

## Laparoscopic management of hepatic hydatid disease, what makes it safe and effective?

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### Abstract

**Objective:** To determine factors that increases the effectiveness and safety of laparoscopic surgery for the management of hepatic hydatid cyst. **Design:** A prospective study. **Setting:** Department of surgery at Aljamhori Teaching Hospital in Mosul, during the period from June - 1- 2009, to June – 1- 2012. **Participants:** Forty-eight patients who met our criteria for laparoscopic surgery were selected from 80 patients complained of liver hydatid cyst. **Main Outcome Measures:** The diagnosis was settled by ultrasonic evaluation and CT scan, the exclusion criteria was as follows: Deep intra-parenchymal cysts, posteriorly situated cyst ( segment 7), More than 2 cysts, cysts with calcified wall, other intra abdominal organ involvement by hydatid cyst, recurrent hydatid cyst in the liver, previous upper abdominal surgery and patient refusal. Exposure of the cyst done 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 where a high negative pressure suction tube introduced. The cyst was punctured with a 14-gauge 6F aspiration needle surmounted by second suction device inserted through 5 mm trocar. 100mg Hydrocortisone was given to the patient at time of aspiration, the 10mm canulla introduced inside the cavity were the germinal layers sucked completely. At time of penetration and during suction, the flow rate of CO<sub>2</sub> increased to maximum L /M and the intra abdominal pressure decreased to 12 mmhg. Intracystic visualization was performed by the camera, the cavity washed by isotonic saline, omentoplasty done after deroofing of the cyst, tube drain at the vicinity of the cyst was put. **Results:** There were 29 male and 19 female patients, their age varied from 14 to 58 years. The study included 42 patients with solitary cyst and 6 patients with 2 cysts in their liver. The size of the cyst according to ultrasonic measures were varied from 6 to 12cm, 34 cysts were in the right lobe and 20 cysts were in left lobe. The mean operative time was 52 minutes. There was no intra operative complication. All patients had uneventful recovery from anesthesia. Cavity infection occurred in 1 patient, bile leakage was observed in 2 patients. The mean length of hospital stay was 2 days. No reported recurrences in any patients during 12 months follow up period. No conversion was needed, no mortality was recorded. **Conclusion:** Laparoscopic surgery for hepatic hydatid cyst is a safe and effective method when there is selection, with the use of special maneuvers to decrease spillage and recurrence. Further studies should be encouraged in this field because there is no universally accepted standard technique.

**Keywords:** Hepatic hydatid cyst. Laparoscopic treatment for hydatid cyst.

## Introduction

Two thousand years ago, Hippocrates described hydatid disease of the liver as the liver full of water -1- Tyson in 1687 suggested the parasitic nature of the disease-1-. The details of its clinical aspect, however, only became clear at the twentieth century.

Hydatidosis is an endemic parasitic disease in Mediterranean countries, North Africa, Turkey, the Middle East, Australia, New Zealand, South America, Baltic areas, the Philippines, Northern China, and the Indian subcontinent-2-. The liver, still the most common site of occurrence of hydatid cysts in humans through all old and recent literatures which is about 50% to 93% of cases -3-4-.

The rationale for elective treatment of a hydatid cyst of the liver is based on the possibility that it may grow and cause symptoms and complications such as infection, jaundice, cholangitis from a biliary communication, rupture and anaphylaxis -5-. Studies have failed to show any correlation between the presence of symptoms and the stage of disease, or size of the cyst, that is why management for all patient with liver hydatid cyst is recommended even if it is asymptomatic-6-7-.

The choice of the best management of hydatid cyst of the liver is very difficult because of variable clinical and pathological aspects. The treatment should be individualized to the morphology, size, number and location of the cysts, that is why a variety of surgical operations have been advocated from complete resection like total pericystectomy or partial hepatectomy to laparoscopy to a minimally invasive procedures like percutaneous aspiration of cysts to conservative drug therapy-8-. The first report of laparoscopic treatment of hydatid cyst of the liver was published in 1994-9-. Since that time, laparoscopic treatment of hepatic hydatid disease become increasingly popular and has undergone a revolution parallel to the progress of other laparoscopic surgery-10-. However, fear of anaphylactic shock resulting from spillage of hydatid fluid during treatment by the laparoscopic method may be discouraging a wider adoption of this technique-11-. Even so, gradually reports started appearing in the world literature detailing laparoscopic management of liver hydatid disease-12-. As is the case for traditional operations, laparoscopic hydatid surgery follows the basic surgical principles of treating hydatid cysts of the liver that is evacuation of the live cyst content, prevention of spillage, washing or sterilization of the cavity with scolicidal agents and management

of the residual cavity. In general, the laparoscopic approach proved to be suitable surgical technique to achieve these aims, but there are certain technical problems to overcome-11-. It certainly eliminates the disadvantages of a surgical incision and shortens the hospital stay markedly, but it needs certain equipment, experience and facilities-11-12-13-.

This study presents our experience, with special criteria for selection and modified techniques for laparoscopic treatment of hepatic hydatid disease.

## Patients and methods

From June, 1, 2009, to June, 1, 2012, 48 patients with hepatic hydatid disease were treated laparoscopically in the Department of General Surgery at Aljamhori Teaching Hospital in Mosul city. They were selected from 80 patients with hepatic hydatid disease according to certain criteria. The operations were taken by a team work composed of the three authors. The disease was diagnosed by ultrasonography (US) and computed tomography (CT) or magnetic resonance imaging (MRI) and confirmed by operative finding. Our exclusion criteria for laparoscopic intervention included: Deep intraparenchymal cyst. Posterior cyst (segment 7). More than 2 cysts. Cyst with calcified wall. Involvement of other intra-abdominal organ by hydatid cyst. Recurrent hydatid cyst in the liver. Previous upper abdominal surgery. Patient refusal. All procedures were performed under general anesthesia in supine position with endotracheal intubation. Antibiotics in form of IV cefotriaxon 1000 mg were administered at operation and another injection after 24 hour. A nasogastric tube was placed, if needed. Three trocars were placed according to cyst location. Following exposure of the cyst by a 30° telescope inserted through the 10mm umbilical trocar (T1), CO<sub>2</sub> pressure maintained at 15mmh, a 10mm trocar (T2) was inserted from a point as close as possible to the top of the cyst, third 5 mm trocar (T3) introduced at the midline according to the position of the cyst. The intra abdominal pressure now decreased to 12mmgh, the insufflations flow of CO<sub>2</sub> increased to maximum L/M to prevent loss of intra abdominal pressure and to prevent spillage of the fluid from the cyst. The cyst was punctured with a 14-gauge 6F aspiration needle introduced from (T2) with reducer and as much cystic fluid as possible was aspirated, another sucker was activated through (T3) and put near the site of the puncture to prevent spillage, so that the endocyst (germinative

## Laparoscopic management of hepatic hydatid disease, what makes it safe and effective?

membrane) detached from the cystic wall and shrank to the bottom of the cyst. A 10 mm sucker with negative pressure of (-100kp) power was introduced through (T2) inside the cyst and activated, the deflated cystic wall was suspended by a grasper inserted through (T3) to aid complete aspiration. At this stage, the germinative membrane was aspirated with or without grinding, in cases of thick wall cyst a nylon basket was used for retrieving it. In all cases, the telescope was inserted into the cyst cavity to explore for potential biliary openings or retained daughter cysts after deroofting of the cyst by harmonic knife or electrocautery. The cystic cavity was irrigated with isotonic saline several times. Omentoplasty was used to fill the cavity, a tube drain was placed near the cyst cavity, the abdomen deflated and the wounds closed in the usual manner. Oral liquid intake was started within 8 hours postoperatively; the drains were removed according to the need. A 3 month course of albendazole (10 mg/kg per day) was administered postoperatively to all patients. The patients were followed up by US after 3, 6 and 12 months post operatively.

### Results

There were 48 patients selected from a total of 80 patients complaining of hepatic hydatid cyst according to our exclusion criteria, there were 29 male (60%) and 19 female patients (40%), their age varied from 14 to 58 years with a mean of 30 years. Forty three patients (89.5%) were from rural area and had positive history of contact with dogs and sheep, while 5 patients (10.5%) were from Mosul city and gave no history of direct contact with domestic animals. The study included 42 patients (87.5%) with solitary cyst and 6 patients (12.5%) with 2 cysts in their liver. the size of the cyst according to ultrasonic measures were varied from 6 to 12 cm, 34 cyst were in the right lobe (63%) and 20 cysts (37%) were in left lobe.

The presentation of patients was as follows: Thirty patients (62, 5%) presented as abdominal pain at right hypochondria. Twelve patients (25%) diagnosed by ultrasound accidentally. Six patients (12.5%) presented with painless mass at right hypochondria.

The mean operative time was 52 minutes from skin to skin (range, 25-70 minutes). There was no intra operative complication. All patients had uneventful recovery from anesthesia. No conversion was needed, no mortality was recorded. Cavity infection occurred in 1 patient (2%), bile

leakage was observed on the second postoperative day in 2 patients (4%) (Leak of bile through the drainage tube more than 300ml/day), which were managed conservatively.

The mean length of hospital stay was 2 days (range, 1-4 days). The follow-up of patients was for 12 months by ultrasonic examination each three months. Ultrasonic tests results showed no recurrences in any patients during this period.

### Discussion

The treatment of choice for hydatid disease of the liver is still not settled, especially in the last 2 decades, because of increase researches about success of medical treatment, and the use of percutaneous drainage, or a combination, but, surgery remains the mainstay of therapy in most condition because of high rate of success, furthermore, the use of other modalities is restricted to certain stages of the disease and is associated with inconsistent results-14-15-. The revolution of laparoscopy extended to involve the management of liver hydatid cyst but with certain precaution-11-. The aims of surgery in general are: adequate evacuation of the cyst content, prevention of spillage, sterilization of the cavity with scolicedal agents and management of the residual cavity. In order to achieve these aims and to overcome these precautions by laparoscopic approach, certain technical procedures and special equipments and various instruments were manufactured. On the other hand, not all liver hydatid cysts is suitable for laparoscopic surgery, In particular, intraparenchymal cyst, which do not reach the surface of the liver, is difficult to localize and manage laparoscopically as well as posteriorly situated one. Multiplicity is to be considered while planning laparoscopic treatment-13-. Cysts with calcified wall may cause cavity-related problems after surgery. These problems can be solved with the use of more advanced laparoscopic techniques such as partial cystectomy or pericystectomy, which in return, may increase morbidity-13-15-. Patients with recurrent disease may not be suitable candidates for laparoscopic surgery due to the possibility of dense intra-abdominal adhesions, as well as cysts with preoperatively recognized biliary communications or rupture within the biliary passages may need exploration of common bile duct-16-17-. In our series we used an exclusion criteria (although it may appear restricted) that allowed us to select the most appropriate patients for safe laparoscopic management for liver

## Laparoscopic management of hepatic hydatid disease, what makes it safe and effective?

hydatid cyst and we faced no intra operative complication, with very limited complication post operatively and no recurrence in 12 months post operatively.

Regarding the evacuation of the cyst, various instruments have been described; Bickel et al -16- initially advocated the use of a large transparent beveled cannula. Later on, they modified the technique by creating a continuous vacuum inside the cannula while its tip was firmly adhered to the cyst wall -17-. Saglam -18- described a perforator-grinder-aspirator apparatus designed for the evacuation of hydatid cysts. A similar aspirator-grinder apparatus was described by Alper et al-19-. Kayaalp-20- directly inserted a laparoscopic trocar into the hydatid cyst but reported greater success for anterior and unilocular cysts than for posterior and multi-locular cysts. Al-Shareef et al-21- used a liposuction cannula to evacuate hydatid cysts. Zengin et al -22- used another perforator and aspirator called the “per-fore-aspirator. We have not had any experience with the devices advocated by other authors. In contrary, we believe that decreasing the intra peritoneal pressure with increasing the flow rate are beneficial to avoid possible spillage. It is true that the classical surgical aspirators are usually blocked by daughter cysts and germinal membrane, but the use of a wide bore tube and a high negative pressure at minus 100 kp can overcome this problem-18- 23- 24-. Palanivelu planned a recent technique, the so-called PHS (Palanivelu Hydatid System), which consists of a complex system of fenestrated trocar and cannulae through which it's reduced at least the peritoneal spillage-25-. Of course the use of multiple suckers with high suction ability and a wide caliber facilitate the adequate and rapid aspiration and even aspiration of the germinal layer and this was our policy in the management of our patients taking in consideration that the increase of flow rate of CO<sub>2</sub> well prevents the collapse of abdomen during suction. Vision over the operative field can be mentioned by the use of 30 degree camera to overcome loss or blocked field by instruments, there is no need to change the position of the table during the operation as we adapted in our series. A classical and popular method for prevention of recurrence is to insert a needle into the cyst, for aspiration of the cyst fluid and to replace the same volume with a scolicidal agent -26-. Karaođlanođlu M et al -27- in their experimental study showed that the integrity of the hydatid cyst membrane was preserved for 7 days after injection by alcohol, acetone, glutaraldehyde, albendazole, acetylsalicylic acid, formaldehyde,

lidocaine, hydrochloric acid, ammonia, pancreatin, Betadine, methylene blue and isotonic saline samples. Smego et al-28- have shown that there are no significant differences in the outcomes by injection or without it in his results of a meta-analysis study. ALwattar et al -29- in his series in traditional operation for hydatid liver disease stated that it's not necessary to use scolicidal agent for injection of the cyst. Resent scolicidal agents like Octenidine dihydrochloride 0.1% actually had strong scolicidal effect but after 15 minutes, others like Povidone iodine 10% had strong scolicidal effects after 15-30 minutes, hypertonic Saline 20% killed all the protoscoleces after 30 minutes of exposure -30-. Logically, it is doubtful if any surgeon can wait this time during operation, doing nothing but hoping that the germinal layer will be killed. Some have even questioned the logic of scolicidal injection before cyst evacuation 31-. On the other hand; the safety profiles of these agents have been called into question. For example, formalin is associated with sclerosing cholangitis. Experience in open surgery showed that injection of cyst has main disadvantages, as there is high pressure in the cyst and any attempt to puncture it even with a fine needle may result in a leak around the puncture site-32-. - and this is also true during laparoscopy. Although spillage is considered a nightmare during hydatid cyst surgery, its relevance in practice is questionable -33-. Here there is a rising question, is spillage has any clinical importance? We no more inject the cyst by any type of chemicals, this will help to maintain the cystic pressure less than the intra-abdominal pressure, we believe that this method of killing the scolices is not necessary, neither effective and simple irrigation with isotonic sodium chloride for washing of the cavity is far enough in agreement with other authors who do not recommend the use of scolicidal agents -29-34-. In reality, the ectocyst consists of compressed liver cells and fibrotic tissue, which is a host reaction to the parasite and does not belong to it, but to the host liver. Therefore, the only live material, which should be the target of any treatment modality is the germinative membrane, the fluid it contains and daughter cysts, that is why we did not perform cystectomy or partial hepatectomy to any of our patients, we advocate the use of conservative laparoscopic operations techniques since it can remove parasitic contents in adequate way, some authors advocate radical procedures, mainly pericystectomy but they got more complications-35-36-37-. The recurrence rate range from 3% to 10% following open surgery for

## Laparoscopic management of hepatic hydatid disease, what makes it safe and effective?

hepatic hydatid cysts-38-. Research reported that it is between 0-9% -39- in laparoscopic procedure. In our laparoscopic series with follow-up for one year, we have not seen any recurrences; this may be attributed to our selection criteria for the patients, although more time is needed to confirm that. In our series of 48 patients, conversion to open surgery was zero, in other series who did not perform selection, it was necessary in 13% due to difficult location of the cysts (intraparenchymal and/or dense intra-abdominal adhesions-38-. The mortality and the morbidity rates were assessed by eight potential predictors by Daradkeh *et al*-40-, this includes age of the patients, size of the cyst, number of cysts, other organs involved by the disease, the presence of preoperative complications, the type of surgery performed (radical or conservative), whether the disease was new or recurrent, and type of surgery performed (open or laparoscopy), this was totally in agreement with our exclusion criteria. The most frequent complications in the postoperative period were cavity infection and biliary fistula which was recorded in 13.5% 11.5% respectively-36-, these complications were treated with conservative procedures such as percutaneous drainage and ERCP-40-41-. Complications can only be avoided with experience and better patient selection. With these measures we have been able to decrease the conversion rate to open surgery down to (0%) and lower the frequency of infectious complications to (1%) and postoperative biliary leakage to (4%).

### Conclusion.

laparoscopic treatment of liver hydatid cyst disease is safe and effective and can be performed successfully and offers all the advantages of laparoscopic surgery, certain intraoperative precautions included the use of two suckers system with high negative pressure, decreasing of intraperitoneal pressure and increasing of flow rate of CO<sub>2</sub> during evacuation of the cyst and careful patient selection with the use of minimum surgical interference are the keys to achieve successful results. Although 1 year is not long enough to say that no recurrences have taken place, but it is a convincing result.

Further studies should be encouraged in this field to determine a universally accepted standard technique.

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## Laparoscopic management of hepatic hydatid disease, what makes it safe and effective?

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## الخلاصه

دراسة المعايير التي تؤثر على امانة وفعالية الجراحة المنظارية لعلاج الاكياس المائية في الكبد:أهداف

التصميم: دراسة مستقبلية.

المشاركون: ٤٨ مريضا مصابون بالأكياس المائية في الكبد.

زمان و مكان الدراسة: مستشفى الجمهوري التعليمي في الموصل من تاريخ ١ حزيران ٢٠٠٩ لغاية ١ حزيران ٢٠١٢.

القياسات الإجرائية: تم تشخيص الحالات بفحص السونار والمفراس واثبت التشخيص أثناء العملية. تم عدم اختيار التداخل الجراحي بواسطة المنظار من قبل الفريق الطبي في الحالات ألتالية: كون الكيس داخل النسيج الكبدي وغير ظاهر الى السطح" او كونه في المنطقه رقم ٧"وجود اكثر من كيسين في الكبد" تكلس الجدار الخارجي للكيس"وجود كيس اخر خارج الكبد"وجود عملية سابقه للأكياس المائية في الكبد او في البطن لأسباب أخرى او في حالة رفض المريض اجراء العملية بواسطة المنظار الجراحي

تم استخدام الكامره الرقميه ذات العدسه ٣٠ درجه عن طريق السره وإدخال مسبار ١٠ ملم بحيث يكون فوق قمة الكيس مباشرة ومسبار ٥ ملم في الخط الوسطي للبطن وقد تم انقاص الضغط داخل البطن الى ١٢ملم زئبقي وزيادة معدل دخول غاز ثاني وكسيد الكربون الى اقصى مدى اثناء شفط الماء من الكيس. تم سحب الجدار الجرثومي عن طريق الشفط في معظم الحالات او عن طريق الكيس الواقى. عولج الكهف الناتج عن رفع الكيس بالغسل المتكرر بالماء المتعادل ايونيا ثم وضع الثرب داخل التجويف وكذلك انبوب التصريف.

النتائج: ضمت الدراسة ٤٨ حالة ٢٩ ذكرا و ١٩ انثى تراوحت اعمارهم من ١٨ الى ٥٨ سنه. ٢٤ من المرضى من الاكياس كانت في الفص الايمن و 34 مصابون بكيس واحد و ٦ بكيسين. تراوح حجم الكيس بين ٦ الى ١٢ سم. في الايسر. معدل وقت العملية كان بحدود ٥٢ دقيقة. لم تسجل أي مشاكل اثناء التداخل الجراحي ولا ايه حاله 20 تحويل الى فتح بطن كما لم تسجل ايه عودة للأكياس المائية بعد ١٢ شهر من المتابعه بواسطة السونار. حدث التهاب جرثومي في كيس واحد ونضح العصارة الصفراء في حالتين بعد التداخل الجراحي

الاستنتاج: إن عملية الاكياس المائية للكبد بالمنظار الجراحي امينه وفعالة ويمكن الاعتماد عليها في حاله الانتقاء المناسب و انقاص الضغط داخل البطن الى ١٢ ملم زئبقي وزيادة معدل دخول غاز ثاني وكسيد الكربون الى اقصى مدى اثناء شفط الماء من الكيس بواسطة شافط عالي الكفاءة.

**الكلمات الدليلية:** التهاب المرارة. رفع المرارة بالمنظار الجراحي.