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Surgical techniques for management hepatic hydatid cysts in fallujah teaching hospital: A prospective study

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Abstract
Background: Hepatic hydatid cysts (HHCs) are a parasitic infestation caused by several species of Echinococcus, even though surgery is the mainstay in the management of hydatid disease of the liver, controversies still exist about the preferred operating technique.
Aim of study: To assess the effectiveness of different surgical procedures for managing the hepatic hydatid cyst at Baghdad Teaching Hospital and study the incidence of post-operative complications.
Patients and Method: Sixty-four patients aged between12 and 60 years underwent surgery for HHCs within a one-year period from the first of January 2018 to end of December 2018.
We recorded demographic data, location of the cysts in liver, surgical procedures used, postoperative complication, morbidity, mortality and hospital stay.
Results: Most of the patients were females 48(75%) from rural area and the mean age was 40 years, the most common symptom was abdominal pain in 51 patients (79.6%) and the right lobe of the liver was mostly affected 39(60.9%).
The External drainage technique was used in 28 patients (43.3%). Omentoplasy technique was used in 19 patients (29.6%)
Conclusion: The morbidity and hospital stay were highest in external drainage method and least in omentoplasty. The method of omentoplasty is simple and can be performed in the majority of patients.

Keywords: Cyst. echinococcus hydatid disease liver

Introduction
Human cystic echinococcosis or hydatid cyst disease is a zoonosis caused mainly by the larval cestode of *Echinococcus granulosus* of taenia Hippocrates recognized hydatid disease over 2000 years ago who referred to (a liver full of water) [1].
T The disease is relatively common in the sheep and cattle-raising areas of the world [2].
Hydatid cyst disease in Iraq is endemic mainly in the central and southern between Tigris and Euphrates rivers which is inhabited by farmers who raised sheep's in large numbers [3].
Hydatid is a zoonetic infection in which the human is an alternative to intermediate host of the larval stage of this parasite which is referred to hydatid cyst, the intermediate host are herbivorous mammals and the definitive host are carnivore animals [4].
In human the liver is infected in about (60%) of patients, the lung in about (20%) and other organs such as the kidney, brain, bone, and muscles in about (20%) [5].

The cyst consist of three layers [6]
1. The outer coat (pseudocyst or pericyst).
2. Laminated membrane (ectocyst).
3. Germinal layer (endocyst).

Hydatid fluid is thick colorless, odorless, ph (6.7-7.2), highly antigenic and the pressure can be as high as 300ml H2O [6].

Symptom & sign: [7]
1. The cyst may be silent (asymptomatic).
2. Chronic abdominal pain.
3. Abdominal mass.
4. Nausea, vomiting and weight lose.

5. Fever (infected hydatid cyst).
6. Hepatomegaly.
7. Jaundice (obstructed) due to pressure effect or rupture hydatid cyst into biliary tree.
8. Acute abdomen or death due to rupture hydatid cyst (anaphylactic shock).

Investigation [7]

1. Imaging: plain x-ray.
2. Abdominal ultrasonography (U/S) and abdominal (CT). Are uses to classify the cysts to the five categories according to Gharbi classification?
3. Liver function tests.
4. Serological tests to detect antibody in the serum, ELISA and complement fixation test.
5. Confirmation of the diagnosis is possible only by examination of the cyst content after surgical removal [7, 9].

Treatment [10]

Surgery is definitive treatment and the medical treat- ment of hydatid cysts with mebendazole or albendazole alone is controversial and the medical treatment is usu- ally reserved for disseminated systemic disease, inop- erable disease, patient unfit for surgery and prophylaxis during surgery.

Surgical treatment includes [10]

1. Radical operation.
2. Conservative operation.

Radical operation [10]

1. Cysto-pericyst ectomy.
2. Segmental resection.
3. Hepatic lobectomy.

Conservative operation includes [11]

Evacuate the content of the cyst without removal of the pericyst, management the residual pericystic cavity is very important because the operative morbidity and mortality depend on how the pericystic cavity is managed.

There is a lot of method of handling residual cavity of HHC (Capsulorrhaphy, Extraperitoneal drainage, Marsupialazation, Left opened to the peritoneal cavity, Omentoplasty, Capitonnage, Overlapping, External drainage and Myoplasty) [12].

Recently [13]

1. Laparoscopic deroofing, when cyst present in accessible place.
2. PAIR technique (puncture, a spirtion, ninjection and respiration).
3. PAIR was proposed in 1986 by Tunisian team and Guideline for the treatment of hydatid disease include PAIR have been proposed by WHO in 1996 13.
4. DPAI (double percutaneous aspiration and injection of alcohol).
5. Water jet dissector used to deeply located cyst, cyst cavity is filled with gelatin sponge which induce fibroblast response and assist rapid and effective obliteration of cavity [14].
6. Nd-YAG laser: photocoagulation used for residual cavity [14].

The aim of the study

1. To assess the effectiveness of different surgical procedures for managing the hepatic hydatid cysts in Baghdad teaching hospital.
2. To study the incidence of post-operative complications and compare with other studies.

Patientas and Methods

This is Prospective study of 64 patients who underwent surgical [17] treatment for HHC at Fallujah Teaching Hospital over period from the first of January 2018 to end of December 2018 (one year period). Patients with liver hydatid were included as elective cases or emergency case (acute abdomen).

We recorded the main symptoms, preoperative radio- logical investigations, location of the cysts, surgical procedures performed, postoperative complications, morbidity, and mean hospitalization period after surgery.

Preoperative diagnosis was established by a history followed by clinical examination and the main clinical features were (chronic abdominal pain, abdominal mass, acute abdomen, asymptomatic and jaundice).

Imaging studies including

1. Ultrasonography was done routinely in all patients to determine the location, number, and morphol- ogy of cysts within the liver. Unfortunately Gharbi classification was not used at Baghdad teaching hospital.
2. CT scan were needed for further anatomical details, especially in patients with recurrent disease and presence of multiple hydatid cysts.
3. All patients underwent chest radiography to exclude pulmonary hydatid cyst.
4. Other investigation were complete blood picture and liver function test.

All patients kept on albendazol (10mg/kg/day) for 2 week before surgery. During surgery the principle incision was the right subcostal and midline incision used in emergency cases and multiple hydatid cyst, the operative field was packed with 20% hypertonic saline compresses to protect the surrounding tissues, the cyst was punctured and decompressed as much as possible if there was no bile in fluid then (20%) hypertonic saline injected in the cyst and kept for 5 minute then aspirated, after that the cyst opened. If the aspirate contained bile, no irrigation was performed and the containing is evacuated after that laminated membrane removed with sponge-holding forceps then the visible biliary communications were sutured individually with absorbable material. Some time for adjacent multiple hydatid cyst we open one to other after that finally hypertonic saline used on wall of cyst then remaining cavity was dealt with by one of these procedure.

1. Closed-tube drainage (external drainage). This method use for large cyst >16cm and infected hydatid.
2. Omental flap was placed over the residual cavity (omentoplasty), patch of omentum is brought to rest within the cavity and the omentum loosely with 3-4 stitches of absorbable suture to widely open mouth cavity. This method used for size of cyst between (7-16cm) and bile stained content.
3. Combination of procedures (omentoplasty and external drainage). This method used infected cyst and bile stained and some of multiple hydatid cysts.
4. Postoperatively all patients were followed up during their admission and kept on albendazole (10mg/kg/day) for four weeks this cycle is re- peated three time by 2 week intervals. Information regarding the demographic features of the patients, operative details and immediate post-operative complications were recorded.

Results

It is randomized prospective study which was carried out in the surgical department in Fallujah Teaching Hospitals during the period of Jan. 20017-Dec. 2018.

The total series of 64 patients treated surgically during the one year period forms basis of this study, the females patients were 48(75%), mean age 40year and their ages range between 12-60 year. The males patients were 16(25%), mean age 34year, their ages range between 17-60 year and female to male ratio 3:1.

Age and gender distribution of 64 patients with HHC in table.1

Table 1: Age and gender distribution of 64 patients with hepatic hydatid cyst.

Age in year	Male	Female
12-19	4 (6.2%)	6 (9.3%)
20-29	2 (3.1%)	10 (15.6%)
30-39	2 (3.1%)	4 (6.2%)
40-49	6 (9.3%)	20 (31.2%)
50-60	2 (3.1%)	8 (12.5%)
Total No.	16	48

The diagnosis was made by clinical features and imaging techniques.

The abdominal discomfort was the most frequent symptom and reported by 51(79.6%) patients.

The rural people were more affected 38(59.3%), the right lobe of the liver are more affected 39(60.9%) and the cyst was mostly solitary 40 (62.5%).

The most operations were elective 61(95.3%) and the subcostal incision was mostly used 53 (82.8%).

Size, contains of HHC and Post-operative complications are summarized in Table 1.

The external drainage procedures was mostly used in 28 patients (43.3%), the omentoplasty was used in 19 patients (29.6%) and the combination of both procedures are used in 17 patients (26.5%).

Table 2: Size contains of HHC and Post-operative complications.

	External drainage	Omento-plasty	Combination Procedures
Size of HHC(cm) median and range	11.6 (7-21)	9.6 (7-16)	10.2 (8-13)
Contains of HHC			
Pure	25(89.2%)	13(68.4%)	16 (94.1%)
Bile	2(7.1%)	6 (31.5%)	1(5.8%)
Infected	1(3.5%)		
Post-operative	13 patients	2 patients	5 patients
Complications	(46.4%)	(10.5%)	(29.4%)
No. of patient	28(43.3%)	19(29.6%)	17(26.5%)

The post-operative complications and period of hospital stay for each operation method are summarized in table3.

The highest morbidity was in external drainage in 13 patients (46.4%), the least morbidity was in omentoplasty in 2 patients (10.5%), the longer mean hospital stay (days) were in external drainage 9 days and 5 days in omentoplasty.

Statistical analysis was performed using analysis of (ANOVA) variance for length of hospital stay and Fisher's exact test for morbidity.

Highest morbidity and hospital stay in external drainage ($P<0.04$) and least morbidity and hospital stay in omentoplasty ($P<0.02$).

A value of $P<0.05$ was considered statistically signifi- cant.

Table 3: Post-operative complications and period of hospital stay for each operation method

Post-operative complication	External drainage	Omento-plasty	Combination Procedures
Biliary discharge	4 (14.2%)		1 (5.8%)
Wound infection	7 (25%)	2 (10.5%)	4 (23.5%)
Abscess in cavity	2 (7.1%)		
Morbidity	(46.4%)	(10.5%)	(29.4%)
Hospital stay	9 days	5 days	6 days
Mean no. of day			
Total No.	(28)	(19)	(17)

Discussion

We found that, the hydatid cyst has a maximum incidence in female's patients. They were 48 (75%), mean age 40 year and their ages range 12-60 year.

The external drainage was mostly used 28 patients (43.3%), but in study by Al-Janabi; 16 at Al-Rasheed Military Hospital this method was used in (34.4%) and in study in UK by STAVROSE *et al* [17], the external drainage was used in (25.5%) of patients while in 15

The incidence in the males patients were 16 (25%), mean age of 34 year, their ages range 17-60 year and a study in Turkey by ERGUNERDEM *et al* method used in (12.7%) of patients., this female to male ratio 3:1 and this is probably due to females deal with infected vegetables. It agrees with study in Turkey by ERGUNERDEM *et al* [15], the incidence was (74.5%) in females and (25.5) in males, it is different from study by Al-Janabi; 16 at Al-Rasheed Military Hospital which revealed a high incidence in males (87.9%) because most militaries were men and (12.1%) in females but in study in UK by STAVROSE *et al* [17], the incidence was (56.2%) in females and (43.8%) in the males.

Treatment of HHC is mainly surgical and it is directed toward the cyst and the remaining cavity, the surgical approach may be chosen on basis of local experience and the characteristics of each individual case (e.g. number, size and location of cyst), so in this study we assess the different surgical techniques in general.

All patients diagnosed with HHC underwent laparoto- my, which was performed through a right subcostal incision in 28patients (43.7%), extended Right subcos- tal in 25 patients (39%) for cyst in left or both lobes and midline incision in 11 patients (17.1%), 3 patients were emergency operations and 8 patients multiple hydatid cyst.

In our series, patients are treated by three surgical procedures to deal with the remaining cavity of HHC which included (external drainage, omentoplasty and combination of both procedure drainage and omento-plasty).

In external drainage procedur e, this method used for HHC size (7-21) cm and the contains of cyst were pure hydatid fluid in 25 patients, bile stained in 2 patients and infected in 1 patient. A high morbidity (biliary discharge, wound infection and abscess in cavity) was found in external drainage in 13 patients (46.4%) and long period of hospital stay 9 days (mean hospital stay), the high morbidity due to high wound infection rate in 7 patients (25%), biliary leak in 4patients (14.1%) and abscess in cavity in 2 patients (7.1%).

But in study by Al-Janabi; 16 at Al-Rasheed Military Hospital the morbidity was higher (55%) while in study in Turkey by ERGUNERDEM *et al* [15], the morbidity was highest (58.3%) and hospital stay was 19 days (mean hospital stay).

In omentoplast, this method was used in 19 patients (29.6%), this method used for HHC size (7-16) cm and the contains of cyst were pure hydatid fluid in 13 patients, bile stained in 6

patients and there is no infected cysts. The morbidity was in 2 patients (10.5%) and the Hospital stay 5days (mean hospital stay).

The morbidity was less than other methods, the low morbidity in this method due to no cases of biliary leak or abscess in cavity but there is two patients of wound infection and these results agree with study by Al-Janabi; 16 at Al-Rasheed Military Hospital the morbidity was (9.5%) and also agree with study in UK by STAVROSE *et al* [17], the morbidity was (9.7%) and Hospital stay 9.9 days (mean hospital stay).

The low morbidity in omentoplasty is because this method has the advantage to seal off small biliary fistulas, promote absorption of serosal fluid and an immunological effect but the limitation of this method are omentum excised in previous surgery, small omentum and in the children [18].

In method (drainage and omentoplasty), this method used for HHC size (8-13) cm and the contains of cyst were pure hydatid fluid in 16 patients, bile stained in 1 patient and there is no infected cysts. The morbidity was in 5patients (29.4%) and the Hospital stay 6 days (mean hospital stay), in this method there is 1 patient (5.8%) with biliary leak and 4 patients (23.5%) of wound infection, it is different from study by Al-Janabi; 16 at Al-Rasheed Military Hospital the morbidity was (50%) while in a study in Athena by Alkis Kostakis *et al* [19], the morbidity was (22.5%) and Hospital stay 10 days (mean hospital stay).

So the omentoplasty alone decrease post-operative complication and hospitalization.

Conclusions

1. The remaining cavity is the main surgical problem which lead to many complications and increase hospitalization period.
2. The morbidity was a highest in external drainage method and least in omentoplasty.
3. So, the omentoplasty method is simple and can be performed in the majority of patients.

Recommendations

1. Fallow up the patient; regarding the fate of residual cavity and recurrence.
2. Further study for assessment the relationship be- tween the size of cyst and complications.

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