

EVALUATION OF PACKING THE RESIDUAL CAVITY AFTER TOTAL OR PARTIAL CYST RESECTION IN MANAGEMENT OF HEPATIC HYDATID CYSTIC DISEASE

By

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Abstract

Hydatid disease is a worldwide zoonosis caused by the larval stage of the echinococcus tapeworm, that is endemic in many parts of the world (in Europe, Middle East, Mediterranean, South American and African countries). Hydatid disease is a relevant health problem in underdeveloped areas where veterinary control does not exist. The most frequent location of hydatid cystic lesions is the liver (up to 80% of cases), followed by the lung (about 20% of cases), and with a lower reported incidence in any other organ or tissue in the body. Currently, surgical operation remains the treatment of choice in hydatidosis.

Many surgical options can be done for management of the cyst, ranging from unroofing of the cyst, pericystectomy, up to liver resection for the affected liver parenchyma site. The cyst cavity can be managed by different techniques, capitonnage, external drainage, introflexion or omentoplasty.

The Omentoplasty (OP) filling technique was the method of choice for filling of the Residual Cavity (RC). The omentoplasty filling was done by two procedures Pedicle Omental Pack (POP), and Isolated Omental Pack (IOP); both techniques were applied for the filling of the residual cavity compared to non-filling of the residual cavity after surgery, in our retrospective comparative multicenter study. Seventy six patients operated for hydatid cyst between January 2010 and February 2014 were analysed retrospectively. Either with or without filling of the cavity, and either the filling was with pedicle or isolated omentoplasty were used to treat the residual cyst cavity.

Patients were categorised into three groups to evaluate complications: without filling of the RC (GA), omentoplasty filling with Pedicle Omental Pack (GB), and omentoplasty filling with Isolated Omental Pack (GC). The overall mortality rates were 0%. Overall morbidity rates were 57.1% for GA, and 10.3% for GB, and 7.7% for GC respectively. Mean hospital stay was 11.8 days for GA, and 8.1 days for GB, and 8.7 days for GC.

The isolated omentoplasty filling technique is a safe management in the filling of the residual cavity after surgery with less operative time and same result as pedicle omentoplasty technique. Because of omentum has a high absorptive capacity and capable to fill the residual cavity, and omentoplasty was recommended (whether with pedicle or isolated omental flap) to manage patients with hydatid cyst of the liver.

Key words: Egypt, Human hepatic hydatid cysts, Omentoplasty.

Introduction

The hydatid cysts occur throughout the world but endemic in Eastern Europe, the Middle East, South America, Australia and the South Africa, especially in the pastoral and farming regions. In Egypt, the endemic

zoonotic hydatidosis were reported in camels (Haridt *et al*, 1998), in man (El Shazly *et al*, 2007a), equines (Haridy *et al*, 2008a), and farm animals (Hassanain *et al*, 2016). Also, natural *E. granulosus* infection was found in the street dogs (El Shazly *et al*, 2007b) and even pet ones or indoors as a

zoonotic silent health problem (Haridy *et al*, 2008b).

Treatment of echinococcal infestation has a major impact on health care economy in endemic region. (Barnes *et al*, 1997)

Liver hydatid cysts are often diagnosed incidentally (A history of travel to or immigration from a region where the disease is endemic), finding a liver mass during physical examination warrants suspicion of echinococcal disease. Nearly 75% of patients having asymptomatic abdominal mass, right upper quadrant pain and dyspepsia. Imaging techniques are of paramount importance because most liver hydatid cysts are either asymptomatic or produce mild and non-specific symptoms. Ultra-sonography, CT scan and, less frequently, MRI studies are used to classify and delineate cystic liver lesions.

The ultrasonographic appearance of hydatid cysts may vary, from a simple aspect to a more complex one, in relation to the stage of the evolution and maturity (Gianluca *et al*, 2012).

CT has high sensitivity and specificity for hepatic hydatid disease. Intravenous administration of contrast medium is useful to give a vascular map to the surgeon, and when complications (especially infection and communication with the biliary tree) and extra-hepatic diffusion are suspected. CT may show the same findings as US. Calcification of the cyst wall, internal septa, floating membranes and daughter vesicles are easily detected at CT (Eckert *et al*, 2004)

In MRI, The hydatid cysts may show variable signal intensities on T1- and T2-weighted images, according to the different components inside the lesion (Czermak *et al*, 2008).

The characteristic sign of hydatid disease is represented by the pericyst that usually appears as a low-signal-intensity rim on T2-weighted images. In addition, there may be an intermediate-signal-intensity inner ring representing the detachment of the membranes.

Although CT scan and MRI are superior in determining the location and spatial relationships between hydatid cysts and surrounding structures, ultrasonography is recommended as an initial diagnostic tool, because it is the non-invasive, the inexpensive and the simple technique (Rozanes *et al*, 2007).

Surgery is the treatment of choice for most individuals infected with *Echinococcus granulosus*. Use of antihelminthic medications complements surgical management but does not replace it. Although percutaneous aspiration of a hydatid liver cyst carries the risks of intraperitoneal rupture, parasitic spread and subsequent anaphylaxis, there are reports of successful management of liver hydatid cyst with percutaneous drainage in a limited number of patients (Polat *et al*, 2002).

Hydatid liver cyst can be managed surgically by partial or total cyst resection. After which, the cavity can be managed by leaving it open to the peritoneum, omentoplasty, external drainage, introflexion or reapproximation (capitonnage) (Ormezi *et al*, 2001).

Patients, Materials and Methods

Medical records of all patients who were diagnosed with liver hydatid cyst and hospitalized between January 2010 and February 2014 were retrospectively reviewed. A total of 103 patients were diagnosed and operated in four specialized Hepato-Bilio-Pancreatic units in Cairo and Giza, 27 patients were excluded from our study due to other surgical modalities, and multiplicity of the hydatid cyst disease, and only 76 patients were fulfilling the selection criteria and included in our study (single cyst & the previously chosen surgical procedure). The most frequent complaint was vague upper abdominal pain. Ten patients (10%) were asymptomatic and the cyst was diagnosed by incidental findings on scanning. Of the serological tests, the indirect haemagglutination test was used widely (65 patients 85.5%) and was positive in 52 patients (80%).

Ultrasonography was used in all patients (100%) and abdominal CT scan with con-

trast (Spiral Triphasic study) was done in 75 patients (98.6%). MRI study was realized in 32 patients (42%). Liver hydatid cysts were found in the right lobe in 56 patients (73.7%), and in the left lobe in 20 patients (26.3%). All patients received pre-operative medical treatment in the form of Albendazole 200mg (400mg twice daily-10 mg/kg/day) for four to six weeks. Patients received a prophylactic third generation cephalosporin by intravenous injection before the incision. Right subcostal incision was preferred, but midline and right paramedian incisions were also used. The operative procedure was whether un-roofing in 68 patients (89.5%), or Peri-cystectomy in 8 patients (10.5%). Albendazole (10mg/kg/day) was continued post-operatively for six months regularly for all patients. Postoperative surveillance protocols included a clinical and radiological evaluation every 6 months for the first 2 years and once a year thereafter for patients with IOP, the surveillance in the early post-operative was done weekly with ultrasonography, complete blood picture and C.R.P (quantitative), till the end of 6 weeks then every two weeks till the end of three months then follow the protocol of surveillance as others. Patients left without residual cavity filling (No Omentoplasty- NO) were 21 patients (27.6%) classified as GA, the Omentoplasty procedure was realized for 55 patients (72.4%), from them, 29 patients (38.2%) had enough greater omentum that could be mobilized with a sufficient pedicle to do A Pedicle Omental Pack (POP), while 26 patients (34.2%) had Isolated Omental Pack without any pedicle (IOP). In cases of POP, the operative time was longer with a

relative time ranging from 8 to 10 minutes more than the IOP.

In the early post-operative period, patients were followed-up for the operative bed collection, surgical site infection, peritoneal abscess formation, Biliary Fistula, the recurrence of hydatid disease, or major abdominal complications, as well as the hospital stay.

Results

A total of 76 patients had a diagnosis of liver hydatid cyst. There were no deaths (mortality 0%). Seven patients had operative bed collection (9.2%), 2 patients were drained using CT guided aspiration and pigtail drain insertion for collection drainage, while the other five patients were managed conservatively. Three patients with Biliary Fistula (3.9%), two patients were managed conservatively and one patient had ERCP drainage with sphincterotomy and stent application that was inserted for three months. Intra-abdominal abscesses developed in one patient (1.3%); and this patient was managed with per-cutaneous ultra-sound guided drainage with Pigtail drain insertion for 4 days. Recurrence of Hydatid Cyst lesions occurred in four patients (5.2%), for which un-roofing and omentoplasty was done. The median postoperative follow-up period was 26 months (36.6±6.2). The distribution of postoperative complications and mean hospital stay was given (Tab. 2).

The patients were categorized with three groups for evaluating complications (Tab. 3). GA (NO - filling of the residual cavity), GB (POP- Pedicle Omental pack), and GC (IOP- Isolated Omental Pack). Details are given in tables (1, 2,3 & 4) and cases (1 & 2).

Table 1: Surgical management of liver hydatid cyst.

Operative technique	Number of patients	Percentage
Without filling (NO)	21	27.6%
POP	29	38.2%
IOP	26	34.2%
Un-roofing	68	89.5%
Pericystectomy	8	10.5%

Table 2: post-operative complications

Procedure	Operative bed collection (O B C)	Surgical site infection (S.S.I)	Peritoneal abscess (P.A)	Biliary fistula (B.F)	Recurrence (R)	Overall morbidity	Mean hospital stay
NO	6 / 28.6%	2/ 9.5%	1/ 4.7%	1/ 4.7%	2/ 9.5%	57.1%	11.8 days
POP	1/ 3.4%	0/ 0%	0/ 0%	1/ 3.4%	1/ 3.4%	10.3%	8.1 days
IOP	0/ 0%	0/ 0%	0/ 0%	1/ 3.8%	1/ 3.8	7.7%	8.7 days

Table 3: operative technique

Groups	Number of patients	percentage
A (NO)	21	27.6%
B (POP)	29	38.2%
C (IOP)	26	34.2%

The patients without filling of the residual cavity: No Omentoplasty (NO) GA, patients had their residual cavity filled with Pedicle Omental pack (POP) GB, and patients had their residual cavity filled with Isolated Omental Pack (IOP) GC.

The GB and GC showed no significance difference, with equal percentage in having no surgical site infection (SSI), or intra-abdominal (peritoneal abscess-PC) formation (0%), while GA had two patients with SSI (9.5%) and one patient with intra-abdominal peritoneal collection (4.7%). Operative bed collection (OBC) which was an important post-operative complication

was noted mostly in GA, with six patients (28.6%), while only one patient in GB (3.4%), and was not recorded in GC. The biliary fistula occurred in one patient in each G, (4.7%, 3.4%, and 3.8% respectively).

The disease recurrence was recorded mostly in GA, two patients (9.5%), while only one patient in GB ((3.4%), and GC (3.8%).

The overall morbidity was highest in GA (57.1%), while it was 10.3% in GB and only 7.7% in GC. The highest percentage of operative bed collection, surgical site infection and peritoneal abscess formation were recorded in GA (NO- without filling of the residual cavity filling).

Table 4: complications postoperative with P value

Procedure	Operative bed collection (OBC)	Surgical site infection (SSI)	Peritoneal abscess (P.A)	Biliary fistula (B.F)	Recurrence (R)	Overall morbidity	Mean hospital stay
NO	6 / 28.6%	2/ 9.5%	1/ 4.7%	1/ 4.7%	2/ 9.5%	57.1%	11.8 days
POP	1/ 3.4%	0/ 0%	0/ 0%	1/ 3.4%	1/ 3.4%	10.3%	8.1 days
IOP	0/ 0%	0/ 0%	0/ 0%	1/ 3.8%	1/ 3.8	7.7%	8.7 days
P value	0.001	0.068	0.265	0.972	0.588		

Discussion

The liver hydatid cystic disease is still a health problem in certain regions all over the world (Abdelraouf *et al*, 2015), including Egypt (Elsebaie *et al*, 2006) and is often discovered incidentally on ultrasonography. It is generally accepted that systemic albendazole treatment is not an alternative to surgical treatment but can be given as an adjuvant to surgery. All symptomatic and asymptomatic patients with cysts >5 cm in diameter should be considered as surgical candidates. The hydatid cyst of the liver can be managed surgically by partial or total cyst resection, as well as by liver resection. The aim of the operation is to remove all living parasites

and daughter cysts, with maximum parenchymal preservation (Aeberhard *et al*, 2006).

Following the evacuation of hydatid cyst content, the management of the residual cavity remains controversial. Many techniques are available, depending on the size and location of the cyst, the presence or absence of complications and the surgeon's experience as well, that plays an important role in the outcome.

The cyst can be opened to the peritoneum, if it is superficial, uncomplicated or unilocular, filling of the residual cavity after surgery can be achieved by omentoplasty (either with a pedicle omental pack, or an isolated omental pack).

The external drainage is achieved by placing a catheter into the cyst and is indicated in the presence of infection. However, the routine use of external drains after partial resection of an uncomplicated liver hydatid cyst increases postoperative morbidity and prolongs hospital stay. Omentoplasty implies placing a viable pedicle flap of omentum or isolated omental flap into the cyst cavity. It is generally used for single, uncomplicated hydatid cysts, but it also can be combined with external drainage for infected cysts (Sitting *et al.*, 1997)

Omentoplasty was thought to assist healing of the raw surface and to promote resorption of serosal fluid; it also brings macrophages to septic foci. Omentum is well known as the 'policeman' of the abdomen. It can passively move to a site of intra-abdominal inflammation, when it becomes adherent. Omentum sealed off minute leaks from viscus. These features of omentum led many surgeons (especially the present team) to treat the liver hydatid cyst by using an omental flap (Dziri *et al.*, 1999).

The omentoplasty is the operation of choice in the treatment of uncomplicated hydatid cyst in our series. In the present study, with omentoplasty, a total of 55 patients (72.4%) were managed with omental flap for the residual cavity. A total of 7 patients (9.2%) with operative bed collection, the omental flap patient constitute only one patient of them (1.3%), who was from GB, two patients in had surgical site infection (2.6%), and one patient had peritoneal abscess (1.3%), none from the omentoplasty groups. Omentoplasty patients showed the lowest rate of complications among all surgical techniques, concerning the operative bed collection, SSI, and PA.

The bile fistula is an important complication of surgery. Comparing the three groups, there was no significant difference regarding biliary fistula; each group had 1 patient in this morbidity. The hydatid cyst growing at the operative site was defined as recurrence. Recurrence rate was lower than in other sur-

gical techniques, there is also no significant difference between the three groups in the recurrence.

There was also an apparent difference in the distribution of mean hospital stay among the groups of patients without cavity filling rather than with cavity filling. Mean hospital stay was 11.8 days for the GA (no Cavity filling), compared with 8.1 & 8.7 days for GB and GC respectively, that means that the omentoplasty groups of patients still have the lowest mean hospital stay compared with the non omentoplasty group of patients.

Postoperative surgical site infection, bile fistula, recurrence rate and overall morbidity were seen less frequently in patients who underwent omentoplasty in the series. The difficulties were in follow-up as some patients from rural areas gave irregular visits to the surgical units. (Morris *et al.*, 2005).

Albendazole was given to all patients preoperatively for 4 to 6 weeks and for a period of 6 months postoperatively. Albendazole has a positive effect on clinical progression and assists shrinkage of the cyst, seroconversion and sterilisation of the cyst contents (Mentes *et al.*, 2003).

Several retrospective studies reported a lower morbidity rate by using the omentoplasty compared with other techniques (Safioleas *et al.*, 1994). Urvic *et al.* (1998) showed that omentoplasty gave the lowest morbidity and the shortest hospital stay among the surgical procedures. Balik *et al.* (1999) analysed 304 cases of liver hydatid cyst and found that omentoplasty and capitonnage is superior to external drainage. But, there was still no consensus on best treatment choice for liver hydatid cyst (Koksal *et al.*, 2001). Wani *et al.* (2013) stated that omentoplasty offers many advantages over external tube drainage and should remain the preferred option whenever possible.

Omentoplasty was performed with satisfactory outcomes for a long time in the series. The results probed that omentoplasty with or without pedicle (POP & IOP) had fewer complications than other procedures,

with a shorter hospital stay. It can also produce satisfactory results in treating complicated hydatid cysts. The isolated omentoplasty carries the same result as the pedicle omentoplasty with no over morbidity, or fear from necrosis of the isolated omental flap, and that was followed up for long period postoperatively without significant morbidity.

Conclusions

The filling of the residual cavity with either a Pedicle or an isolated omental pack, decreases the rate of morbidity, especially operative bed collection and SSI, and deep abdominal abscess after surgical treatment (unroofing or pericystectomy) for hydatid disease of the liver, and there is no difference between the Pedicle type and isolated type of flaps in omentoplasty, and should be recommended in this setting.

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Explanation of cases

Case 1: Pediculated Omental Pack: A: cyst before opening, B: On aspiration of cyst before opening, C: After unroofing of the cyst & cauterisation, D: Pedunculated Omental pack (POP) and E: CT finding of the cyst pre-operative

Case 2: Isolated Omental Pack- IOP: A: Cyst after opening and aspiration, B: Packing with Isolated Omental Pack (IOP) and C: Isolated Omental Pack (IOP).



