

HYDATID DISEASE OF THE LIVER: LAPAROSCOPIC APPROACH, INITIAL RESULTS IN EGYPT

By

AMR ABDELAAL¹ and HANY DABBOUS²

Department Of General Surgery¹ and Department Of Tropical Medicine², Faculty of Medicine, Ain Shams University, Cairo 11566, Egypt

Abstract

This prospective study assessed the laparoscopic approach for treatment of HHC in Ain Shams University Hospitals from January 2010 to April 2012. Laparoscopic partial cystectomy was performed in all patients; no conversion to open technique or anaphylaxis was recorded. The mean operative time was 60 minutes with no perioperative mortality, while postoperative morbidity was recorded in 4 patients (36%). The mean length of hospital stay was 4.5 days. Radiological and serological tests showed no recurrences at a median follow up period of 18 months.

Laparoscopic management of HHC is feasible gaining all the benefits of laparoscopy with no added morbidities or increased risk of recurrence. Careful patient selection is mandatory to achieve successful results.

Key words: Egypt, Hepatic hydatid cyst, Anti-helminthes, Laparoscopic approach

Introduction

Generally speaking, cystic hydatid disease (echinococcosis) is an important zoonotic global disease caused by *Echinococcus granulosus*, a cestode that usually inhabits the intestine of dogs and other canines as a definitive host. Humans are accidental intermediate hosts due to ingestion of the parasitic eggs (Eckert and Deplazes, 2004). The liver is the most common site for the occurrence of the larval form of cystic hydatid disease, the others being lung, brain and other viscera¹.

Although drug treatment has been followed by many failed attempts, today we can witness its revival due to new drugs (mebendazol, albendazole) which completely destroy the univesicular hydatid cyst in 50-80% of the cases after 3 months of treatment. Some authors reported a sterilization rate of 95% (Menezes da Silva, 2003)

New therapeutical methods have been proposed for the management of hepatic hydatid cysts (HHC), such as the minimally invasive percutaneous or laparoscopic approach (Palanivelu *et al*, 2006). Benzimidazoles (albendazole, ABZ; mebendazole, MBZ), given either alone or combined with

praziquantel (PZ) are currently used for the treatment of non-surgical cases and as a supplementary treatment prior and post-surgery. Combined chemotherapy was found to be more effective than either of the agents given alone. ABZ is easily absorbed and more effective than MBZ. ABZ (12-15 mg/kg/day) and MBZ (30-70 mg/kg/day) given for 14-20 days prior to surgery and continued for an additional 3-24 months in a cyclic monthly form were found effective against the disease. Either increased or decreased circulating antigen levels, which consequently cause changes in the humoral (IgG, IgG1, IgG4, IgE) immune responses, have a prognostic value in successfully treated CE cases. However, although the cellular immune response to echinococcal antigens decreased in improved or cured CE patients, it was not considered of practical use in determining treatment efficacy (El On, 2003).

Nevertheless, the treatment of choice remains surgical. Many surgical techniques have been described, some of them are conservative and some are radical. Among the conservative surgical methods, the most frequently used are reduction with or without

drainage of the cyst, partial pericystectomy with drainage. Among the radical ones, there is the ideal cystectomy or visceral resection (El Kady *et al*, 2011).

The surgical treatment was to cure the parasitosis with a minimal visceral scarification and new therapeutical methods have been proposed, such as the minimally invasive percutaneous or laparoscopic approach (Busić *et al*, 2014)

Interventional radiologists and gastroenterologists have used minimal invasive procedures such as PAIR as puncture, aspiration, injection, reaspiration (Fayyaz and Ghani, 2013) and PEVAC (percutaneous evacuation of cyst content)ⁱⁱ for treating hepatic echinococcosis. An array of surgical procedures has been recommended. In recent times, laparoscopic surgery and the use of laparoscopic instruments have been found to be safe and effective in the management of hepatic hydatid disease (Chinnusamy *et al*, 2013).

The aim of the present study was to evaluate hospitalized hydatidosis from January 2010, to April 2012 and the initial laparoscopic approach.

Patients, Materials and Methods

A total of 11 patients with hepatic hydatid disease were treated laparoscopically in the Department of General Surgery, Ain Shams University, Egypt. Two of them had undergone PEVAC 6 months & one week earlier. The disease was diagnosed by ultrasonography (US) and computed tomography (CT) and confirmed by serological examination. Three patients were sero-negative by Indirect Hemagglutination test.

The exclusion criteria for laparoscopic intervention included deeply situated cyst without any subcapsular presentation, the presence of multiple cysts (>3 cysts), or previous upper abdominal surgery. There were 6 women and 5 men. The mean age was 37 years (range, 30-52). Although 8 patients had solitary cysts, 3 patients had multiloculated cysts. The mean cystic diameter was 8.5 cm (range 7-15). All procedures were

performed under general anesthesia. Medical treatment by albendazol was started before surgery to ensure sterilization of the cyst, and antibiotics were administered 30 minutes before the operation. A nasogastric tube was placed, and the urinary bladder was catheterized. Prophylactic administration of corticosteroids 2 hours preoperative and intraoperative was to guard against anaphylaxis.

Four trocars were placed according to cyst location. Following exposure of the cyst by a 30° telescope inserted through the umbilical trocar, a 10 mm trocar was inserted from a point as close as possible to the cyst. From this trocar, 3 gauzes were introduced into the abdominal cavity, placed around the cyst, and soaked with 10% povidone iodine solution as a scolecidal agent.

The cyst was punctured with an aspiration needle. As a precaution, the tip of a 5-mm suction catheter was placed close to the puncture site, and as much cystic fluid as possible was aspirated, so that the endocyst (germinative membrane) detached from the cystic wall and shrank to the bottom of the cyst, followed by intracystic injection of hypertonic Saline 3% for 4-5 min and reaspiration (Fig. 1).

The deflated cystic wall was suspended by 2 graspers, and cystotomy or deroofing was performed. At this stage, an endosac was inserted through the 10-mm trocar, and the germinative membrane was aspirated and the entire membrane was removed. In all cases, the telescope was inserted into the cyst to explore for potential biliary openings and retained daughter cysts. As much cystic fluid as possible was aspirated, followed by intracystic injection of hypertonic Saline 3% for 4-5 min and re-aspiration (Fig. 2).

The cystic cavity was irrigated with 20% hypertonic saline (another scolecidal agent) several times, and deroofing was performed by partial or near-total cystectomy. A drain was placed in the cystic cavity. Gauzes and pieces of the excised cystic wall were placed in an endosac and removed (Fig. 3).

Oral liquid intake was started on the first postoperative day. In the second postoperative day, if no bile leakage was present, the drain was removed and the patient was discharged. 3 courses of albendazole (10 mg/kg per day) were administered postoperatively to all patients for 28 days separated by 2 weeks (Fig. 4).

The patients were followed up by US and IHAT every month during the first 6 months.

Results

Laparoscopic partial cystectomy (deroofing) was performed to all patients while omentoplasty was performed in 5 patients. No conversion to open technique was performed in any of our patients, the anesthesiologists didn't record any case of anaphylaxis even with the minor spillage of the cyst contents in the intraperitoneal cavity (this may be due to the administration of corticosteroids 2 hours preoperative and intraoperative). The mean operative time was 60 minutes (range, 40-120), without perioperative mortality. Postoperative morbidity was recorded in 4 patients 36% (port-site infection in 2 patients, biliary leakage in one patient and infected operative site collection in one case). Biliary leakage was observed in the drainage fluid which was treated conservatively & the leak stopped after 10 days.

Operative site infected collection was observed after discharge of the patient on day 3, she was presented to us with fever, abdominal pain and leucocytosis. Follow up U/S proved the presence of turbid collection which was treated with pig tail insertion and antibiotics.

Two patients were treated in other centers by insertion of pig tail as the serological tests were negative for hydatid. Cytological analysis of the aspirate confirmed the presence of scolices and they were transferred to our unit and were treated laparoscopically. The present aspirates were infected in both cases but we followed the same technique.

The mean length of hospital stay was 4.5 days (range, 3-10 days). The mean follow-

up was 18 months (range 12-27). Radiological and serological test results showed no recurrences.

Nine Patients had solitary cysts; two of them were multiloculated while two patients had 2 cysts. Cysts were located in nearly all liver segments (segment II, segment II&III, segment IVa, segment IVb, or the cysts may involve more than two segments, in one case the cyst involved the whole right lobe segments VI to VIII).

Discussion

Although treatment options for hydatid disease of the liver have increased in the last 2 decades, including medical treatment, percutaneous drainage, or a combination, surgery remains the mainstay of therapy. Use of these other modalities is restricted to certain stages of the disease and is associated with inconsistent results (Goksoy and Duren, 2000)

Open surgical techniques employed include evacuation and simple closure, evacuation with drainage, marsupialization, closed total cystectomy, partial pericystectomy or pericystectomy with capitonnage, partial pericystectomy with cavity management (omentoplasty and internal drainage) and partial hepatectomy (Buttenschoen and Buttenschoen, 2003)

Total pericystectomy seems to be the best operative procedure for small and peripherally located cysts. It has been demonstrated that pericysts contain no scolices. For large and deeply located cysts, the more extensive cystectomy and hepatectomy are accompanied by higher morbidity (Tuxun *et al*, 2014).

Despite a variety of open and minimal invasive techniques available for the treatment of hydatid disease of the liver, one of the main concerns of the treating physician is spillage of cyst contents that can lead to recurrence in various forms and anaphylactic reactions. In the present study, a single procedure uniformly was not applied because hepatic hydatid disease presents in diverse forms, which necessitates appropriate measures for

each case. PAIR is recommended as a primary line of therapy for uncomplicated hepatic echinococcosis (Nasseri *et al*, 2011)

The principle of any surgical procedure for liver hydatid disease is complete evacuation of cyst, prevention of intra-abdominal spillage, detection of major cysto-biliary communications, and sterilization and early obliteration of the residual cavity (Kayaalp, 2002). However, surgical procedures are not without complications and are associated with both morbidity (anaphylaxis, cyst infection, liver or intra-abdominal sepsis, hemorrhage and biliary fistula) and rarely mortality. Over the last decade, laparoscopic management of liver hydatid disease has been carried out the world over with excellent results (Jani, 2014).

While, laparoscopic surgery followed all the principles of open surgery, it was beneficial to the patient in providing reduced postoperative discomfort, shorter recovery time and reduced hospital stay.

An experimental percutaneous technique was first described in 1985 and was performed on the human body for the first time after 6 years (Spichtin, 1985)

Bastid *et al*. (2005) reported 14 cases of hepatic hydatid cyst (HHC) with diameters between 42 and 180 mm that were treated by this method. This treatment is good for the young HHC with thin walls (hydatid cyst type I, II or III after Gharbi classification). The inactivation was done with hypertonic saline 30%. In the absence of biliary fistula, the residual cavity was treated with alcohol mixed with lipiodol. There was no anaphylactic shock, no complications or relapse during the first 18 months. The hospitalization period in this group was 24-72 hours.

Saglam (1996) proposed the laparoscopic technique as a method for treating HHC. In 1996, Bickel *et al*. (1998) reported 10 cases of HHC treated laparoscopically without mortality or relapse.

A total of cases of HHC were solved by laparoscopy with 4 postoperative abscesses and no relapse (Alper *et al*, 1996). Initially,

they included 33 patients for whom a laparoscopic intervention was decided; 11 cases were not indicated for laparoscopy (multiple localizations or relapse after classical treatment) and 22 cases remained to be solved by laparoscopy. Among these, 6 cases were converted because of adhesions or difficult localization.

The laparoscopic method implies the reduction of the cyst with the extraction of proligera, intracystic and sub-hepatic drainage. This procedure has many advantages among which the limitation of the dissection to the cystic dome, avoiding the risk of hemorrhage and of biliary tract or hepatic veins injuries. It is very important to protect the surgical area with scolicedal substances in order to avoid the dissemination in case of leakage of hydatid contents (Sung *et al*, 2014).

Laparoscopy, in comparison with the percutaneous technique, has many advantages, mainly the possibility of controlling the location of the cyst, and of protecting the surgical area from hydatid leaks. It also allows the sterilization of the remaining walls, the detection of possible biliary fistulas, the treatment of biliary complications, and also the treatment of the cystic cavity using the omentum (Sforza *et al*, 2012).

Specialized instruments such as the Palanivelu Hydatid System or the locking umbrella trocar, which have been designed to prevent the spillage of hydatid fluid during laparoscopic surgery, were not available; hence, we used the conventional laparoscopic route (Subramaniam *et al*, 2012)

A major disadvantage of laparoscopy is the lack of precautionary measures concerning spillage, especially under high abdominal pressures induced by pneumoperitoneum. However, Bickel *et al*. (1998) demonstrated that the increase in intracystic pressure was no greater than the increase in intra-abdominal pressure and that the pneumoperitoneum was protective against spillage. The most dangerous step is the initial puncture and aspiration of the cystic fluid, but

precautions taken were not less than in conventional surgery, with gauzes soaked with scolecidal agents surrounding the puncture site and the suction catheter on guard.

Usually, postoperative care is easy, with an average hospitalization of 8-10 days in the published trials. Drainage is the cause of a prolonged postoperative period after laparoscopic intervention. In our series, the average postoperative hospitalization was 4.5 days (range, 3-10 days), prolonged drainage being the major cause of a longer stay.

Moreover, the new scolicedal agents, if administered before and especially after surgical intervention, can prevent recurrences. Albendazole seems to be the most recommended; Gil Grande et al. showed that albendazole (10 mg/kg/b.i.d.) sterilizes the cyst in 72% of cases after the first month of treatment and in 94% after 3 months of treatment (Gil-Grande *et al.*, 1993).

If the hydatid cyst is fit for a minimally invasive surgical approach, drug treatment should be given for 3 months before the surgical intervention. If this is not possible, medical treatment should be applied for at least 2 weeks before surgery and then continued, after surgery, for 3 months. Alper *et al.* (1996) reported that the medical treatment was given 10 days before surgery and continued for 3 months after surgery. No relapse was reported.

Generally speaking, hydatidosis is a real worldwide health problem particularly in sheep raising countries.

In Egypt, hydatidosis was well documented in all governorates in man (El-Sebaie *et al.* 2006; Ibrahim *et al.*, 2007), edible animals (Haridy *et al.*, 2000) and in street dogs (Mazyad *et al.* 2007, El Shazly *et al.* 2007), and even donkeys (Haridy *et al.* 2008).

Conclusion

Laparoscopic management of hydatid cysts of the liver can be performed safely and successfully to obtain all the benefits of laparoscopy with no added morbidities or increased risk of recurrence. Careful patient

selection is mandatory to achieve successful results.

One must keep in mind that infected dogs are asymptomatic and human hydatidosis are typically asymptomatic except a few cases of long standing and heavy infections that may be fatal. So, owners of pet dog, they should be registered, periodically examined and treatment as well as sanitary deposit of the wastes and garbage would be a must.

References

- Alper, A, Emre, A, Acarli, K, Bilge, O, Ozden, I, *et al.*, 1996: Laparoscopic treatment of hepatic hydatid disease. J. Laparoendosc. Surg. 6:29-33
- Bastid, C, Ayela, P, Sahel, J, 2005: Percutaneous treatment of a complex hydatid cyst of the liver under sonographic control: Report of first case. Gastroenterol. Clin. Biol. 29, 2:191-2.
- Bickel, A, Daud, G, Urbach, D, Lefler, E, Barasch, EF, 1998: A laparoscopic approach to hydatid liver cysts: is it logical? physical, experimental and practical aspects. Surg. Endosc. 12:1073-7.
- Bickel, A, Eitan, A, 1995: The use of a large, transparent cannula, with a beveled tip, for safe laparoscopic management of hydatid cysts of liver. Surg. Endosc. 9:304-5.
- Busić, Z, Kolovrat, M, Kopljar, M, Servis, D, Cavka, V, *et al.*, 2014: Laparoscopic surgery for large hydatid liver cyst after two previous laparotomies. Coll. Antropol. 38, 2:577-81.
- Buttenschoen, K, Buttenschoen, CD, 2003: Echinococcus granulosus infection: the challenge of surgical treatment. Langenbecks Arch. Surg. 388, 4:218-30.
- Chinnusamy, P, Ahluwalia, JS, Palanisamy, S, Seshiyer, RP, 2013: Single incision multi-trocar hepatic cyst excision with partial splenectomy. J. Minim. Access Surg. 9, 2:91-4.
- Eckert, J, Deplanes, P, 2004: Bio-logical, epidemiological, and clinical aspects of *Echinococcus*, a zoonosis of increasing concern. Clin. Microbiol. Rev. 17:107-35.
- El Kady, N, Ramzy, I, Hanan, HA, Haleem, A, El-Bahnasawy, MM, 2011: Echoguided pair technique in diagnosis and treatment of abdominal hydatid cystic disease in Egyptian patients: clinical and ultrasonographic follow up. J. Egypt. Soc. Parasitol. 41, 3:527-42.

- El Shazly, AM, Awad, SE, Hegazy, MA, Mohammad, KhA, Morsy, T A, 2007:** Echinococcosis *granulosus*/hydatidosis an endemic zoonotic disease in Egypt. J. Egypt. Soc. Parasitol. 37, 2:609-22.
- El-On J, 2003:** Benzimidazole treatment of cystic echinococcosis. Acta Trop. 85, 2:243-52.
- Gil Grande, LA, Sánchez Ruano, JJ, López San Román, A, García-Hoz, F, Barcena, R, et al, 1993:** Treatment of hepatic and intra-abdominal hydatidosis with mebendazole: prospective comparison of the cyclic and the continuous regimen. Rev. Esp. Enferm. Dig. 84, 6:386-9
- El-Sebaie, SB, El-Sebae, MMA, Esmat, ME, Majid, M, Nasr, MM, Kamel, MM, 2006:** Modified endo-cystectomy versus pericystectomy in *Echinococcus granulosus* liver cysts: a randomized controlled study, and the rule of specific anti-hydatid IgG4 in detection of early recurrence. J. Egypt. Soc. Parasitol. 36, 3:995-1008.
- Fayyaz, A, Ghani, UF, 2013: Successful treatment of hydatid cyst of lesser sac with PAIR therapy. J. Coll. Physicians Surg. Pak. 23, 12:890-2.
- Goksoy, E, Duren, M, 2000:** Operative therapies *Echinococcus granulosus* (cysticus). Chirurgia (Bucur). 71:21-29
- Haridy, FM, Abdel Gawad EA, Ibrahim, BB, Hassan, AA, El-She-rbini, GT, El Shazly, AM, Morsy, TA, 2008:** Zoonotic hydatidosis in donkeys: postmortum examination in the Zoo, Giza, Egypt. J. Egypt. Soc. Parasitol. 38, 1:305-12.
- Haridy, FM, Ibraheim, BB, Morsy, TA, 2000:** Sheep-dog-man: The risk zoonotic cycle in hydatidosis. J. Egypt. Soc. Parasitol. 30, 2:423-9.
- Ibrahim, BB, Haridy, FM, Hegazi, MM, Morsy, TA, 2007:** Human hydatidosis *granulosus* in Greater Cairo, Egypt: With general review. J. Egypt. Soc. Parasitol. 37, 2:681-8.
- Jani, K, 2014:** Spillage-free laparoscopic management of hepatic hydatid disease using the hydatid trocar canula. J. Minim. Access Surg. 10, 3:113-8.
- Kayaalp, C, 2002:** Evacuation of hydatid liver cysts using laparoscopic trocar. World J. Surg. 26, 11:1324-7
- Mazyad, SAM, Mahmoud, LH, Hegazy MM, 2007:** Echinococcosis *granulosus* in stray dogs and Echino-IHAT in the hunters in Cairo, Egypt. J. Egypt. Soc. Parasitol. 37, 2:523-32.
- Menezes da Silva, A, 2003:** Hydatid cyst of the liver-criteria for the selection of appropriate treatment. Acta Trop. 85:237-42
- Nasseri, MS, Abrishami, A, Taefi, A, Malekzadeh, R, 2011:** Percutaneous needle aspiration, injection, and re-aspiration with or without benzimidazole coverage for uncomplicated hepatic hydatid cysts. Cochrane Database Syst. Rev. 19, 1:CD003623.
- Palanivelu, C, Jani, K, Malladi, V, Senthilkumar, R, Rajan, PS, et al, 2006:** Laparoscopic management of hepatic hydatid Disease. JSLS 10:56-62.
- Sağlam, A, 1996:** Laparoscopic treatment of liver hydatid cysts. Surg. Laparosc. Endosc. 6, 1:16-21.
- Sforza, M, Andjelkov, K, Ivanov, D, Marčić, Z, Krstić, S, 2012:** A rare case of benign omentum teratoma. Srp. Arh. Celok. Lek. 140, 5/6:362-4.
- Spichtin, HP, 1985:** Hepatitis non-A, non-B: epidemiologic, clinical, serologic and morphologic aspects. Klin. Wochenschr. 63, 9:389-404.
- Subramaniam, B, Abrol, N, Kumar, R, 2013:** Laparoscopic Palanivelu-hydatid-system aided management of retrovesical hydatid cyst. Indian J. Urol. 29, 1:59-60.
- Sung, NS, Choi, IS, Moon, JI, Ra, YM, Lee, SE, et al, 2014:** Four-channel single incision laparoscopic cholecystectomy using a snake retractor: comparison between 3- and 4-channel SILC 4-channel single incision cholecystectomy. Ann. Surg. Treat. Res. 87, 2:81-6
- Tuxun, T, Zhang, JH, Zhao, JM, Tai, QW, Abudurexti, M, et al, 2014:** World review of laparoscopic treatment of liver cystic echinococcosis--914 patients. Int. J. Infect. Dis. 24:43-5

Explanation of figures

Fig. 1: Preoperative CT showing hepatic cyst 6X7 cm in anterior part of the right lobe with thin wall showing slight dense contrast and no enhancement in all phases.

Fig.2: Cyst punctured with an aspiration needle.

Fig.3: Germinative membrane was removed and collected in an endosac to avoid spillage.

Fig. 4: Cystic cavity is deroofed and irrigated with hypertonic saline.

