

## Surgical Treatment of Hydatid Cyst of the Liver

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### ABSTRACT:

#### BACKGROUND:

Human Hydatid disease or echinococcosis, caused by larval form of *Echinococcus granulosus*, has a worldwide distribution and is endemic in many countries especially in Mediterranean region, middle and Far East.

#### OBJECTIVE:

To compare of different surgical procedures used in treatment of hepatic Hydatid cysts and their outcomes and complications.

#### PATIENTS AND METHODS:

All patients with hepatic Hydatid cysts disease both symptomatic and asymptomatic of both sexes and any age group were evaluated by history, examination and investigations and data was collected, all patients underwent surgical treatment of different procedures, outcome and complications of such procedures were analyzed.

#### RESULTS:

All patients were treated surgically. Surgical procedures included external drainage, simple closure, marsupialization (group A), partial cystectomy with omentoplasty, pericystectomy and segmentectomy (group B). Group A techniques carried out a higher complication rate (39.1%) compared with group B techniques (10%) (P-value <0.05).

#### CONCLUSION:

Partial cystectomy with omentoplasty and radical procedures as pericystectomy and segmentectomy carry a lower complication rates compared with external drainage and marsupialization but the former procedures should be reserved to more peripheral cysts and should be done with a low operative risks.

**KEYWORDS:** hydatid cyst, omentoplasty, pericystectomy.

### INTRODUCTION:

Hydatid disease is endemic mainly in the Mediterranean countries, the middle east, the Baltic areas, South America, India, north China, and other sheep-raising areas<sup>(1,2)</sup>. However, owing to increased travel and tourism all over the world, it can be found anywhere, even in developed countries. Hydatid disease is a zoonotic infection caused by adult or larval stages of the cestode *Echinococcus granulosus*<sup>(3)</sup>. The adult of *E. granulosus* is a worm that resides in the jejunum of the dogs, eggs ingested by intermediate hosts (cows, sheep, mice, deer, and humans) liberate an embryo in the duodenum, which passes through the intestinal mucosa to enter portal circulation. Most of these embryos are trapped in the liver, the rest pass through the liver and are scattered to other organs and develop into Hydatid cysts. The Hydatid cyst of the liver has three layers; the pseudocyst (adventitia), consisting of fibrous tissue, the result of reaction of the liver to parasite, is grey in color and blended intimately with the liver, from which it is inseparable.

Ectocyst (laminated membrane) formed of the parasite itself is whitish and elastic and contain hydatid fluid. Endocyst (germinal epithelium), the only living part of a hydatid cyst is a single layer of cells lining the cyst which secretes the hydatid fluid internally and laminated membrane externally<sup>(4)</sup>. Uncomplicated Hydatid cyst is usually asymptomatic. symptoms are produced by two mechanism, a generalized toxic reaction due to presence of the parasite itself and local or mechanical symptoms depending on location of the cyst<sup>(5)</sup>. The mechanical symptoms also depend on the size and number of the cysts. In more than 40% of cases, the complications precede the diagnosis of the disease. Rupture, secondary infections, and suppuration the most common complications<sup>(6)</sup>. Once in the human liver, cysts grow as much as 1 cm during the first 6 months and 2 to 3 cm every year thereafter, depending on the host's physical resistance<sup>(7)</sup>. As the results of medical therapy for Hydatid disease are not satisfactory, surgery remains the main stay of treatment. Several surgical techniques have been proposed for liver Hydatid disease, like classic open surgical techniques including cysts ablation, unroofing of the cyst with omentoplasty, cyst drainage

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,marsupialization , pericystectomy ,and liver resection for large cyst<sup>(4)</sup>. Resections of small superficial cysts may be simple and fast procedure; however, in case of large cysts, cystectomy involves major liver resections with its associated operative risk<sup>(8)</sup>. Conservative procedures, such as cyst drainage or omentoplasty on the residual cavity, are easier to perform, but they carry a considerable morbidity and recurrence rate<sup>(9)</sup>. More recently minimally invasive procedures, such as PAIR- puncture, aspiration, injection and reaspiration, and this is done after adequate drug treatment with albendazole. laparoscopic surgery, have been included in our armamentarium against this disease<sup>(10)</sup>. The choices of surgical therapy depend on patient's general condition, the number and location of the cyst, and the surgeon expertise.

### **PATIENTS AND METHODS:**

Ninety patients with hepatic hydatid cyst were treated surgically from May 2006 to May 2009 in first surgical unit at Baghdad teaching hospital. (55) (61.3%) patients were females and (35) (38.7%) patients were males. Complete history and clinical examination were done for them, the most common complaints were pain in the right quadrant, epigastrium , abdominal mass and to lesser extent some of the patients presented with history of jaundice, fever or they were asymptomatic.

The diagnosis was established by combining the physical findings and the results of the laboratory tests. Hematological tests include blood counts were done to all patients but the liver function tests for selected patients. Plain abdominal x-rays, ultrasonography were done for all patients, CT-Scan were used as imaging techniques for selected patients. Surgical procedures used were many, for the external drainage procedure, after the abdominal cavity had been isolated with compresses soaked in 20% hypertonic saline solution, the cyst was punctured and Hydatid fluid aspirated to reduce the tension within the cyst. Cysts were then widely deroofed by excising the projecting part of the pericyst and evacuating its contents. The remaining cavity was irrigated with scolocidal agent. Sterile hypertonic saline or povidone iodine was used as scolocidal agents. External drainage of the residual cavity was done using a wide gauge rubber tube brought out through a stab wound and connected with a bag for gravity drainage; suprahepatic or subhepatic spaces are also drained in some cases. Tubes were removed within a few days in the absence of bile

leakage or any discharge. To obliterate the remaining cavity, a portion of omentum with a good blood supply was sutured to the cavity (omentoplasty). In the cases of cystobiliary communications, treatment included closure of communications with fine absorbable suture if it well identified. In cases of obstructive jaundice, the common bile duct is explored and the daughter cysts are removed with T-tube insertion or choledochojunostomy with no need to sphincterotomy or sphincteroplasty. Evacuation of the cyst from its content and primary closure of the cyst by obliteration of the cavity through a continuous or interrupted absorbable sutures is another option especially done for small cysts which has a less fibrosis and rigidity in its wall or the edges of the cavity are sutured to abdominal wall and several drains are inserted to the depths of the cavity in a procedure of marsupialization. Complete excision of the cyst especially which is peripherally located, removed totally without opening of the adventitia in pericystectomy which is considered radical procedure along with segmentectomy or lobectomy.

### **RESULTS:**

Ninety patients with hepatic hydatidosis were treated surgically from May 2006 to May 2009 in first surgical unit at Baghdad teaching hospital. (55) (61.3%) patients were females and (35) (38.7%) patients were males. The mean age was 38.4 years, range (5-65) years. The most common complaints were pain in the right quadrant, epigastrium (58.9%) and abdominal mass (25.6%). Clinical presentations are summarized at table 1.

Investigations were done to the patients including blood counts, liver function tests for selected patients. Plain abdominal x-rays, ultrasonography, CT-Scan were used as imaging techniques. Plain x-rays was done to all the patients (100%) showed calcifications in 10 patients(11.2%), ultrasonography done for all the patients (100%) and it was positive for 88 patients(97.7%) and CT-Scan for 14 patients (15.6%) who had unclear relations of the cysts. Cysts were single in (56) (62.2%) of cases and multiple in (34) (37.8%) of cases. Cysts were found in right lobe in (63) (70%) of cases , in the left lobe in (20) (22.3%), and bilaterally in (7) (7.7%)of cases and (11) (12.3%) of cases had coexisting cysts as in spleen (4) patients, pancreas (2) patients, mesocolon (2) patients, omentum (2) patients and in one patient in the retroperitoneum. The diameter of the cysts was smaller than 5 cm in (9) (10 %) of cases, 5-10 cm

**Table 1: Clinical presentations**

|                            |                     |
|----------------------------|---------------------|
| Clinical presentations     |                     |
| Characteristic of patients |                     |
| Age                        |                     |
| Mean                       | 38.4 years          |
| Range                      | 5- 65 years         |
| Sex male\female            | 35\55               |
| Symptoms                   | No. of patients (%) |
| Abdominal pain             | 53 (58.9%)          |
| Palpable mass              | 23 (25.6%)          |
| History of jaundice        | 4 (4.3 %)           |
| History of fever           | 3 (3.4%)            |
| Acute abdomen              | 2 (2.3%)            |
| Asymptomatic               | 5 (5.6%)            |

in (35) (38.7%) of cases, and larger than 10 cm in (46) (51.1%) of cases. There were (6) (12.3%) of cases had infected cysts. There were (5) (5.6%) of cases received mebendazole 50 mg\kg\wt

preoperatively for one month in cases of multiple cysts in abdomen during waiting the operation. Table 2 shows the character of cysts.

**Table 2: Character of cysts**

| characteristic        | No. (%) of patients |
|-----------------------|---------------------|
| No. of cyst           |                     |
| Single                | 56 (62.2%)          |
| Multiple              | 34 (37.8%)          |
| Localization          |                     |
| Right lobe            | 63 (70%)            |
| Left lobe             | 20 (22.3%)          |
| Both lobes            | 7 (7.7%)            |
| Size of the cavity cm |                     |
| Mean                  | 11.4 cm             |
| Range                 | 4 – 27 cm           |

Treatment was surgical in all of the cases. To facilitate the study of the results, patients were classified in to 2 groups according to the type of surgical procedure. Group A comprised (64)(71.2%) patients, external drainage is done in (48)(53.4%) patients of them, marsupialization in (11) (12.2%) patients, and simple closure of the cyst in (5) (5.6%) patients. Group B comprised (26) ( 28.9%) patients who had undergone a variety of procedures, partial cystectomy with omentoplasty was performed in (15)(16.7%) patients, pericystectomy was performed in(6) (6.7%) patients to the superficial cysts, one case (1.2%) with solitary cyst located in the left lobe, a left lateral segmentectomy was performed, (4) (4.5%) patients with 2 or more cysts, a

combination of procedures was performed such as omentoplasty combined with external drainage. Percutaneous drainage and laparoscopic surgery were not performed to any of our patients. Most of intraperitoneal cysts are excised and splenectomy is done in concomitant cysts in the spleen. In cases with cystobiliary communications, exploration of common bile duct was performed in (2)(2.3%) patients followed by a T- tube insertion because of daughter cysts present in common bile duct, in another (2) (2.3%) patients the common bile duct was dilated because it contained Hydatid debris and choledochojuenostomy was carried out. Cystobiliary communications were closed with fine absorbable sutures, the residual cavity was filled with omental pedicle and a drainage tube was left in the cavity.

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Postoperative complications consisted mainly of septic complication such as cavity infection in (7) (11%) of cases of group A and (2) (7.6%) of cases in group B, wound infection in (6) (9.3%) of cases of group A and (2) (7.6%) of cases in group B, chest infection occurred in (5) (7.8%) of cases only in group A. One patient of cavity infection needed surgical drainage and wound infection treated by cleansing and oral antibiotics. One patient (16.6%) of those underwent pericystectomy in group B developed postoperative hemorrhage immediately which was managed expectantly. (12) (18 %) of cases in group A with cystobiliary communications develop bile leakage and in (2) (7.6%) of cases in group B which were ceased within 10 days spontaneously, (4) (6.2%) of cases in group A developed biliary fistula (bile leak continues more

than 10 days) and (1) (3.8%) of cases in group B, they needed prolonged tube drainage, all of them underwent ERCP which reveal patent common bile duct, and the fistulae closed conservatively. (2) (3.1%) of cases in group A developed deep venous thrombosis (DVT) in post operative period and treated conservatively. If the complications reviewed according to type of procedures we concluded that group A had a significantly higher complication rate (39.1%) compared with group B patients (10%) P-value <0.05. The patients who underwent the formerly used procedures such as external drainage, marsupialization, and simple closure were more prone to serious complications. No mortality was recorded in this study. These facts summarized in table 3 and 4.

**Table 3: Details of complications according to the types of surgery.**

| No. of patients (%)    |                 |                 |                  |                 |          |         |                 |
|------------------------|-----------------|-----------------|------------------|-----------------|----------|---------|-----------------|
| Type of surgery        | Biliary leakage | Biliary fistula | Cavity infection | Wound infection | bleeding | DVT     | Chest infection |
| Group A                |                 |                 |                  |                 |          |         |                 |
| External drainage      | 7(14.5%)        | 3(6.2%)         | 5(10.4%)         | 2(4.1%)         | 0        | 2(4.1%) | 4(8.4%)         |
| Simple closure         | 1(20%)          | 0               | 0                | 2(40%)          | 0        | 0       | 0               |
| Marsupialization       | 4(36.3%)        | 1(9%)           | 2(18%)           | 2(18%)          | 0        | 0       | 1(9%)           |
| Total                  | 12(18%)         | 4(6.2%)         | 7(11%)           | 6(9.3%)         | 0        | 2(3.1%) | 5(7.8%)         |
| Group B                |                 |                 |                  |                 |          |         |                 |
| Cystectomy +omentoplas | (1)(6.6%)       | 1(6.6%)         | 2(13.2%)         | 2(13.2%)        | 0        | 1(6.6%) | 0               |
| Combin.procedures      | 1(25%)          | 0               | 0                | 0               | 0        | 0       | 0               |
| Pericystectomy         | 0               | 0               | 0                | 0               | 1(16.6%) | 0       | 0               |
| Segmentectomy          | 0               | 0               | 0                | 0               | 0        | 0       | 0               |
| Total                  | 2(7.6%)         | 1(3.8%)         | 2(7.6%)          | 2(7.6%)         | 1(3.8%)  | 1(3.8%) | 0               |

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**Table 4: Shows the numbers (%) of complications for patients of different procedures.**

| Type of procedure               | No. of patients (%) | No. of complications (%) |
|---------------------------------|---------------------|--------------------------|
| Group A                         |                     |                          |
| External drainage               | 48 (53.4%)          | 23 (25.6%)               |
| Simple closure                  | 5 (5.6%)            | 2 (2.3%)                 |
| Marsupialization                | 11(12.3%)           | 10 (11.2%)               |
| total                           | 64 (71.3%)          | 35 (39.1%)               |
| Group B                         |                     |                          |
| Partial cystectomy+omentoplasty | 15 (16.6%)          | 7 (7.6%)                 |
| Combinations procedures         | 4 (4.4%)            | 1 (1.2%)                 |
| Pericystectomy                  | 6 (6.6%)            | 1 (1.2%)                 |
| segmentectomy                   | 1(1.1%)             | 0                        |
| total                           | 26(28.7%)           | 9 (10%)                  |

Regarding postoperative hospital stay, the average hospital stay was longer significantly in external drainage procedure as compared with other procedures  $P < 0.01$ , and there were no significant differences between other procedures. This is shown in table 5.

**Table 5: Shows postoperative hospital stay**

| Type of treatment               | Mean hospital stay |
|---------------------------------|--------------------|
| External drainage               | 13.4 days          |
| Evacuation+ primary closure     | 5.2 days           |
| Marsupialization                | 8.3 days           |
| Partial cystectomy+omentoplasty | 4.6 days           |
| Combination of procedures       | 4.4 days           |
| pericystectomy                  | 3.8 days           |
| segmentectomy                   | 4 days             |

### DISCUSSION:

Surgery remains the main treatment for Hydatid liver disease. Although there is non randomized study to compare radical and conservative surgery, some surgeons favor pericystectomy or hepatectomy in most of the cases<sup>(11)</sup>, and some surgeons, especially in endemic areas, prefer conservative surgery<sup>(12)</sup>. We performed conservative surgery in most of the cases ( 71.3%) and radical procedures reserved for the most peripheral located hepatic cysts, such procedure must used selectively to provide short operative time, less blood loss and low operative risk for this benign disease. In addition, most Hydatid liver cysts can be treated successfully by conservative surgery<sup>(8)</sup>. Despite these advantages conservative surgery has a higher reoccurrence rate than radical excisions, and postoperative cavity related complications are not uncommon<sup>(6)</sup>. Management of cyst cavity is a step in the conservative approach for protection against postoperative cavity related complications, several techniques are advocated including external drainage, marsupialization and

omentoplasty, selection of appropriate method is still controversial and each has advantage and disadvantage<sup>(13)</sup>. Capitonage and introflexion (the remaining walls of the cavity were brought together with a series of purse-string or mattress sutures starting from the bottom and working outward) can be used selectively; because of the rigid cyst wall resulting from fibrosis and calcification this will restrict the use of these techniques so it does not apply in our study. Biliary leakage is common postoperative complication that associated with increased risk of morbidity. The incidence is variable, as in study of Ozmem V et al<sup>(14)</sup> it is 7.9%, and in study of Langer JC<sup>(4)</sup>, et al is 28.6%, in our study the incidence is 26.3% in both group A and B, and all leakage and fistulae ceased spontaneously by conservative treatment. Adequate drainage and obliteration of remaining cavity is a necessary procedure to minimize the possibility of serum or blood accumulation or liver abscess<sup>(15)</sup>. These situations, along with biliary leakage

constitute the main postoperative complications and the principle reasons for morbidity and mortality<sup>(16)</sup>. There is low morbidity rate among patients treated with cyst excision and omentoplasty<sup>(12)</sup>. In our study omentoplasty and radical procedures had a significantly a lower complication rate, respectively (7.6% and 1.2%) than external drainage (25.6%). Drainage procedures in particular may cause severe complications such as hepatic abscess, biliary leak, and fistulae leading to prolonged hospital stay<sup>(17)</sup>, and this is concomitant to our study that the complications of this procedure is significantly high (25.6%). Recent studies, indicate the evacuation of cyst content can be carried out successfully using laparoscopic trocar, it seems that this method has a better yield for posterior cysts and generally diminishes the risk of spillage in to peritoneal cavity and the rate of recurrence<sup>(18)</sup>. Among the radical procedures, total pericystectomy is the treatment of choice, because it does not carry the risk of liver function compromise caused by resection of hepatic tissue<sup>(16)</sup>. In our study pericystectomy was performed in<sup>(6)</sup> (6.7%) of cases with superficial cysts or peritoneal cysts. Hepatic lobectomy should be applied only to large or multiple cysts displacing the parenchyma of a liver lobe, smaller cysts can also be managed by segmentectomies or atypical liver resection<sup>(4)</sup>. All radical procedures carry the risk of intraoperative or postoperative bleeding owing to absence of a true surgical cleavage with liver parenchyma<sup>(12)</sup>. In cases of rupture in to biliary tract, exploration of biliary tract and removal of the Hydatid debris and daughter cysts with placement of T-tube for drainage is necessary<sup>(8,6)</sup>. In our study<sup>(4)</sup> (4.3%) of cases presented with obstructive jaundice, exploration of common bile duct is performed, 2 of them with T-tube drainage and another 2 patients with choledochojunostomy, provided that ERCP was done preoperatively, this is agreed to the studies done by Agaoglu N et al and Mgistrelli P et al<sup>(16,19)</sup>.

**CONCLUSION:**

The surgical techniques used for the treatment of hydatid cysts of the liver are the procedures which carries the least morbidity and mortality as partial cystectomy with omentoplasty, radical procedures as pericystectomy and segmentectomy compared to external drainage and marsupialization. The choice of the surgical technique for the treatment of hydatid cyst depends on multiple factors as the size, location and existing complications.

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