

Laparoscopic Treatment of Hepatic Hydatid Disease

Alaa Bakir Raheem

Department of General Surgery, Hilla Teaching General Hospital, Babylon, Iraq

Abstract

The rapid development of laparoscopic techniques revolutionized the optimum surgical intervention in *Echinococcus granulosus* disease. The procedure was shown to be feasible and safe, offering the advantages of laparoscopic surgery. Since the first report on the long-term follow-up of this operation in a large group of patients.¹

Background: Echinococcal disease is still a serious health problem in certain parts of the world.

In the human being the liver is the most frequent organ affected. The natural history of liver hydatidosis in humans till now is poorly understood and Different morphological appearances was observed.²

Over recent decades, various reports have been published comparing standard surgical and more conservative modalities for the treatment of the disease. Although Hand-assisted laparoscopic surgery (HALS) has been proposed as a useful alternative to conventional open or laparoscopic surgery and seems to be a promising technique in laparoscopic treatment of hydatid cyst which has been applied with success as well as with a wide range of digestive tract-related surgical procedures.³ Gasless laparoscopy also had been introduced in the treatment of liver hydrated and has the advantage of permitting the use of conventional instruments during minimally invasive procedures with a promising results. With many advantages regarding technique.⁴

Keywords: Laparoscopic management of liver hydatid cysts, *Echinococcus granulosus*.

Aims and objectives: Many review articles was written all over the worlds regarding precautions, accessibility, operative risks, remote satisfaction in operative results and duration of free disease following prolonged regular follow-up.

The aims of this study was to compare the effectiveness and safety of laparoscopic intervention and conventional open surgery that practiced decades of years ago and regarded as standard modality treatment of hepatic *Echinococcus granulosus* disease. The following parameters were evaluated for both laparoscopic and open procedures modalities.

Methods of patients selection, operative technique, operating time, intraoperative and postoperative complications, postoperative pain and amount of pain killers. Time until resumption of diet, post-operative morbidity, hospital stay, cost effectiveness, and quality of life analyses.

Material and methods: A literature search was performed using Medline and the search engine Google, Springer link and Highwire press. The following search terms used: laparoscopic management of liver hydatid cysts *Echinococcus granulosus*. There were over thousand of literatures and papers published discussing this subject. Most recent (2000-

2008) and universally widely accepted and recognized was selected. The selected papers were screened for further references. criteria for selection of literatures were the number of cases (more than 50 cases). Methods of analyses whether statistical or nonoperative procedures only universally accepted chosen and the institution where the study was done in specialized institutions for laparoscopic surgery.

During this study we observed that patient response to surgical trauma, hospital hostility, rapid turn over of hospital beds, cost effectiveness, less morbidity, no mortality, early resuming normal usual activity, minimal postoperative complication, reduced operative time, early recovery from general anesthesia, decreasing risk of surgery, access to certain locations difficult to be approached in open surgery all these parameters are better in minimally access surgery than in open conventional surgery.

INTRODUCTION

Hydatid cyst is zoonotic disease with a worldwide distribution and is endemic in many cattle-raising regions of the Mediterranean, middle and far east, South America, Australia, and in certain areas in North America.⁵ Most cases are caused by the cestode tapeworm *Echinococcus granulosus* that is found in the small bowel of carnivores.^{6,7} In this disease the human is intermediate host. The parasite exists only in its larval form, other species *Echinococcus multilocularis* is rare occurrence and not include in the study .

Complications include cyst rupture with intraperitoneal dissemination of disease, anaphylactic reaction, pressure on contiguous organs, secondary infection, and intrabiliary tree rupture of cyst causing obstructive jaundice.^{6,8} The old standard approach in the treatment of liver cysts is open surgery; the principles and various techniques have been extensively reviewed,^{6,9,10} whoever laparoscopic surgical techniques to treat hydatid cysts of the liver have been gradually introduced.^{11,12} Although reported to be successful, the series are still in going, no one of the both methods has been reported to be out of risk from above mentioned complications.

In the last decade laparoscopic treatment of hepatic hydatid disease has been increasingly popular and has undergone a revolution parallel to the progress in laparoscopic surgery. There are encouraging preliminary results; however, there have been limited reports concerning long-term results of this technique.¹³

There were many modalities and suggestions in the treatment and management of liver hydatid disease (scollicidal injection and controlled rupturing, reaspiration of cyst). PAIR (injection with scollicidal and percutaneous reaspiration under ultrasound guide) but controlled rupturing injection. Reaspiration remain the option of choice whether it is open or laparoscopic safely performed.

The open conservative surgical approach is the most accepted approach for recurrent giant cysts and on the same principles, the laparoscopic approach developed which based on the creation of an isolated hypobaric system, through which the cysts can be managed without spillage of their content⁵ there were many studies was done to evaluate and combines the effectiveness of open surgery with the advantages of the laparoscopic approach with different techniques and theoretically solving the problems of access and preventing spillage of cyst content following controlled rupturing of cyst to get rid from acute setting of anaphylaxis during cyst control rupturing laparoscopically if spillage occur. As well as in open, surgery these studies was done in a specialized institutions for laparoscopic surgery.

CONTENT

Treatment of liver hydatid disease via laparoscopic approach, based on the creation of an isolated hypobaric system, the initial attempts at 1994¹⁶ then the first report of laparoscopic treatment of hydrated cyst of the liver was published in 1994¹⁷ and was followed soon thereafter by the first report of anaphylactic shock complicating laparoscopic treatment of hydatid cysts of liver.¹⁷ In fact, an exaggerated fear of anaphylaxis seemed to discourage surgeons from more widely adopting minimal access techniques for the treatment of hydatid cysts.^{16,18} However, gradually reports started appearing in the world literature detailing laparoscopic management of liver hydatid disease through which the cysts can be managed without spillage of their content^{14,15} the technique combines the effectiveness of open surgery with the advantages of the laparoscopic approach. The chosen patients with no selection criteria underwent consecutive laparoscopic operations for symptomatic liver hydatid cyst.

METHOD OF INTERVENTIONS

The main surgical maneuvers are: (injection, control rupture reaspiration) were performed through an assembled transparent cannula, in which a vacuum was created, while its tip adhered firmly to the cyst wall. Following evacuation of the cyst contents and deal with the procedure of the drainage accordingly.⁵ In one study the procedures performed urgently in nearly halves of the patients and in more than half of the patients the procedure done on an elective basis.

All patients were treated with albendazole (400 mg twice a day, or 12 mg/kg when weight was < 60 kg) prior to operation

(1-4 weeks), as well as postoperative and with preoperative antibiotics (usually third-generation cephalosporins). *While in other study* after the cysts were identified. Three to four trocars were required for each operation according to cyst (cysts) locations. A long, 10/12 mm trocar was Introduced from a point as close as possible to the cyst, and two long strip of gauze soaked with hypertonic sodium chloride solution as a scolecidal agent were placed around the cyst. The cyst was then punctured with a 14 gauge 120 mm needle and the cyst content was rapidly aspirated. At that moment, an additional aspirator tip was placed close to the puncture point to avoid spillage of cyst contents. The cyst cavity was then nearly filled with hypertonic sodium chloride solution for irrigation, which was left in the cavity for 5-10 minutes. In the next step, the cyst wall was opened and the endocyst was evacuated into a specimen-retrieval bag with careful observation of the separation from pericyst. The cystic cavity was reirrigated with hypertonic saline and the telescope was introduced into the cavity to explore for potential biliary openings and retained daughter cysts. The procedure was completed with partial un roofing, and closed-suction drains were placed into the cysts with subhepatic or perihepatic drains.¹⁹

While Martin Ertem et al did other procedure of attaching the cyst is little difference in this study¹³ they introduce 3 gauzes into the abdominal cavity, placed around the cyst, and soaked with 10% povidone iodine solution as a scolecidal agent. The cyst was punctured with a 14 gauge 6F aspiration needle. As a precaution, the tip of a 5 mm suction catheter was placed close to the puncture site, and as much as cystic fluid as possible was aspirated, so that when the endocyst (germinative membrane) detached from the cystic wall and shrank to the bottom of the cyst when. The deflated cystic wall was suspended by 2 graspers, and cystotomy was performed. At this stage, the 11 mm trocar was exchanged for an 18 mm one. A transparent tube with a 15 mm internal diameter was inserted through the 18 mm trocar, and the germinative membrane was aspirated. A hose of the same diameter was connected to the transparent tube, 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. The cystic cavity then irrigated with 20% hypertonic saline, and unroofing 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 endo sac and removed.

Albendazole (10 mg/kg per day) was administered postoperatively to all patients.

Follow-up by US every 3 months during the first year, then by US and CT every 6 months during the second year. The result of this study although have little drawback but encouraging regarding hospital stay time consume early return to work resume normal activity dealing with other pathology remote from operative site like in this study surgical procedures for

inguinal hernia repair (trans-abdominal preperitoneal polypropylene mesh plasty)¹³ was done in to one patient simultaneously and this also an advantages to laparoscopic intervention.

While Palanivelu et al in india he advocate the 2 way canula for the treatment of liver hydrated cystes laparoscopically.

Palanivelu Hydatid System (PHS)

The PHS consists of a trocar and cannula along with 5 and 3 mm reducers. The trocar is 29 cm long. It is hollow throughout its length to accommodate a suction cannula (Fig. 1). Its tip is pyramidal shaped, with each facet of the pyramid bearing a fenestration to enable any fluid leaking on its insertion to be sucked into its hollow body by the cannula placed within. The cannula is 26 cm long, with an inner diameter of 12 mm. It has two side channels—one for gas insufflation and another for suction. The suction channel has an inner diameter of 10 mm. Its outer nozzle is designed so that the suction tube has an airtight fit on it.

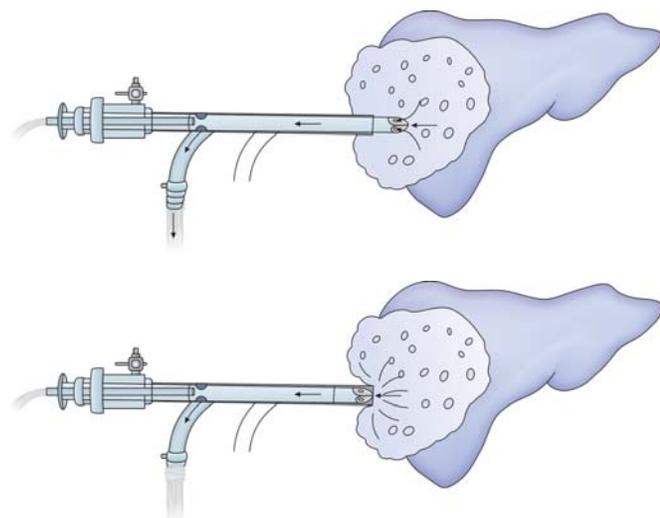


Fig. 1: Special trocar used for hydatid cyst surgery

TECHNIQUE

After introducing the camera port through the umbilicus following creation of pneumoperitoneum, the hydatid cyst is identified on the surface of the liver. Then, the PHS trocar with cannula is introduced into the peritoneal cavity directly over the hydatid cyst. Once inside the peritoneal cavity, the trocar is removed and the cannula alone is advanced until its tip is in total contact with the hydatid cyst surface. Suction is applied through the side channel to maintain contact between the cyst and the cannula opening. Continuous suction creates a vacuum seal between the cyst wall and the rim of the cannula opening and prevents any spillage. Thereafter, the trocar with a 5 mm suction nozzle inside (connected to another suction machine)

is introduced into the cannula and, by steady pressure, is pushed into the cyst along with the cannula. Any fluid spillage on puncture of the cyst wall is immediately suctioned either into the body of the hollow trocar through its fenestrated tip and then into the suction cannula or into the outer cannula and then into the suction side channel. Once the PHS enters the hydatid cyst, the trocar is removed and the cavity is irrigated through the main channel while simultaneously maintaining continuous suction. In this way, fragments of laminated membrane, daughter cysts and debris are easily removed. Once the returning fluid is clear, CO₂ is insufflated at low pressure (3-4 mm Hg) and another telescope is introduced into the cavity through the cannula to visualize the interior for any overt cyst-biliary communication. In the absence of overt cyst-biliary communication (verified by the absence of bile staining in the suctioned fluid and nonvisualization of the opening within the cyst cavity), 0.5% cetrimide is instilled into the cyst cavity as a scolicalid agent. Separate telescopes should be used for intra peritoneal and intracystic visualization to minimize the risk of anaphylactic shock. After 10 minutes, the scolicalid agent is suctioned and the cyst is marsupial zed. The minor biliary leaks that are seen near the cyst wall are sutured by laparoscopic extracorporeal suturing with 3-0 vicryle. All patients were treated with albendazole 10 mg/kg/day for at least 2 weeks pre-operatively and continued postoperatively for 4 weeks patients follow-up by US which was repeated at shorter intervals. CT scan was performed if indicated in the follow-up period.

Resultes of *palanivelu hydatid system (PHS)study*: In 83.3% of patients, only evacuation of the hydatid cyst by the PHS was done. In 13.7%, this was followed by left lobectomy because the cysts were surge almost the entire left lobe of the liver. The remnant cavity was dealt with by omento plasty. The average follow-up period was 5.9 years, during which there were no recurrences. PHS is successful in preventing spillage,

The average duration of surgery was 52 minutes. None of the patients in this study had intraoperative anaphylactic shock which is the major concern. Postoperatively, two patients (2.7%) had infection, whereas nine patients (12%) had a minor biliary leak that stopped draining by 5-7 days. Out of the 75 patients, regular follow-up was maintained for 59 patients, with an average follow-up period of 5.9 years. To date, there have been no recurrences.¹⁶

In other study by Alexandra K Tsaroucha et al and Alexandros C. Polychronidis,²⁰ (in North-Eastern Greece) over the last 20 years. In the period from 1984 to 2003.²⁰ Same encouraging result they obtained to their patients.

STATISTICAL ANALYSIS

Most statistical analysis used standard method of statistical evaluation of the data performed using the Fisher exact test and Goodman and Kruskal test. Results are expressed as median \pm SD. Differences were considered significant at $P < .05$.

OUTCOME AND FOLLOW-UP

Patient follow-up in the convalescence stage were evaluated in the outpatient clinic evaluation included physical examination, abdominal sonography and liver function tests. Abdominal X-Ray, sinogram for the residual persisting cavity if necessary. Postoperative ERCP was not necessary in every patient.

CONVERSION TO OPEN LAPAROTOMY

Conversion to open laparotomy was performed in a very few number of patient who had 2 large hydatid cysts and abnormal liver function tests¹⁶ in the most of the mentioned studies.

COMPLICATIONS

Bile peritonitis occurred for large cysts can be treated conservatively. This complication can be treated by laparoscopy (lavage and pericystic drainage) or by laparotomy anaphylactic reaction which might occur when the assembling of the transparent cannula over a relatively protruding cyst is triad if this thin membrane of the cyst ruptured, whoever this complication can be successfully treated with fluids, ephedrine, and dopamine and the postoperative convalescence was uneventful. In most of patients reported in most of the series.^{13,16}

Atelectasis, pneumonia, and drug-induced fever as equal as open surgery.

DISCUSSION

Although hydatid disease is an endemic disease, physicians and surgeons worldwide may encounter the disease sporadically because of increased travel and migration.¹⁶ Hence, doctors everywhere should be aware of the diagnosis and the therapeutic options available for the management of hydatid disease surgery remains the mainstay of treatment for hepatic echinococcosis. With many surgical options regarding dealing with cyst but in this article we review those who approached the cyst with (controlled rupturing and reaspiration drainage). The first report of laparoscopic treatment of hydrated cyst of the liver was published in 1994¹⁶ and was followed soon after by the first report of anaphylactic shock complicating laparoscopic treatment of hydrated cysts of liver.^{15,18}

Laparoscopy in hydatid liver disease has gained a lot of attention all over the world however the role of laparoscopy in abdominal surgery including any liver pathology such as segmental resection and transplant liver donations in going development and succeed. While in hydatid remain controversial several controlled trails have being done some of them prefer laparoscopy while other not. The aim of this review was to identify which method is superior and better and if so what are the benefits and who it could be instituted more widely.

There is also diversity in the quality of the randomized controlled trails. The main variable in these trails are the following parameters:

Number of patient in the trail with drawl of cases studied in open is more study available due to the task of laparoscopy is early practiced in that the first trail of laparoscopic drainage of liver hydatid disease was done at 1994^{16,17,19,20} regarding exclusion of cases done according to the local surgical practice and laws that govern the selection of patients for safe end result. Blinding also was taken in full consideration intention to treat analysis was gained a lot of time to predict a lower and highest *p* value in the studies. Publication biases was taken the highest respective publications and most authorized all over the world. Taken in to consideration the local practice variations in areas where these studies done.²¹

CONCLUSION

Minimally access surgery invade the field of liver hydatid disease and deliver excellence result in properly selected patients in certain center of laparoscopy surgery and appeared to be promising in this field of newly generated surgical practice which is safe and effective method in selected patients. Further studies should be encouraged in this field because there is no universally accepted standard technique all over the world.

REFERENCES

1. Khoury G, Abiad F, Geagea T, Nabout G, Jabbour S. Laparoscopic treatment of hydatid cysts of the liver and spleen. Division of General Surgery, American University of Beirut Medical Center, Post Office Box 113-6044, Beirut, Lebanon.
2. Controversies in the laparoscopic treatment of hepatic hydatid disease HPB (Oxford). Department of Surgery, Istanbul Medical Faculty, Istanbul University, Istanbul, Turkey 2004;6(4):213-21.
3. Eduardo M, Targarona, Ester Gracia, Manuel Rodriguez, Gemma Cerdán, Carmen Balagué, Jordi Garriga, Manuel Trias, Hand-Assisted Laparoscopic Surgery. Arch Surg 2003;138:133-41.
4. Berberoglu M, Taner S, Dilek ON, Dilek A, Demir S. Gasless vs gaseous laparoscopy in the treatment of hepatic hydatid disease.
5. Amitai Bickel, Norman Loberant, Jonathan Singer-Jordan, Moshe Goldfeld, George Daud, Arie Eitan. The Laparoscopic Approach to Abdominal Hydatid Cysts A Prospective Nonselective Study Using the Isolated Hypobaric Technique. Arch Surg 2001;136:789-95.
6. Milicevic M. Hydatid disease. In: Blumgart LH, ed. Surgery of the Liver and Biliary Tract. London, England: Churchill Livingstone 1994:1121-50.
7. Langer JC, Rose DB, Keystone JS, Taylor BR, Langer B. Diagnosis and management of hydatid disease of the liver: A 15-year North American experience. Ann Surg 1984;199:412-17.

8. Lewis JW, Koss N, Kerstein MD. A review of echinococcal disease. *Ann Surg* 1975;181:390-96.
9. Doty JE, Tompkins RK. Management of cystic disease of the liver. *Surg Clin North Am* 1989;69:285-95.
10. Wu X, Tan JZ, Yang JH, Shi TH, Zhou SN. Open method versus capsulorrhaphy without drainage in the treatment of children with hepatic hydatid disease. *Br J Surg* 1992;79:1184-86.
11. Katkhouda N, Fabiani P, Benizri E, Mouiel J. Laser resection of a liver hydatid cyst under videolaparoscopy. *Br J Surg* 1992;79: 560-61.
12. Berberoglu M, Taner S, Dilek ON, Demir A, Sari S. Gasless vs laparoscopy in the treatment of hepatic hydatid disease. *Surg Endosc* 1999;13:1195-98.
13. Metin Ertem, Tayfun Karahasanoglu, Nihat Yavuz, Sabri Erguney. Laparoscopically Treated Liver Hydatid Cysts. *Arch Surg* 2002;137:1170-73.
14. Bickel A, Loberant N, Shtamler B. Laparoscopic treatment of hydatid cyst of the liver: Initial experience with a small series of patients. *J Laparoendosc Surg* 1994;4:127-33.
15. Bickel A, Eitan A. The use of a large, transparent cannula with a beveled tip, for safe laparoscopic management of hydatid cysts of liver. *Surg Endosc* 1995;9:1304-05.
16. Palanivelu hydatid system for safe and efficacious laparoscopic management of hepatic hydatid disease.
17. Khoury G, Jabbour-Khoury S, Soueidi A, Nabbout G, Baraka A. Anaphylactic shock complicating laparoscopic treatment of hydatid cysts of the liver. *Surg Endosc* 1998;12: 452-54.
18. Yaghan R, Heis H, Bani-Hani K, Matalka I, Shatanawi N, Gharaibeh K, Bani-Hani A (2004) Is fear of anaphylactic shock discouraging surgeons from more widely adopting percutaneous and laparoscopic techniques in the treatment of liver hydatid cyst? *Am J Surg* 187:533-37.
19. Gokhan Yagci, Bahri Ustunsoz, Nihat Kaymakcioglu. Results of Surgical, Laparoscopic, and Percutaneous Treatment for Hydatid Disease of the Liver: 10 Years Experience with 355 Patients.
20. Alexandra Tsaroucha K, Alexandros C Polychronidis. Hydatid Disease of the Abdomen and Other Locations.
21. Laparoscopically Treated Liver Hydatid Cysts Metin Ertem, Tayfun Karahasanoglu, Nihat Yavuz, Sabri Erguney.