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Original Research Article

Percutaneous Treatment of Liver Hydatid Disease, Clinical Experience with 22 Patients

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Abstract

The purpose of this study was to assess the efficacy and validity of the puncture-aspiration –injection and re-aspiration (PAIR)and catheterization in the percutaneous treatment of hydatid cyst disease of the liver. This is aprospective study that had been performed in a major hospital in Basra city, Iraq for the period between April 2010 and May 2014 in which 22 patients with a diagnosis of hydatid cystic disease of liver subjected to a percutaneous treatment using PAIR technique or catheterization method under ultrasonographic guidance and under cover of albandazol or mebandazol before and after intervention .Following aspiration of the cystic fluid ,hypertonic saline 20% was injected into the cystic cavity and re-aspirated .Subsequent follow up and observation was carried out by ultrasonic examination to assess the efficacy and of this approach.Twenty four cyst (72.7%) in this study was GharbiIcyst, 4 patients (18%) had type II and 2 patients only had type III. The mean reduction in the volume of the cyst after 9-12 months follow up period was 92.6% and 87.5% in catheterization and PAIR method respectively .All patients were in very good condition. Liver and blood tests were normal after intervention. Solidification and pseudotumor was seen in 18 patients (81.8 %) and calcification was seen in 12 patients (54.5%).The mean hospitalization time was 3 days. Percutaneous treatment for selected patients with type I –III Gharbi hydatid liver cyst is effective and safe procedure .It offers complete cure with infrequent complications and short hospitalization. Surgery however, remains the gold standard treatment for multivesicular, infected and complicated cases of hepatic liver cysts.

Key words: Liver hydatid cyst, Percutaneuos treatment, scolicidal agents.

الخلاصة

دراسة مستقبلية انجزت في احدى المستشفيات الكبرى في محافظة البصرة للفترة بين نيسان 2010 وايار 2014, شملت 22 مريضا بمرض اكياس الكبد المائية الغرض من هذه الدراسة هو لتقييم فعالية وصحة طريقة علاج مرض الاكياس المائية في الكبد عن طريق الجلد بالطريقة المعروفة اختصارا ب(ثقب, سحب, حقن, اعادة سحب الكيس) او عن طريق قسطرة الكيس تحت توجيه السونار مع تغطية دوائية بعقار البندازول او المبندازول قبل و بعد أي تداخل. تتلخص هذه الطريقة بسحب سائل الكيس المائي عبر الجلد بواسطة حقنه خاصة ثم حقن الكيس بمحلول ملحي مكثف بتركيز 20%و من ثم اعادة سحب هذا المحلول. تم اجراء هذه الطريقة على 33 كيس موزعه على 22 مريض.كان معدل الانخفاض في حجم الاكياس بعد 9 الى 12 شهر متابعه 92.6% و 87.5% في كل من التداخل بواسطة القسطرة و طريقة (ثقب,سحب, حقن,اعادة سحب) على التوالي. ان طريقة علاج اكياس الكبد المائية عن طريق الجلد وفق معايير ومواصفات معينه هي طريقه امنه وفعاله وقليلة المضاعفات.

Introduction

Hydatid disease is zoonotic infestation caused by the larva the tape-warm *Echinococcus* [1] species. The distribution of the diseases is over all the world but is endemic in certain area like Mediterranean, middle east, fareast, southAmerica, Baltic areas and south Africa. The only species of importance to the human are *E.granulosus* and *E.multilocularis* [2] Infectiontransmitted by fecal- oral route and the disease acquired by ingestion of the parasite eggs shaded in the feces of the

definite host like carnivores and rodentsthat carries he adult warm in its intestine .The eggs hatch after ingestion by the intermediate host which is usually herbivores, including human infected accidentally [2].

Human cystic echinococcosis or hydatid cyst disease is a zoontic infestation caused by the larval cystode *Echinococcusgranulosus* [1,3] Hyppocrate described hydatid disease about 2000 years ago .The disease remains endemic in sheep rearing areas of the world like middle east ,Asia, Mediterranean regions, Africa, South America, Australia and New Zealand Dogs are the definite host for *E. granulosus* and sheep are the major intermediate host. Human are only infected incidentally .The liver is the most frequent site for the cystic lesion seen in the hydatid disease followed by the lung, the brain and other viscera [3,4].

The liver is the most commonly affected organ(about 50-70%).Lungs being the second frequent site.Approximately 80% of the hepatic hydatid cyst are solitary and found in the right liver lobe [4]. Surgical therapy was the main curative treatment for decades although it is usually not necessary for a very small or calcified (dead) cysts. The surgical treatment mandates radical excision of the cyst by a pericystoctomy procedures or occasionally by a partial hepatoctomy.The cyst is usually aspirated followed by injection of scolicidal agents to decrease spillage[4]. The scolicidal agents which are frequently used include hypertonic tonic saline or o.5% silver nitrate,70-90% ethanol, povidone iodine 10 and hydrogen hydroxide, with exception of hypertonic saline the use of other agents is limited by presence of cystobiliary fistulae due to fear of inducing chemical cholangitis and seclorsing cholangitis later on.[5]

Although the surgery is the gold standard treatment of the hydatid liver disease, drainage of the cyst percutaneously after a period of antihelimanthictreatmentis increasingly practicedin many centers, particularly in endemic areas. With the presence of effective anti-echinoccocal agents, percutaneuos aspiration of the cyst under ultrasound guidance now increasingly carried outaccompaniedby drug therapy consisting of albandazol or mebendazol given before and after aspiration [5,6].

The main goals of surgery in hydatid disease in general are to inactivate and killing the cestode of parasite, evacuation of the cyst cavity, removal the germinal active layer and obliteration of the residual cavity [6]. Percutaneous treatment satisfies all of these goals but substitute germinal membrane separation by means of scolisides. Aspiration, proctoscoliside injection and repetitive lavage under ultrasound guidance (PAIR technique, puncture–aspiration–injection-respiration) are considered as a modern modality trans-cutaneous approach. This approach was approved and recommended by WHO as an alternative method to surgery in selected types of cysts and for selected patients [7].

Percutaneous aspiration of liver hydatid cyst can be done if there is no communication with biliary ducts depending on certain specific criteria, such as no previous history of cholangitis ,normal liver function test, normal biliary tree by ultrasound ,CT ,MRI, watery cystic content during the initial aspiration and no diffusion of the scolicidal agents under real–time ultrasound study[8,9].

The aim of this study was to present and analyze the results and effectiveness of percutaneous intervention of hepatic hydatid cyst for 22 patients.

Materials and Methods

This is a prospective study conducted in one major hospital in Basra for 4 years period between April 2010 and May 2014 on 22 patients presented with33 liver hydatid cysts (16 males and 6 females, M:F ratio 2.5:1) with age range between 18 and 68 years (mean age 42.6) treated by percutaneous intervention which either PAIR technique or catheterization .These patients are selected according to the following criteria: patients with hydatid liver disease who accepted the procedure as an alternative choice to surgery, inoperable and unfit patients, patients refuse surgery, hydatid liver cyst with difficult surgical

approach, patients with hepatic failure or other vital organ failure in whom surgery is contraindicated,CL, CE1, CE2 types of hepatic hydatid disease according to WHO classification/Gharbi type 1 and 2 and

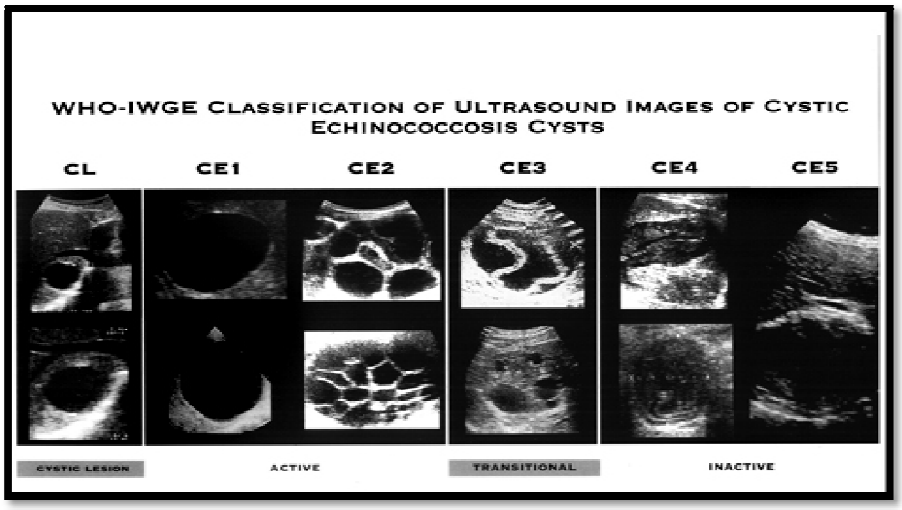

Figure 1: WHO classification of hadatid liver cysts according to images obtained by ultrasound

Gharbi	WHO	US characteristics
Type 1	CE1	Unilocular cyst + wall + internal echogenicities
Type 2	CE3	Detached membrane
Type 3	CE2	Multivesicular, multiseptated cyst, daughter cysts
Type 4	CE4	Heterogeneous cyst, no daughter vesicles
Type 5	CE5	Cyst with a wall calcification

WHO: World Health Organization, CE: Cystic Echinococcosis.

Figure 2: Hydatid cyst types according to Gharbi, WHO and ultrasonic features.

occasionally type 3 and lastly cyst larger than 5cm in various liver segments. Patients who are excluded from this type of treatment are: difficult and inaccessible cysts, multi-septated cyst (honey-comb cyst), hyperechogenic cyst,Cyst communicating to the biliary ducts, hydatid cyst type CE3, CE4 and CE5 according to WHO classification and those patient with pulmonary hydatid cyst.

After taking a detailed history and thorough physical exam, the diagnosis was made by ultrasonic examination and serological tests.The cysts are classified according to WHO and Gharbiclassification. CT scan was done for some patients when the relation of the cyst to the surrounding structures like vessels and the biliary ducts are required.

The relation of hydatid cyst to the normal liver tissue was determined and the site of cyst puncture was localized in such a way that the cyst could be reached through thick normal liverparanchyma. Antihelimenthic drug inform of albesndazol tablet in a dose of 10 mg /kg body weight twice daily was given week prior to the procedure. Drugs to be used in case of allergic reaction – anaphylaxis such as epinephrine and hydrocortisone were always available and stand by. Blood pressure measurement and intravenous cannula was left in the forearm before beginning the procedure so that resuscitation can take place immediately should the need arise.

The study were conducted accordance with the ethical standards of the responsible ethical committee. Both ethical approval and informed written consent from all

patients were obtained. The procedures done under ultrasound guidance with infiltration of local anesthesia and under strict aseptic technique in the ultrasound department . Initial puncture was done using an 18Gneedleby trans-cutaneous trans-hepatic approach and most of the cystic fluid is aspirated leaving only little amount to follow the needle tip within the cystic cavity by ultra sound.The aspirated fluid then was examined by dipstick test for the presence bile to rule out cysto-biliary communication .If we discover any communication with the biliary tree, we stop the procedure. Afterbiliary communication was excluded, the scolicidal agent (20% hypertonic saline) of approximately half of the initial aspirated cyst fluid is injected inside the cyst to be re-aspirated after 20 minutes.

If the cystsize more than 5cm, the catheterization method was adapted which involve injection of hypertonic saline solution into the cyst and size 9 French pigtail catheters are inserted to ensure drainage for 24 hours. The catheterization method described above was applied for 6 cysts(3males, 1 female).

In present study, we adapted percutaneous aspiration (PAIR technique and catheterization) for 33 hydatid cysts as a minimally invasive approach. The intervention is usually done under albendazole prophylaxis started one week before the procedure and continue for one month after it. All cysts are punctured under sonographic guidance. Cyst fluid is sub-totally aspirated; Hypertonic saline 20% is injected, scolisidals are re-aspirated after 20 minutes. Following intracystic injection of socolicidal,both germinal layer and protoscolecis become immediately non-viable. The procedure is recorded successful if the detachment of endocyst occurred, rupture of daughter cyst noticed and non-viable protoscolecis seen by microscopic exam of the cyst fluid. The success of the PAIR is confirmed by ultrasound when heterogeneous refection of the cystic content is seen after 3 months, obliteration and solidification (pseudotumor) at 6 months or loss of echogenecity and complete disappearance of cyst after 12 months follow up period.

The average duration of the procedure was 30 minutes (20-45minutes) and the average duration of the hospital stay was 2 days.

Albendazol was continued for one month after intervention to avoid recurrence. All patients were followed up by ultrasound exam immediately after the procedure, one month later and every 3 months later for one year.

The procedure is considered successful only if there is a decrease in the cyst size, progressive cyst solidification, appearance of solid mass in the cyst or presence of the calcification in the cystic wall.

Results

The study included 22 patients presented with 33 hydatid liver cysts. There were 16 males(72.7%) an 6 females patient (27.3%) with age range from 18- 68years (mean age 42.6 years).All patients were subjected to ultrasound exam and only 6 patients subjected to abdominal CT examination. All patients had chest X ray done to exclude a co- incidental pulmonary hydatid disease.

Most of the patients presented with vague upper abdominal pain and discomfort (no.17)(77.3%).The diagnosis of the liver hydatid in the other 5 patients was an incidental for non-related complaintor during ultrasonic examination for other problems. Pyrexia was noted in 4 patients (18%).Obstructive jaundice was absent in all patients. Twenty six of the cysts were less than or equal to 5 cm diameter .The remainder were lager than 5 cm.

Fifteen patients had single cyst, 5patients had 2cysts and 2 patients only had 3 cysts. These hydatid cysts were classified in accordance toGharbiclassification. The majority of the cyst were Gharbi type 1 (24 cases, 72.7%), 6 cysts were Gharbi type II (18.2%) and 3patients had type III.Most of these cysts (27, 81.8%) were treated by simple PAIR. The remaining large 6 cysts were drained with 9 F pigtail catheter.

Major complications were not noted in this study in any of the patients. Urticariawas noted in 2 patients only, it was mild and

treated successfully by antihistamine .Mild fever noted in 3 patients and treated by antibiotic and intravenous fluid. Three patients developed leakage.These leakage was confined to Morrison pouch confirmed by ultra sound examination and were treated successfully by intravenous cephalosporin and metronidazole. All leakages are resolved after one week on this conservative treatment. All the patients in this study showed a good response to percutaneous drainage of the liver cyst both by PAIR method and catheterization. We followed the patients every 3 months by ultrasonography for one year after intervention.

The reduction in the size of the cysts3 months after intervention was more than 75% in all patients. One year from the initial intervention, ultrasonic examination of all cysts revealed an average reduction of the cysts size by 87.5% and 92.6% in catheterization and PAIR technique respectively .All (100%) of the cysts aspirated showed collapsed of the cyst cavity. Solidification (pseudo tumor) was observed in 25 cysts (75.75%).Calcification observed in 8 cysts (24.2%) and residual cavity in 4 cysts (12%).

No mortality is encountered in this study and no recurrence of the hydatid disease after percutaneous drainage in any patient during the follow up period of one year.

Table 1: Distribution of cyst acceding to Gharbi classification before intervention

Gharbi classification	Cystic feature	No. of the cysts treated with PAIR	No. of cysts treated with catheterization
Type 1	Pure cystic lesion	22	2
Type2	Cystic lesion with segregated membrane	4	2
Type3	Cyst with multiple septa/daughter vesicle	2	1
Type4	Semisolid lesion	—	—
Type5	Cyst with calcified wall	—	—
Total		28	5

Table 2: complications noticed during intervention

Complications	PAIR method	Catheterization
Anaphlaxis	0	0
Urticaria	1	1
Fever	2	0
Bleeding	0	0
Extravasation	2	1
Cystic rapture	0	0
Biliary fistula	0	0
Infection	0	1

Table 3: Treatment outcome during the follow up period

Cystic size after treatment	Cysts treated with PAIR	Cysts treated with catheterization	Total
-Collapse	27	6	33(1oo %)
-Reduction of less than 75% cystic size after 3 months	3	0	3(9%)
-Reduction ofmore than 75% cystic size after 1 year	24	6	30(91%)
-No significant change in size	0	0	0
Relapse	2	0	2(6%)
-Solidifications	20	5	25(75.6%)
-Calcification	5	3	8(24%)
-Residual cavity	4	0	4(12%)

Discussion

Hepatic hydatid disease is an important public health problem in many parts of the world. The disease may remain asymptomatic for years before giving rise to any symptoms and its usually diagnosed as an incidental finding by imaging or could be presentas a complications [7].Management of uncomplicated hepatic hydatid cyst was always surgical .However, thepuncture, aspiration, injection and re-aspiration(PAIR method) with or without anti-helimenthicdrugs has appeared in recent years an alternative to surgery [8].

For many years, percutaneous aspiration of hydatid cyst was contraindicated because ofpossible risk of spillage and anaphylactic shock .However unintended or accidental cases of the cyst puncture showed no significant complication.[9] The so called PAIR technique was then described by Muller 1985 accidentally and later on reported in case series with variable results, most of these studies concluded that technique was safe and effective. PAIR is performed usually under ultrasound guidance or occasionally under computed tomography(CT) and includes drainage of the cyst with fine needle or catheter followed by instillation of protoscolicidalagents (e.g., hypertonic saline or 95% alcohol) into the residual cavity. As supplementary therapy, Benzimidazole derivatives are prescribed before and/or after aspiration followed by serial serological test; the overall results have been reported as a good to excellent in several series[10].

The advantages of PAIR can be summarized by being less invasive, less risk than surgery , aspiration of large numbers of protoscolices with aspirated fluid and short hospitalization. However, PAIR procedure is not without risks .The main risks of this technique are risk of any puncture (hemorrhage, infection),anaphylactic shock, recurrentechinococcusis caused by spillage ,biliary fistula and persistent of the cyst .Regardless,PAIR is considered safe and efficient and has been published and approved by the world health organization (WHO) [7,9,11,12].

PAIR is a safe technique with high success rate of 80-100% and low relapse rate (0-4%) recordedin various series[11,12].In our study the success rate was 87.5% for PAIR technique and 92.6% in catheterization method. Relapserate was 0% and the complication rate was negligible. Anaphylactic shock and peritonitis was 0% in this study .Only Gharbi typeI-III hydatid cyst were included and treated in this study .Type IV cyst contains echogenic material which is tough enough to drained and type V cyst shows classification which is a sign of healing and natural evolution of the hydatid cyst and thus excluded from the study .This quite consistent with other similar studies [8,10,13].

Precutaneousdrainage of liver hydatid cyst without drug therapy has tried and recorded by some authors [12,13].However, concomitant pre and post interventional chemotherapy with albandazol or mebendazol offers the advantage of greatly reducing the risk of recurrence and intraperitoneal seeding that may be happened during cyst rupture and spillage occurring either spontaneously or during puncture of the cyst [14].

Although different scolicidal agents were used during percutaneous injection and drainage in different studies [11,13,14].We used hypertonic saline solution in concentration of 20% as main scolicidal agents to all our patients .Hypertonic saline exerts its scolicidal effect by producing a strong osmotic gradient pressure across the peripheralcuticularmembrane of the protoscolacs which results in its lyses and death. For cyst greater than 6 cm or for multiseptate type III Gharbi cyst,some authors advised the use of absolute alcohol in concentration of 95% due to its powerful sclerosing agent than hypertonic saline .Alcohol however, should not be used if preexisting biliary communication is suspected because alcohol may induce chemical cholangitis .We avoid this agent in our patients.

All the patients were followed up by serial so no graphic examination and the response to percutanous aspiration were assessed through a series of progressive changes in

the echopattern of the cyst .We found that there an instantaneous detachment of the germinal active layer before pericyst after injection and aspiration of the hypertonic saline. Later on, there is a reduction in cyst size, reduction of the fluid contents of the cyst, solidification of the internal cyst (pseudotumorformation) and eventual disappearance of the cyst noticed after 9-12 months follow up period in many patients in this study.

The average reduction in the volume of the cyst after one year follows up period was 92.6% and 87.5% in the catheterization and PAIR patients respectively. The solid appearance of residual cyst indicates complete cure .The average time for solid appearance of the cyst was 8 months for catheterization patients and 12 months for PAIR technique patients. Twenty one out of 22 patients were cured, whereas one recurrence (4.7%) was observed. No peritoneal dissemination or tract seeding occurred and no mortality recorded in this study. Derangement of the hepatic function was not observed in any patient during overall course of the therapy. Paksoy etal [14] showed in their series, PAIR therapy with oral albendazol was effective in the management echinococcosis. Bosanac etal [16] observed cystic size reduction in all their patients. Many other long term results [13,15,17] indicate that PAIR therapy is asefficacious as surgery and has a low complications rate in comparison. It is preferred modality of treatment in children.

Residual cystic area was noticed in 4 patients (18%) in this study .This residual cystic area was probably due to large size of the cyst. Mueller etal and Goktay etal[3,18] did not observe any significant residual area residual cystic area in their series over follow up period of 3 years. Major complication such as anaphylactic shock, peritonitis and biliary fistula were not observed in our patients .Many authors [5,9,14,16]did not observe these complications in their series as well.

Limitations of this study include short follow up period (one year) which is relatively short and insufficient period for recurrent cases to be traced and detected. Other important limitation of this work is the lack of comparison of percutaneous treatment with outcomes of similar patients subjected to surgical treatment.

Conclusion

Percutaneous treatment of liver hydatid cyst with preoperative and post-operative albandazol or mebandazol antihelimenthic treatment is a safe and effective procedure especially for type I-III Gharbi hepatic hydatid cyst, especially in patients unfit for surgery. It is safe, feasible and minimally invasive procedure with short hospitalization and associated with greater clinical and parasitological efficacy .The procedure associated with less major and minor morbidity, very lower rate of mortality and recurrence. Surgery is reserved for hydatid cyst refractory to percutaneous treatment, Gharbi IVand V and the presence of cystobiliary communication and multi-vesicular cysts.

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