

Surgical Treatment of Liver Echinococcosis – Open or Laparoscopic Surgery?

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ABSTRACT

Human echinococcosis remains a significant medical issue in endemic areas. Hydatid cysts can rupture, which is the most severe complication of echinococcosis as it can cause anaphylactic reaction and seeding of secondary cysts. Traditionally, hydatid cysts were evacuated by open surgical procedure in order to remove the entire cyst or by unroofing method, with evacuation of the cyst content. Recently, an increasing number of such operations are performed using laparoscopic approach. This study was prospectively conducted in a 5-year period, from 2004–2008. Altogether, 25 surgically treated patients were included in this study. Clinical examination, specific serological test, abdominal ultrasound and computed tomography were used for establishing diagnosis. Open surgery was initially performed in 17 patients and laparoscopic in 8. Three of those 8 patients required conversion to open surgery. Open pericystectomy was performed in 11 patients and laparoscopic pericystectomy in 3 patients. Open partial pericystectomy according to Papadimitriou was performed in 9 patients with hydatid cyst and laparoscopic partial pericystectomy in 2 patients. Our experience indicates that in the case of liver hydatid cyst disease, laparoscopic exploration, and if possible, laparoscopic pericystectomy or partial pericystectomy, should be performed in selected patients.

Key words: echinococcosis, liver hydatid disease, laparoscopy

Introduction

Human echinococcosis, infestation caused by *Echinococcus granulosus*, remains a significant medical issue in endemic areas. Croatia still remains one of countries where cases of echinococcosis are reported routinely every year. According to Croatian Health Service Yearbook, in the 10-year period between 1997 and 2006 there were 240 cases of echinococcosis in Croatia (yearly range, 15–36). Symptoms of echinococcosis are not specific, with abdominal pain as the most frequent one¹ and sometimes without any symptoms at all. Hydatid cysts can rupture, which is the most severe complication of echinococcosis as it can cause anaphylactic reaction and seeding of secondary cysts². Although not uniformly recommended, the treatment of echinococcosis usually starts with Mebendazole or Albendazole, followed by evacuation of hydatid cyst content³. Traditionally, hydatid cysts were

evacuated by open surgical procedure. Treatment of hydatid liver disease was performed by either removing the entire cyst or unroofing it with evacuation of cyst content. Recently, an increasing number of such operations are performed using laparoscopic approach⁴. In some cases cysts can be drained percutaneously, therefore avoiding operation⁵. Here we present our results in treatment of liver echinococcosis in 5-year period.

Patients and Methods

This study was prospectively conducted in a 5-year period, from 2004–2008. Patients were treated at the Department of Abdominal surgery in University hospital Dubrava, Zagreb, Croatia. Altogether, 25 surgically treated

TABLE 1
DIAGNOSIS OF HYDATID DISEASE

Diagnostic procedures	Performed	Positive	Negative	False Positive	Undefined
Serology (IF and ELISA)	20	18	2	0	0
CT and US	25	22	0	1	2

TABLE 2
NUMBER OF HYDATID CYSTS FOUND

Number of cysts	1	2	3	4
Number of patients	13	6	4	1+1 with 3 cysts in greater omentum

TABLE 3
LOCALIZATION OF CYSTS

Liver segment	IV	VII	II	III	VI	VIII	V
Number of cysts	10	10	9	9	8	5	4

TABLE 4
SIZE OF HYDATID CYSTS

Size of cysts (cm)	<5	5–10	10–20	>20
Number of cysts	10	22	13	1

ted patients were included in this study. Among them there were 14 female and 11 male patients, median age 47 (range 16 – 78 years of age). Clinical examination, specific serological tests, immunofluorescency (IF) and Enzyme-Linked Immunosorbent Assay (ELISA), abdominal ultrasound (US) and computed tomography (CT) were used in order to establish the diagnosis. Serological tests were performed in 20 patients, of which 18 had positive and 2 negative findings. Both US and CT showed positive findings in 22 patients and false positive in 1, while in two cases by using both methods the radiologist could not define whether the cyst was simple or hydatid (Table 1).

One cyst was found in 13 patients, 2 cysts in 6, 3 cysts in 4, and 4 cysts in 1 patient. In one patient a single cyst was found in the liver and 3 cysts in greater omentum (Table 2).

The most common cyst localization was IV and VII liver segment (10 cysts), followed by II and III (both 9 cysts), VI (8 cysts), VIII (5 cysts) and finally V liver segment (4 cysts) (Table 3).

Size of cysts also varied: 10 cysts were less than 5 cm in diameter, 22 cysts were 5–10 cm, 13 cysts were 10–20 cm and one cyst was larger than 20 cm in diameter (Table 4).

In 22 patients echinococcosis was pathohistologically confirmed, while simple liver cysts were found in 3 patients.

Albendazol (Dalben, Krka, Novo Mesto, Slovenia) therapy (800 mg *per os*) was conducted in 20 patients during one month prior to the surgery.

Antibiotic prophylaxis (kefzol 1 g, Carazolin, Eli Lilly, Indianapolis, Indiana, USA) was administered to all patients immediately before surgery. Also, all patients received thromboprophylaxis (enoxaparin 20 or 40 mg, Clexane, Sanofi –Aventis, Paris, France) depending on body weight.

Results

Open surgery was initially performed in 17 patients and laparoscopic in 8. Three of those 8 patients required conversion to open surgery. Open pericystectomy (OP) was performed in 11 patients and laparoscopic pericystectomy (LP) in 3 patients.

Open partial pericystectomy (OPP) according to Papadimitriou⁶ was performed in 9 patients with hydatid cyst and laparoscopic partial pericystectomy (LPP) in 2 patients who were considered to have hydatid cysts preoperatively, but definitive diagnosis of simple cysts was confirmed later by pathologist (Table 5). Both open and laparoscopic surgery was done using LigaSure (Tyco/Healthcare, USA) instrument.

Open surgery

Cholecystectomy had to be performed in 9 cases. Three cases demanded choledochotomy and T tube drainage because of the communication between the cyst and the bile duct. In those 3 patients biliostasis was performed by polyglactin 910 (Vicryl, Ethicon, Sommerville, New Jersey, USA) 2-0 sutures. Endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic pa-

TABLE 5
MODALITY OF TREATMENT

Treatment	Albendazol	Open surgery		Laparoscopy			Conversion
		OP	OPP	Exploration	LP	LPP	
Number of patients	20	11	9	8	3	2 (simple cysts)	3

pillotomy (EPT) with calculus extraction was performed in one patient at the end of conservative therapy, one day before surgery, because of a recurrent hydatid cyst in the left hepatic lobe.

In 13 patients cysts were attached to diaphragm, but diaphragm resection and suturing were required in only one case, because of hydatid cyst invasion through diaphragm into the right thoracic cavity. Furthermore, cysts were attached to stomach in 7 cases, to colon in 2, spleen in 1, but all of them were suitable for removing without resection of the attached organ.

Laparoscopy

Laparoscopic exploration was performed in 8 patients of whom 3 were converted to open surgery.

LP was performed in 3 patients with a single hydatid cyst. Cysts of 4 cm in diameter were located in the IV liver segment, while those of 6 and 7 cm in diameter were located in VII liver segment. In the latter case there were also three cysts sized 2, 3.5 and 2 cm located in greater omentum.

There were also two cases where preoperative ultrasound and CT scan were equivocal and radiologist could not confirm whether the cysts were hydatid or simplex. We treated those cases as hydatid cysts.

In first case laparoscopic exploration revealed cyst of 8 cm in diameter located in II and III liver segments so LPP with evacuation of serous cyst content and drainage were performed.

In the second case, laparoscopic exploration was done and 12 cm diameter cyst was verified in II, III and IV liver segment, so LPP, serous content evacuation and drainage were done.

Conversion to open surgery

In one case, after laparoscopic exploration, the cyst could not be visualized so conversion to open surgery was done and 7 cm diameter hydatid cyst was found in VII liver segment attached to diaphragm. After detachment, PP was done.

Similar, in another patient, after laparoscopic exploration, cyst was not visualized, so conversion was done revealing 12 cm diameter cyst in VII and VIII liver segments penetrating the right diaphragm. The surgical procedure by Papadimitriou was performed, followed by diaphragm suturing and thoracic drainage.

In third case, laparoscopic exploration was performed because of large 18 cm diameter cyst located in II, III, IV and V liver segments. US and CT performed prior to surgery, as well as laparoscopic findings, were indicative of hydatid cyst because of the thick cyst wall. The cyst wall was approximately 5 mm thick, firmly attached to diaphragm and blocked by greater omentum, transverse colon and stomach. Conversion to open procedure was done. After dissection of surrounding structures, simple cyst was verified so PP was performed.

TABLE 6
COMPARISON OF OPEN AND LAPAROSCOPIC SURGERY
CONSIDERING DURATION OF PROCEDURE, HOSPITAL DAYS
AND COMPLICATIONS

	Duration	Hospital days	Complications
Open surgery	130 minutes	10.5	4
Laparoscopic	118 minutes	5.4	0

Average duration of operative procedure for open surgery was 130 minutes (range 70–180 min) and for laparoscopic surgery 118 minutes (range 80–180)

Average duration of hospitalization for open surgery was 10.5 days (7–14 days) and for laparoscopic 5.4 days (range 4–7). Postoperative complications of open surgery included single cases of intraabdominal abscess, pneumonia, pleural effusion and cardiac decompensation. Abscess was treated by ultrasound guided percutaneous drainage and the rest of complications by conservative treatment. There were no complications of laparoscopic procedures (Table 6).

The follow up period ranged from 2 to 6 years.

Discussion

Although chemotherapy, percutaneous therapy or their combination have shown certain success in hydatid cyst treatment, surgery still remains basic principle of treatment, alone or in combination with chemotherapy⁷⁻⁹. Basic principles include the removal of the cyst itself or evacuation of the cyst content without spilling it in the peritoneal cavity, cyst neutralization with scolical agent and obliteration of residual cavity⁹⁻¹⁵. Various procedures have been developed including liver resections, total or partial pericystectomies and unroofing of the cyst with omentoplasty. Procedures such as marsupialisation or simple drainage have been abandoned¹⁶. Radical procedures such as total pericystectomy or liver resection, compared to other methods, provide the best results concerning the recurrence of the disease, but carry a certain operative and postoperative risk for complications^{17, 18}. Percutaneous aspiration-injection-reaspiration (PAIR) and laparoscopic surgery have been introduced lately as minimally invasive procedures^{19,20} with its advantages for the patient, but only laparoscopic surgery can, at the same time, offer radicalism of classic surgery techniques and benefits of minimal invasive procedures, especially in the later stage cysts^{21,22}.

Although it is generally a very rare condition, liver echinococcosis in our country still represents a disease that can be challenging for a surgeon. Our department has large experience considering this disease, both in number of treated patients as well as in treating complicated cases^{23,24}. By obtaining experience in laparoscopic surgery we have also introduced laparoscopy into surgical treatment of liver hydatid disease. In our previous article²⁵ we have shown that it is feasible to treat simple, small cysts located in superficial layers of front liver seg-

ments (II, III, IVb, V and VI). In this paper we have shown that even cysts of diameter greater than 5 cm and location in VII liver segment can be treated by LP, with LPP also being the possibility. Furthermore, complicated forms of the disease with dissemination in greater omentum are also candidates for laparoscopic treatment. In cases of unreliable preoperative diagnosis when ultrasound and CT are unclear, the diagnosis can be achieved using laparoscopic exploration and surgery can be done laparoscopically. Although comparison of results of open and laparoscopic surgery can not be done with statistical significance due to relatively small total number of cases

and different severity of the disease in these two groups of patients, we can see that there are well known advantages of laparoscopic surgery, including less patient trauma, shorter hospitalization, and less complications.

Conclusion

Our experience indicates that in a case of liver hydatid cyst disease, laparoscopic exploration, and if possible, laparoscopic pericystectomy or partial pericystectomy, should be performed in selected patients.

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KIRURŠKO LIJEČENJE EHINOKOZOZE JETRE – OTVORENA ILI LAPAROSKOPSKA KIRURGIJA?

SAŽETAK

Ehinokokoza i dalje predstavlja značajan medicinski problem u endemskim područjima. Najozbiljnija komplikacija ehinokokoze, prsnuće ehinokokne ciste, može uzrokovati diseminaciju ehinokoka u organizmu i anafilaktički šok. Tradicionalno liječenje se sastoji u otvorenoj kirurškoj aspiraciji sadržaja ciste. U zadnje vrijeme, slična operacija se sve češće izvodi laparoskopiskim putem. U ovoj prospektivnoj studiji prikazujemo pacijente operirane na našoj klinici u 5-godišnjem periodu, od 2004. do 2008. godine. Za potvrdu dijagnoze smo koristili serološke testove, ultrazvučni i CT pregled abdomena. Otvorenu operaciju smo izvršili kod 17 bolesnika dok smo laparoskopski pristupili kod 8 bolesnika, od kojih smo kod tri bolesnika morali izvršiti konverziju u otvorenu operaciju. Pericistektomiju smo uspješno izvršili kod 11 bolesnika operiranih otvoreno i kod 3 bolesnika operiranih laparoskopski. Parcijalnu pericistektomiju po Papadimitrou smo izvršili kod 9 bolesnika operiranih otvoreno i kod 2 bolesnika operiranih laparoskopski. Naše iskustvo je da je kod pogodnih bolesnika s ehinokokozom jetre indicirano učiniti laparoskopsku eksploraciju i ako je moguće laparoskopsku pericistektomiju ili parcijalnu pericistektomiju.