion of the procedure.

The cyst fluid was analyzed with regard to the macroscopic aspect and subdivided into serum (clear) or dim (opaque) fluid. Biochemical examination of the fluid was obtained, and glucose, amylase, protein, and pH levels were detailed. Complimentary bacteriologic and cytologic tests were accomplished.

The removed cystic wall was sent for pathology study. Paraffin-embedded specimens and processed hematoxylin and eosin-stained slides were microscopically analyzed.

Short-term and long-term postoperative complications were evaluated, concerning clinical symptoms, physical examination, and imaging studies. Ultrasound

and CT scan were performed to estimate cyst regression after the laparoscopic procedure.

RESULTS

Laparoscopic unroofing of hepatic cyst was carried out in all patients, by the same operative technique.

The median age was 56 years, ranging from 45 to 75 years, and median size of the cyst was 9.8 cm (range, 6 to 15 cm). Multiple hepatic cysts were found in 3 patients and 1 of them had a renal cyst. No calcification in cyst wall was observed, nor septation visualized inside the cyst.

All patients underwent cyst puncture in the bulge of the lesion, making it easier to separate cystic bounds from normal hepatic tissue. The cyst edges were sutured in 4 patients (33.3%), 3 of whom required hemostasis and 1 patient had an injury to the septal bile duct during the unroofing procedure.

The median operative time was 105 minutes (range, 60 to 180 min). Omentum adhesions close to the hepatic cyst were seen in 4 patients (33.3%). Three patients (25%) presented multiple cysts due to polycystic liver disease and 1 patient (8.3%) developed 2 localized cysts. Cystic cavity surface was macroscopically smooth in 4 (33.3%) patients and rugged in 8 patients (66.7%). Septations inside the cyst wall occurred in 4 patients.

Two patients presented chronic calculous cholecystitis and underwent simultaneous laparoscopic unroofing and cholecystectomy. Intraoperative cholangiography revealed normal morphology of the biliary tract and no communication was evidenced between the cyst and the biliary tree.

In 1 patient (8.3%), the operation was converted to laparotomy owing to a suprahepatic vein lesion and abundant bleeding (800 mL), during dissection of the hepatic cyst. A right subcostal incision was made, and the 0.5 cm lesion was sutured with 4-0 polypropylene thread. Blood transfusion was necessary.

A translucent fluid was obtained in all but 2 patients (16.6%), who presented with opaque aspect. Glucose, protein, and pH level analyses confirmed it to be a transudate. Cultures were sterile and no neoplastic cells were identified. Amylase levels were normal.

Postoperative complications were divided into abdominal and systemic groups. Morbidity was 25% and no mortality occurred in this series. One patient who underwent concomitant cholecystectomy developed umbilical wound infection, and was treated with local drainage and oral antimicrobial therapy. Right pleural effusion was diagnosed in 2 patients (16.6%), with right hepatic lobe cyst. No empyema was observed. They had satisfactory outcome after respiratory physiotherapy. They were discharged on the seventh and eighth day postoperatively and follow-up showed complete regression of pleural effusion in both patients.

Pathologic findings showed no malignancy in the specimen and the cyst proved to be nonparasitic. Cystic

wall was constituted by columnar epithelium, similar to the bile duct.

The median length of stay was 4.1 days, ranging from 3 to 8 days. Follow-up was obtained from 6 to 49 months. Patients were seen at 30, 60, and 180 days postoperatively. Subsequently, evaluations continued twice a year.

During the follow-up period, no recurrence of symptoms was referred. Imaging examinations, performed 3 and 6 months after laparoscopic surgery, revealed complete regression in all cases. Untouched cysts, in patients who presented multiple hepatic lesions, had no alterations in their size and morphology.

DISCUSSION

In the last few years, there was a revolution in the area of minimally invasive surgery, especially for the treatment of cholelithiasis, so that the conventional technique turned out to be laparoscopic access. In the same way, hepatic cyst unroofing by laparoscopic access is efficient for the treatment of the cysts, presents great benefits for patients, and is less invasive than open procedures. It also has lower hospital stay and lower level of morbidity when compared with the open procedure.¹⁷

In this paper, there were 12 female patients. The absence of male patients is in accordance with the medical literature that shows predominance of hepatic cysts in females, with a 4:1 ratio.¹⁸ Medical literature shows a higher incidence of this disease between the fourth and sixth decades of life, besides having some reports in the extremes of life.^{1,2,19} As found in medical literature, in our series, patients were aged between the fourth and seventh decades of life.

The main diagnostic modalities for hepatic cyst disease are abdominal ultrasound and CT. These examinations allow visualization of differences between hepatic cysts forms: simple, multiple, and parasitic.^{6,9} Neoplastic processes, developed in the epithelial layer of the cyst can also be detected by radiologic examinations, presenting with an internal thickening or solid nodules in the cyst wall.^{13,18}

An eventual rupture of the cyst, accompanied by intense bleeding can cause hypovolemic shock and abrupt pain, and can be detected by abdominal ultrasound and CT scan but magnetic resonance imaging has been recommended as a diagnostic method to detect bleeding.^{12,20} Intraoperative ultrasound can detect acoustic shadows in the cyst wall as a consequence of internal bleeding, confirmed during surgery.¹⁸

Invasive approach for hepatic cysts should be used when simple cysts become symptomatic owing to their large volume, location, trauma, suspicion for neoplastic growth, or whenever infection is detected.¹⁷

Percutaneous aspiration of the cyst guided by ultrasound or CT scan is related to high recurrence rates and considerable risk of infection; also, alcoholization after percutaneous aspiration has been described, although with poor results.^{19,21} A randomized trial

showed recurrence of symptoms in all patients with hepatic cysts treated by percutaneous aspiration.²²

Surgical treatment for hepatic cysts shows a variety of techniques in the medical literature, as simple procedures, such as cyst puncture and aspiration, to more complex procedures, such as hepatic transplantation,^{13,14,17} are reserved mainly for exceptional cases and polycystic liver disease.

The unroofing technique is based upon cyst aspiration and drainage to the peritoneal cavity associated with removal of part of the cyst wall. This intervention promotes an effective decompression and conserves hepatic function. It has been introduced for the treatment of polycystic liver disease and, since then, has been applied with success to treat simple or multiple hepatic cysts.^{6,13,21}

Other methods can decrease recurrence rates of hepatic cysts, such as complete resection of the cyst, hepatic resection, and hepatic transplantation.^{15,17}

Laparoscopic treatment of hepatic cysts was first described in 1991,¹⁶ becoming a widely accepted access as long as new materials, more experienced surgeons, and better ultrasound imaging, associated with laparoscopic equipments were available to the medical community.¹⁸ At the beginning, laparoscopic treatment was used for superficial lesions. Further on, it has been used for lesions in central parts of the liver. Since the first reports about laparoscopic treatment, peritoneal cavity access was made by a periumbilical incision with pneumoperitoneum installment and introduction of the first trocar. The other trocars are determined by the precise localization of the hepatic cyst. For cysts in the right hepatic lobe, the second trocar of 10 mm is introduced in the median epigastric line and the third of 5 mm can be introduced in the intersection of the middle clavicular line and the costal margin.^{16,18}

In our series, the trocar position was similar to the description above. All patients underwent the same procedures. However, 2 patients had simultaneous laparoscopic cholecystectomy, and another 5 mm trocar in the intersection of the right costal margin and mid-axillary line was necessary.

Cyst decompression through puncture and aspiration is carried out as the initial procedure to gain a better access to the cyst localized in the superior segments of the liver or even to define the clear limit between the cyst wall and normal hepatic tissue.^{17,18} The use of a laser scalpel diminishes the extension of burned area, promoting better dissection and diathermic coagulation. Recently, harmonic coagulation has allowed even more radical and faster surgeries through the hepatic tissue.^{18,23} In our series, the cysts were punctured and we used diathermic coagulation. Sutures were applied in 4 patients (33.3%) to facilitate hemostasis and eventual closure of biliary ducts exposed during hepatic tissue incision. These procedures were achieved by laparoscopy and proved to be very effective.

Hepatic resection is indicated in patients presenting multiple cysts with liver involvement or even after laparotomy surgery or laparoscopic unroofing. Pringle

maneuver is used during hepatectomies to avoid blood loss. This maneuver has been described at first in open procedures, and lately, for laparoscopic procedures.²³

In the present study, we did not use temporary hemostasis for hepatic resections. Sudden intraoperative complications, such as bleeding caused by vascular lesion, may lead the surgeon to convert to an open procedure. In our series, conversion occurred in 1 (8.3%) patient, as a consequence of severe bleeding caused by suprahepatic vein lesion. This lesion might have been avoided if a laparoscopic ultrasound had been used.

All bacteriologic and cytologic examinations of the fluid inside the cysts showed no infection or malignancy. In all cases, the fluid turned out to be a transudate, after biochemical examinations.

Martin et al¹⁸ showed a mean operative time of 60 minutes in 13 patients. On the other hand, in the open surgery group of 8 patients, mean operative time was 88 minutes, 46.6% higher than that in the laparoscopic group. In patients presenting polycystic liver disease, mean operative time by the laparoscopic unroofing method was 120 minutes in 7 patients and for open surgery was 100 minutes in 6 patients, 20% higher. In our series, mean operative time was 105 minutes. There was no unroofing by the open technique.

During laparoscopy for the treatment of hepatic cysts, it is possible to carefully observe the internal surface of the cyst, enabling direct visualization of suspected areas and also to perform biopsies. To allow a higher sensitivity in the search for suspect areas inside the cyst, a laparoscopic ultrasound examination should be carried out. This method presents a higher sensitivity than conventional ultrasound.²⁴ In our series, we did not observe suspect areas that needed biopsy for immediate frozen section.

We could also observe that localization and size of the cysts were similar in the ultrasound, CT scan preoperative examinations, and during surgery.

Martin et al,¹⁸ in his series of 21 patients presenting hepatic cysts (13 by laparoscopy and 8 by open surgery), diagnosed cholelithiasis in 4 patients who were treated using the same procedure. In our series, 2 patients had cholelithiasis and were treated using the same procedure uneventfully.

In the present study, mean hospital stay was 4 days. Only 2 patients had postoperative complications (related to wound infection and pleural effusion) and stayed for 7 days; these data was in accordance with the current literature.^{18,21}

In polycystic liver disease treated by laparoscopic unroofing, bleeding, biliary fistula, and postoperative ascites are not rare. Also, recurrence rates in these patients are high. In our series, 3 patients presented polycystic liver disease and only 1 presented pleural effusion in the postoperative period. No recurrence rates in these patients were found after 6 months, although the literature reports higher rates.⁶ This difference may be due to the short-term follow-up in some of the cases reported.

The main complications related to laparoscopic treatment of hepatic cysts include ascites, pleural effusion, dyspnea, and biliary fistula. The literature shows indexes that vary from 10% to 35%, reporting also deep venous thrombosis, pulmonary embolism, acute myocardial infarction, and pulmonary infection.^{17,18,23} Complication rate in this series was 25.0%. Surgical wound infection occurred in 1 patient, pleural effusion in 2, both were treated with clinical measures with satisfactory outcome. In the postoperative period, clinical and radiologic examinations must be carried out to preview recurrences. Martin et al¹⁸ showed a recurrence rate of 8% for simple cysts and 71% for multiple cysts after 29 months. High recurrence rates for multiple cysts can be related to the fact that commonly, only the larger cysts are treated. Farges and Bismuth²¹ with their series of 13 patients with multiple hepatic cysts treated by open surgery reported a better quality of life for their patients despite the high recurrence rate. They were followed-up from 12 to 140 months. In our series, it ranged from 6 to 49 months. Systematic radiologic examination showed no recurrence until this moment. Untouched cysts in patients who presented multiple cysts showed no growth rate in the follow-up investigation. Until now, patients remain asymptomatic.

CONCLUSION

Laparoscopic treatment of simple or multiple nonparasitic hepatic cysts proved to be safe and effective, with a low complication rate. This technique promoted complete regression of symptoms without recurrences in short-term follow-up.

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