PAIR for Hepatic Hydatid Cyst: A study in tertiary care hospital in Nepal

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Abstract

Introduction: The purpose of this study was to assess the outcome of PAIR in patients with hepatic hydatid cysts.

Methods: A total of 17 hepatic hydatid cysts were treated by PAIR in a tertiary care teaching hospital in Nepal from June 2007- May 2009. In all cases, local anesthesia was applied. All the patients were kept in supine except 1 where the patient was kept in left lateral position due to location of the cyst. A spinal needle of 18G was used to puncture the cyst. A connecting tube was attached at the hub of the needle to facilitate the aspiration & to prevent the accidental dislodgement of the needle. 95% alcohol was used as scolecidal agent in 12 cysts & 20% hypertonic saline in 5 cysts. The process was repeated in when the aspirated fluid was > 100 ml.

Results: A total of 17 hydatid cysts of liver were treated with PAIR under ultrasound guidance. The age of the patient ranged from 10-76 years. All patients had signs & symptoms of a hepatic mass caused by the cysts. All the cysts had prominent fluid component which was anechoic or hypoechoic with marked enhancement of back wall echoes on USG. A few patients had CT sans owing to the location of the cysts. Majority of the cysts were in right lobe (12) & rest were in the left lobe (5, one patient had two cysts). The maximum amount of fluid aspirated was 1000 ml. The volume of alcohol / hypertonic saline was 1/3rd of the aspirated fluid. No major complication was found in any of the patients. Following aspiration all the patients were relieved of their symptoms. Follow up ultrasonogram showed decrease in diameter of the cyst.

Conclusion: Among the treatment modalities of hydatid disease though surgery is the first choice treatment, it is associated with considerable morbidity. Chemotherapy with benzimidazoles carbamates is palliative as it is poorly absorbed by the intestine & is unable to diffuse across the cyst wall. PAIR has the benefits of minimal invasiveness, less morbidity & hospital stay as compared to surgery along with confirmation of diagnosis (parasitological examination of the fluid) and cost-effectiveness among others.

Key words: Echinococcus, hydatid cyst, liver, PAIR

Introduction:

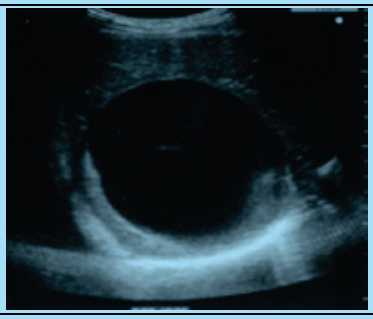
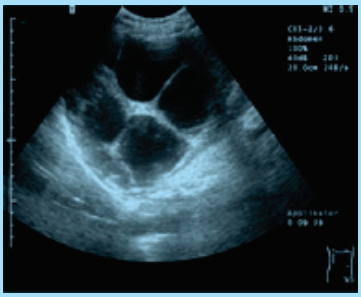
Hydatid disease is a parasitic infestation by a tapeworm of the genus Echinococcus. Of the 4 known species of Echinococcus, 3 are of medical importance in humans. These are Echinococcus granulosus, causing cystic echinococcosis (CE); Echinococcus multilocularis, causing alveolar echinococcosis (AE); and Echinococcus vogeli. E granulosus is the most common of the three. E multilocularis is rare but is the most virulent, and E vogeli is the most rare.[1]

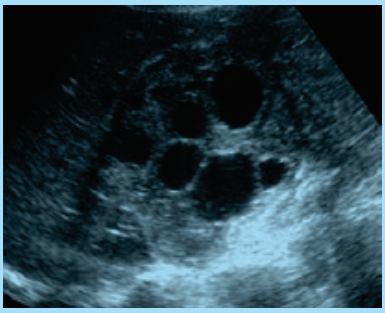
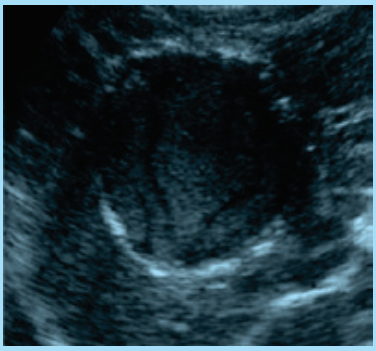
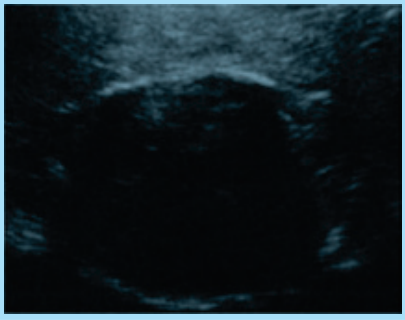
Many hydatid cysts remain asymptomatic, even into advanced age. Parasite load, the site, and the size of the cysts determine the degree of symptoms. Symptoms due to pressure usually take a long time to manifest, except when they occur in the brain or the eyes. Most symptomatic cysts are larger than 5 cm in diameter.

Theoretically, echinococcosis can involve any organ. Organs affected by E granulosus are the liver (63%), lungs (25%), muscles (5%), bones (3%), kidneys (2%), brain (1%), and spleen (1%). The liver is the most common organ involved, followed by the lungs. These 2 organs account for 90% of cases of echinococcosis[1].

The advent of modern imaging techniques, in particular ultrasound, represented a breakthrough in the diagnosis, treatment, and follow-up of patients with CE. With this new tool at hand, clinicians have been striving for an imaging based classification of CE cysts for the past 25 years [2,4] and to correlate individual cyst stages with the natural history and treatment-induced involution processes of the cysts. Two classifications are most frequently used: the Gharbi and the WHO Informal Working Group on Echinococcosis (IWGE) classification (Table 1)[3, 5]. As shown in Table 1, the WHO classification is almost the same as Gharbi's, with Gharbi type II corresponding to CE3a and vice versa. However, there are two important additions in the WHO classification: the predominantly solid cyst with daughter cysts, which was not explicitly included in Gharbi's classification, has been found a place in the CE3 slot, and the types are now grouped according to their biological activity (Table 1; far right column). This has important consequences for treatment decisions.

Table 1: Ultrasound classification of echinococcal cysts[3, 5]

Gharbi	**WHO IWGE 2001**	Image	**Description**	**Stage**
Type I	CE1		Unilocular unechoic cystic lesion with double line sign	Active
Type III	CE2		Multiseptated, "rosette-like" "honeycomb" cyst	Active
Type II	CE3 A		Cyst with detached membranes (water-lily-sign)	Transitional

Type III	CE3 B		Cyst with daughter cysts in solid matrix	Transitional
Type IV	CE4		Cyst with heterogenous hypoechoic/hyperechoic contents. No daughter cysts	Inactive
Type V	CE5		Solid plus calcified wall	Inactive

TREATMENT MODALITIES CURRENTLY IN USE

1. Surgery: For many years, surgery has been the only treatment available for CE. Surgical procedures range from simple puncture and aspiration of cyst content to partial resection of the affected organ. An immediate cure is claimed for surgical treatment of liver cysts, but even with radical procedures, this is far from being achieved, with morbidity, mortality, and relapse rates of 32%, 8%, and 20%, respectively[6-8]. In patients with complicated cysts (rupture, cysto-biliary and most cases of cysto-bronchial fistulas, compression of vital organs and vessels, hemorrhage, secondary bacterial infection), surgery maintains its place as the treatment of choice. In uncomplicated liver cysts, surgery is increasingly being replaced with other treatment options (percutaneous treatment in liver cysts, chemotherapy, watch and wait) depending on the stage of the cyst.

2. Benzimidazoles: Since 1961, several benzimidazoles have been developed for the treatment of helminithic disease and in the early 1970s benzimidazole was shown to be effective against echinococcus granulosis. Albendazole is most commonly used for the treatment of hydatid disease. Many results of medical treatment with albendazole and mebendazole have been reported.[9,10] However, chemotherapy with benzimidazoles carbamates is palliative as it is poorly absorbed by the intestine & is unable to diffuse across the cyst wall.

3. Percutaneous treatment: Percutaneous treatment

of abdominal CE was introduced in the mid-1980s.[11] Initially received with skepticism by some, it developed into an attractive alternative to surgery and benzimidazole derivatives for certain cyst stages. These treatment modalities aim to destroy the germinal layer with scolicidal agents or to evacuate the entire endocyst.

Destruction of the germinal layer: *PAIR.* Historically, the first percutaneous treatment used was to puncture the cyst, aspirate cyst fluid, inject a scolicidal agent, and re-aspirate the cyst content (PAIR).[12, 13] The classic PAIR technique is widely known. Several series with minor variations of the essential steps have been published.[14-16] The technique is increasingly being used as documented in the literature.[17-19] Those studies have shown that PAIR combined with periinterventional benzimidazole derivatives to be as effective as open surgical drainage with fewer complications and less cost.[19] The study from Turkey reported a single-center experience comparing surgery, laparoscopic surgery, and percutaneous treatments in 355 patients over a period of 10 years and concluded that PAIR is an effective and safe option.[20-22] Other authors also claimed that the rate of clinical and parasitologic cure was greater in patients receiving PAIR plus chemotherapy than in those receiving surgery. Disease recurrence, major complications (anaphylaxis, biliary fistulas, cyst infection, liver/intraabdominal abscesses and sepsis), minor complications, and death occurred more frequently among patients treated with surgery than among patients treated with PAIR. The mean durations of hospital stay were for patients treated with PAIR was also shoter than surgical control group. Some other authors [21, 23] reported repeated failures of PAIR in multivesiculated cysts (CE2 and CE3B). These findings prompted most clinicians to use PAIR exclusively for unilocular cysts, with or without detached endocysts.

The PAIR technique can be performed on liver, bone, and kidney cysts but should not be performed on lung and brain cysts. The cysts should be larger than 5 cm in diameter and type I or II according to the Gharbi ultrasound classification of liver cysts. PAIR can be performed on type III cysts as long as it is not a honeycomb cyst.

The indications of PAIR include inoperable patients; patients refusing surgery; multiple cysts in segment I, II, and III of the liver; and relapse after surgery or chemotherapy.

Contraindications for PAIR are early pregnancy, lung cysts, inaccessible cysts, superficially located cysts (risk of spillage), type II honeycomb cysts, type IV cysts, and cysts communicating with the biliary tree (risk of sclerosing cholangitis from the scolecidal agent).

The reduced cost and shorter hospital stay associated with PAIR compared to surgery make it desirable. The risk of spillage and anaphylaxis is considerable, especially in superficially located cysts, and transhepatic puncture is recommended. Sclerosing cholangitis (chemical) and biliary fistulas are other risks. Experience is still limited, but early reports are supportive of this technique if the indications are followed.

Methods:

PAIR was performed in 17 hepatic hydatid cysts in a tertiary care teaching hospital in Nepal for a period of two years. The procedure was performed under USG guidance & fluoroscopy was performed when necessary. In all cases, local anesthesia was applied. All the patients were kept in supine except [1] where the patient was kept in left lateral position due to location of the cyst. A spinal needle of 18G was used to puncture the cyst. A connecting tube was attached at the hub of the needle to facilitate the aspiration & to prevent the accidental dislodgement of the needle. The cyst fluid was first aspirated. In cysts located adjacent to or near the biliary system intravenous contrast material was injected into the cyst through the needle & observed fluoroscopically for any communication with biliary system. Once it was ruled out, 95% alcohol was used as scolecidal agent in 12 cysts & 20% hypertonic saline in 5 cysts. Scolicidal agent was kept inside the cyst for 15-20 minutes and then reaspirated. The process was repeated in when the aspirated fluid was > 100 ml.

Results:

A total of 17 hydatid cysts of liver in 16 patients were treated with PAIR under ultrasound guidance. There were 7 male & 9 female patients with a female patient having 2 cysts. The age of the patient ranged from 10-76 years.

The majority of the cysts (79%) were in right lobe & rest (21%) were in the left lobe with one patient had two cysts. The type of cysts according to Gharbi's classification were as follows: 11 (64.8 %) of the cysts were Type 1, 3 (17.6 %) of the cysts were type 2 & 3 (17.6 %) were type 3.

Cyst characteristics and locations are showed in figure 1 and 2 .

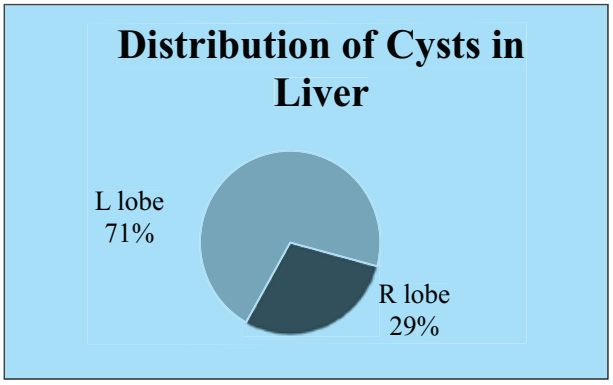


Figure 1: Distrubution of cysts liver lobes

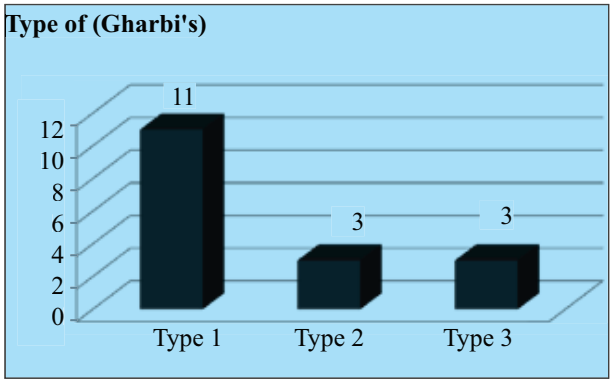


Figure 2: Type of Hydatid Cysts (Gharbi's Type)

All patients had signs & symptoms of a hepatic mass caused by the cysts. All the cysts had prominent fluid component which was anechoic or hypoechoic with marked enhancement of back wall echoes on USG. A few patients had CT scans owing to the location of the cysts.

The amount of initial fluid aspirated was 30 – 1000 ml. The volume of alcohol / hypertonic saline was 1/3rd of the aspirated fluid with volume ranging from 10 – 320 ml. No major complication was found in any of the patients. Following PAIR all the patients were relieved of their symptoms. Among 17, only 10 (59%) cysts were followed up. Seven cysts (41%) could not be followed up. The follow up period was from 1 – 52 weeks. Patients who came for follow up showed either decrease in diameter of the cyst or changed in appearance of the cyst (from cystic to solid) (Figure 3, 4, 5).

Figure 3: Photograph showing aspiration of the cyst under USG guidance & fluid collection

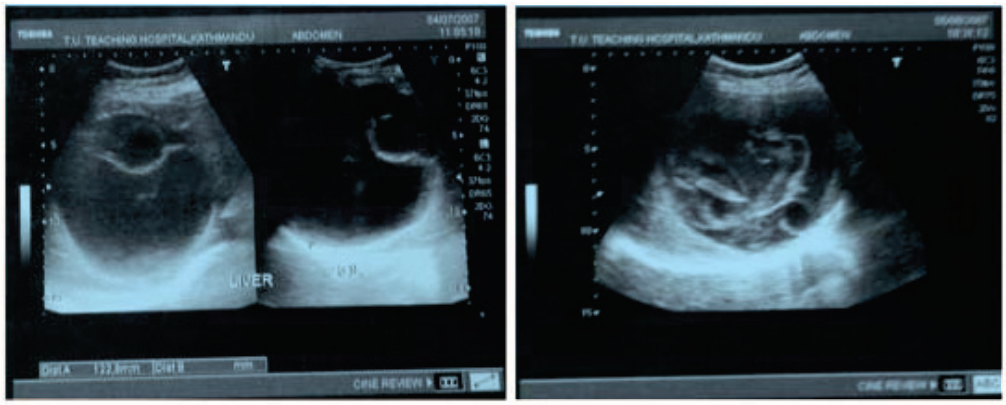


Figure 4: Ultrasonographic images showing Pre (04/07/2007) & post PAIR (05/08/2007, 1 month) hepatic hydatid cyst

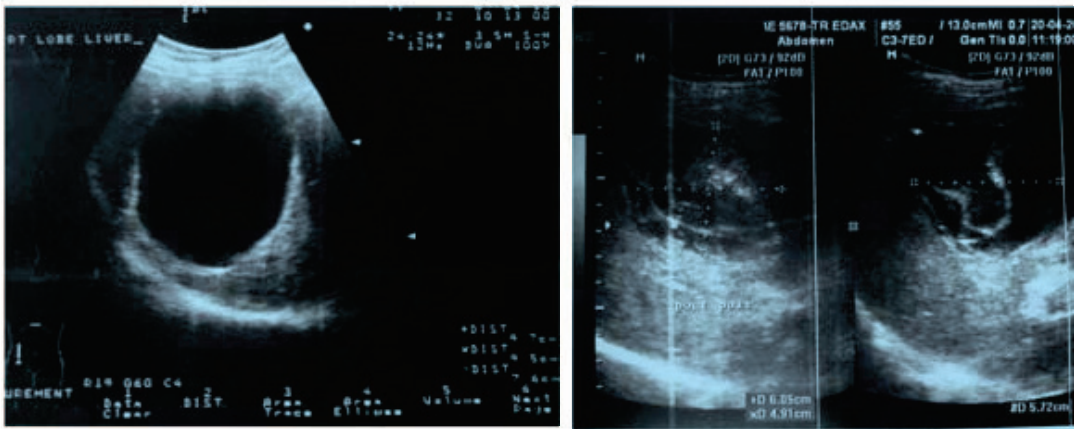


Figure 5: Ultrasonographic images showing Pre (08/01/2009) & post PAIR (4 months, 01/05/2009) hepatic hydatid cyst

Discussion

Hydatid disease caused by *E. granulosus* is a common medical problem in many countries including Nepal. The conventional treatment of hydatid liver disease is surgery, which is associated with considerable mortality, morbidity, and high recurrence rates.

Recently, results of medical treatment with albendazole and mebendazole have been reported.[22, 23] However, chemotherapy with benzimidazoles is palliative as it is poorly absorbed by the intestine & is unable to diffuse across the cyst wall.

Percutaneous treatment of abdominal CE was introduced in the mid-1980s[11]. The classic PAIR technique is widely known. The technique is increasingly being used as documented in the literature.[17-19] Those studies have shown that PAIR combined with periinterventional benzimidazole derivatives to be as effective as open surgical drainage with fewer complications and less cost.[19] The cysts are sterilized with a scolicidal agent, such as hypertonic saline, silver nitrate, 90% alcohol, cetrimide, hydrogen peroxide, benzimidazolic solutions, or formalin

In our study we used 95% alcohol or hypertonic saline as scolecidal agents. PAIR was performed in WHO type I & II hydatid cysts with diameter more than 5 cm. No major complications occurred during the procedure. Follow up studies show reduction in size of the cysts.

Conclusion:

Among the treatment modalities of hydatid disease though surgery is the first choice treatment, it is associated with considerable morbidity. Chemotherapy with benzimidazoles carbamates is palliative as it is poorly absorbed by the intestine & is unable to diffuse across the cyst wall. PAIR has the benefits of minimal invasiveness, less morbidity & hospital stay as compared to surgery along with confirmation of diagnosis (parasitological examination of the fluid) and cost-effectiveness among others. Hence percutaneous treatment of hepatic hydatid cysts is a safe, easily applicable, well-tolerated, and effective method.

Conflict of interests: None declared.

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