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International Journal of Surgery Open

journal homepage: www.elsevier.com/locate/ijso

Research Paper

Liver hydatid diseases of the pregnancy: Management approaches and outcomes

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ARTICLE INFO

Article history:

Received 7 January 2021

Received in revised form

25 January 2021

Accepted 18 February 2021

Available online 25 February 2021

Keywords:

Hydatid disease

Pregnancy

Echinococcosis

Albendazole

PAIR

Surgery

ABSTRACT

Background: Although hepatic hydatid disease is infrequent during pregnancy, it could be hazardous for both the mother and the fetus. Most cases of hydatid cysts during pregnancy are asymptomatic and discovered accidentally during prenatal care. The diagnosis of hepatic hydatid disease is easy and straightforward but the management is difficult and problematic.

Objective & method: We present 12 pregnant patients of various gestational age discovered to have hepatic hydatid disease during antenatal period or for investigation for non-specific symptoms. Their representations, diagnosis and treatments options and outcomes were studied and assessed.

Results: A retrospective cohort study in which 12 consecutive pregnant patients of different gestational ages diagnosed incidentally or due to non-specific symptoms to have hydatid liver diseases. The age ranges from 18 to 42 year (mean 31.5 years). The size of the cysts measured by ultrasound ranges between 3 cm and 8.5 cm (average 4.8 cm). Four asymptomatic patients were managed by expectant observation and close follow-up, two patients were managed by anthelmintic drug (Albendazole), four symptomatic large (>5 cm) and palpable cysts underwent PAIR procedure and the last two patients were submitted to surgery in form of pericystectomy due to their acute symptomatic presentation. No mortality occurred and all neonates were healthy with no congenital anomalies.

Conclusions: Up to now there is no consensus of the management of hydatid disease during pregnancy and each case should be individualized. Observations with close follow up, medical treatment using anthelmintic drugs such as albendazole, percutaneous aspiration and surgery are treatment options.

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1. Introduction

Hydatid cystic disease is a parasitic infestation caused by the larval form of *Echinococcus granulosus*. Humans are the intermediate accidental host while canines like dogs are the definitive host [1,2]. Hydatid cysts can affect any organ, but the liver and lungs are most common sites accounting about 60% and 30% of the cases respectively. Although the occurrence of hydatid disease is rare in pregnancy ranging from 1/20,000 to 1/30,000, it could be problematic for the mother and the fetus [2]. The hydatid disease of the liver pregnancy is usually asymptomatic, discovered accidentally during antenatal care by imaging exam. Early detection is very crucial because a decrease in the cellular immunity during pregnancy could result in increase in the parasitic growth and enlargement of cysts [3]. The diagnosis of hydatid disease necessitates a high clinical awareness especially in the endemic area. The probable complications of the hydatid disease during pregnancy include dystocia, early labor, and uterine rupture. Anaphylactic

shock may also due to ruptures of the cyst during the second stage of labor. Up to now, there is no consensus on the ideal or standardized management of the hydatid disease during pregnancy [2,4]. Various treatment modalities are available including observation, medical, percutaneous aspiration and surgery, but standardized guidelines and general consensus on which treatment is superior on others are still lacking and management of each case should be individualized [5–7]. We present 12 pregnant patients discovered to have hepatic hydatid disease during different trimesters of the pregnancy. Their representations, diagnosis and treatments options and outcomes were studied and assessed.

2. Methods

This is a prospective controlled study conducted in one major hospital in Basra province, Iraq for the period that extend between March 2016 and April 2020 in which 12 pregnant patients of various gestational ages diagnosed accidentally during prenatal routine checkup and investigation. Their age ranges from 18 to 42 year (mean 31.5 years) and gestational age at the time of diagnosis ranges from 7 to 38 weeks (mean 24 weeks). Six patients were

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asymptomatic, four patients presented with nonspecific symptoms such as upper abdominal pain nausea, vomiting, fever and post-prandial fullness that resemble the symptoms of the pregnancy. The two other patients were presented with palpable right upper abdominal and epigastric swellings, one of them showed mild tinge of jaundice. (Table 1). The diagnosis of hepatic hydatid disease was confirmed by ultrasound. Primary hepatic hydatid disease was noticed in 10 patients and recurrent hydatid in 2 patients. Multiple hepatic hydatid (two or more cysts) were found in 4 patients and solitary cysts in the rest 8 ladies. The right lobe of the liver was the dominant site of hydatid cysts (10 patients). The size of the cysts ranges between 3 cm and 8.5 cm (average 4.8 cm). These cysts were classified according to world health organization (WHO) [8] and Gharbi's [9] classifications (Table 1). MRCP was offered for 3 patients to identify any communications of the cyst to intra-hepatic bile ducts which was not seen. These ladies were jointly treated throughout their pregnancy by multidisciplinary surgical and obstetric team. Patients included in this study were submitted during their pregnancy and thereafter to different treatment modalities including close observation, medical treatment, percutaneous aspiration (PAIR: and surgery. Patients were followed for 6–18 months to assess the feasibility of the treatment and for any complication and recurrence. The effect of hydatid diseases on the mother and the fetus as well as the outcomes of treatment modalities were studied and analyzed. Informed consent and approval of ethical committee were obtained for all patients participated in this study. The work has been reported in line with the STROCSS criteria [10].

3. Results

A 12 consecutive pregnant patients of different gestational ages diagnosed accidentally during the routine antenatal check up by ultrasound examination or due to nonspecific symptoms to have hydatid liver diseases for the period between March 2016 and April 2020. The age ranges from 18 to 42 year (mean 31.5 years) and gestational age at the time of diagnosis ranges from 7 to 38 weeks (mean 24 weeks). Four patients (33.3%) were in the first trimester, 5 patients (41.7%) in second trimester and 3 patients (25%) in third trimester. The disease was silent and asymptomatic in 50% (6 patients), giving rise to nonspecific symptoms that mimic pregnancy symptoms in 33.3% (4 patients), and epigastric or right hypochondrial mass in 16.7% (2 patients). Eight patients (66.7%) were multigravida and other 4 patients (33.3%) were primigravida. Solitary cyst was reported in the 9 cases (75%) and multiple cysts (two or more cysts) were found in 3 patients (25%), giving a total number of 17 cysts.

Ten patients (83.3%) were diagnosed as primary liver hydatid diseases and only 2 patient (16.7%) had recurrent hydatid diseases for which she had prior hydatid cyst surgery. Most of the cysts were located in the right lobe of the liver (10 patients, 83.3%) and only 2 cysts were detected in the left lobe of the liver. The clinical presentations of patients included in this study are shown in Table (2).

Patients in this study were submitted to thorough investigation but the diagnosis of hydatid cystic diseases was confirmed by ultrasound. MRI and MRCP was done for 3 patients, mainly for those with recurrent diseases and palpable mass to identify their relations to the biliary ducts. Communications with intrahepatic biliary trees was not reported.

The size of the cysts measured by ultrasound ranges between 3 cm and 8.5 cm (average 4.8 cm).

The hydatid cysts were classified according to World Health Organization (WHO) [7] Gharbi [8] classifications (Table 3). Accordingly, 2 patient (16.7%) had type I cyst (clear fluid collection), 2 patients (16.7%) had type II cyst (fluid collection, with detached wall), 5 patients (41.6%) had type III cyst (fluid collection with daughter cysts), one patient (8.3%) had type IV (cyst with heterogeneous content and 2 patients (16.7%) had type V cyst (calcified wall, inactive) cyst. The characteristics of the patients and their hydatid cysts are shown in Table (3).

Patients were managed by multidisciplinary team consisting of surgeon and the gynecologist. Four asymptomatic patients (2 small sized cysts of type I WHO classification and 2 calcified cysts) diagnosed incidentally situated deep in the posterior segments of right lobe were considered suitable candidate for expectant observation and close follow-up. Three of them completed her pregnancy safely and uneventfully by normal vaginal delivery and one patient delivered healthy female infant by cesarean section due to obstetric issues. All neonates were normal with no congenital abnormalities.

Two pregnant patients, one in the late second trimester and other in the late third trimester who's their cysts size were ≤5 cm were managed by anthelmintic drugs. Albendazole in a dose of 10–15 mg/kg body weight daily in 2 divided doses was the drug of choice due to high degree of penetration into hydatid cyst. The drug given for 28 days course which repeated after 14 days rest without treatment for a total of 3 treatment cycles. One of the cysts shrink and decreased in size and the other remained stable with no change in its size. Both patients had a full term normal vaginal delivery of healthy infants. They advised to be seen 2–3 months after labor for further assessment and need for other definite treatment.

Four patients with symptomatic large (>5 cm) and palpable cysts underwent PAIR procedure (Puncture, Aspiration of cyst content, Injection of 20% hypertonic saline as protoscolicidal agents and Re-aspiration of the cyst) with adjuvant anthelmintic albendazole therap. Corticosteroids and antihistamine were available for any inadvertent spillage of cystic fluid, however, no such

Table 2
Clinical presentations of 12 pregnant patients with hepatic hydatid cysts.

Presentation	Number	%
Asymptomatic	6	50
Upper abdominal pain and discomfort	3	25
Nausea and vomiting	3	25
Upper abdominal mass	2	16.7
Indigestion	2	16.7
Jaundice (mild)	1	8.3

Table 1
Gharbi and WHO- Informal Working Group in Echinococcosis (WHO-IWGE) classification of hydatid cyst.

Gharbi	WHO-IWGE	Sonographic characteristics
–	CL ¹	Unilocular cyst, anechoic, no wall depicted
Type 1	CE ² 1	CL characteristics + wall +mobile internal echogenicity
Type 2	CE 2	Multivesicular, multiseptated cyst, daughter cysts
Type 3	CE3	Detached membrane (water –lily sign)
Type 4	CE 4	Heterogeneous, hypo or hyper-echoic cyst, no daughter vesicles
Type 5	CE 5	Cyst with partial or complete wall calcification

CL¹: Cystic lesion, CE² Cystic echinococcosis.

Table 3
Characteristics of 12 pregnant patients with hepatic hydatid disease.

Variables	Number	%
Patients number	12	100
Age (years)		
- 15-25	3	25
- 26-35	6	50
- 36-45	3	25
Gestational age		
-1st Trimester	4	33.3
-2nd Trimester	5	41.7
-3rd Trimester	3	25
Gravida		
-Primigravida	4	33.3
-Multigravida	8	66.7
Diagnosis (confirmed)		
-Ultrasound	12	100
- MRI & MRCP	3	25
Number	17	
-Single	8	66.7
- Multiple	4	33.3
-Primary cyst	10	83.3
-Recurrent cyst	2	16.7
Site		
-Right lobe	10	83.3
-Left lobe	2	16.7
Size		
-≤ 3 cm	2	16.7
-3-5 cm	4	33.3
-5-8 cm	5	41.7
>8 cm	1	8.3
Type (Ghabri&WHO)		
= Type I	2	16.7
-Type II	2	16.7
-Type III	5	41.7
-Type IV	1	8.3
-Type V	2	16.7
Treatment modality		
-Observation	4	33.3
-Medical therapy	2	16.7
-PAIR	4	33.3
-Surgery	2	16.7

complications occurred. All patients were followed throughout the pregnancy with no any events to deliver healthy normal babies, one by normal vaginal delivery and the others three by Cesarean section.

The last two patients were primigravida discovered to have large cyst in early weeks of second trimester and the other were in the late second trimester with large cyst (8.5 cm) located deep in posterior portion of right hemiliver with recurrent attack of acute upper abdominal pain. Surgery in form of pericystectomy was

planned for these patients to prevent any possible complications such as rupture, infection and anaphylaxis. The procedure and probable risks were fully explained to patients and written informed consent was obtained. The surgery was uneventful and patient had smooth postoperative recovery. They completed her pregnancy to have a healthy infant, one by normal vaginal delivery and the other by cesarean section. Recurrence was not detected in any patients during the median follow up period of 12 months (range 6–18 months). No mortality occurred and all cesarean section done in this study due to obstetric causes rather than due to presence of hydatid cysts and according to gynecologist preference and advice. Different treatment options and their outcomes are shown in Table (4).

4. Discussion

Although rare, hepatic hydatid disease could occur in pregnancy especially in endemic area. Diagnosis of hydatid disease in pregnancy requires high clinical awareness because the cyst may get rapid increase in size due to decrease in the cellular immunity during pregnancy and placental secretion of corticosteroids [5,9]. The diagnosis of hydatid cyst during is usually confirmed by imaging mainly ultrasound and MRI [10] Serological tests such as indirect hemagglutination test (IHA) and enzyme-linked immunosorbent assay (ELISA) can be done but are less reliable during pregnancy owing to immunological changes [11,12].Obstetrics complications of hydatid disease include abdominal pain, obstructed and difficult labor, and uterine rupture [13–15]. Anaphylactic shock may also occur when the cyst ruptures during labor.

For asymptomatic small and calcified hydatid cyst discovered incidentally during pregnancy, some authors prefer observations and close follow up. Observation is practiced only if the cyst is asymptomatic, small and located in the posterior segments of the liver. Observation was practiced for 4 asymptomatic patients discovered to have small and calcified cysts during their antenatal checkup. Three of them completed her pregnancy safely and uneventfully by normal vaginal delivery and one patient delivered healthy female infant by cesarean section. All neonates were normal with no congenital abnormalities. Our practice was consistent with Aliakbarian et al. [15] who reported seven pregnant patients with asymptomatic hepatic hydatid cysts diagnosed in routine prenatal care who managed them by conservative follow-up treatment for The same approach was reported by Rodrigues et al. [4]who stated that expectant observation appeared to be the best practice for asymptomatic hydatid cyst diagnosed accidentally during pregnancy.

Table 4
Hepatic hydatid cyst size, treatment modality and outcomes.

Patients	Age	Type	Ghabri, WHO	Trimester	Initial Volume	Treatment Modality	Delivery	Treatment outcomes
1	21	II	CE 2	Third	5.4 × 6.4 cm	PAIR ¹	NVD ^a	Shrink
2	33	I	CE 1	First	3.6 × 2.8 cm	Observation	NVD	Stable
3	38	V	CE 5	Second	3.5 × 4.3 cm	PAIR	CS**	Disappeared
4	31	III	CE3	Second	8.0 × 5.2 cm	Surgery	CS	Disappeared
5	28	IV	CE4	Third	3.9 × 3.6 cm	Observation	NVD	Stable
6	35	III	CE3	First	7.4 × 4.5 cm	PAIR	CS	Shrink
7	42	III	CE3	Second	4.7 × 6.7 cm	Drugs	NVD	Shrink
8	18	I	CE 1	First	3.2 × 4.8 cm	Observation	NVD	Stable
9	36	V	CE 5	First	4.1 × 3.2 cm	Observation	CS	Stable
10	25	III	CE3	Second	5.6 × 3.3 cm	PAIR	CS	Disappeared
11	34	II	CE 2	Third	7.2 × 4.3 cm	Drugs	NVD	Stable
12	37	III	CE3	Second	7.3 × 4.2 cm	Surgery	NVD	Disappeared
Mean	31.5			4.8 cm				

PAIR¹: Puncture, Aspiration, Injection, Re-aspiration.

^a Normal vaginal delivery.

Four patients with palpable and accessible cyst in our series were presented for PAIR. The cysts disappeared or shrink after aspiration and symptoms were relieved in all patients. No Recurrence was detected after 18 months of this study follow up period. The main indications for PAIR technique include Cystic Echinococcosis type I, III and some of type II cysts according to Ghabri and WHO classification (Table 1). Other indications include patient unfit for or refuse surgery, patient with multiple cysts, and recurrent cysts after surgery or chemotherapy. The percutaneous aspiration of the cystic by PAIR technique is a minimally invasive procedure usually conducted under ultrasound or CT guidance with albendazole prophylaxis. Bahri et al. [19] showed in their study of six pregnant patients with six hepatic hydatid cysts that the percutaneous treatment of hydatid cysts in pregnancy is safe and effective, for selective patients. Jayant et al. [20] in their case study of pregnant patient with hydatid cyst of the liver presented as obstructive jaundice, showed that management by PAIR technique followed by long term oral albendazole is a valid option. Smego et al. [21] in their meta-analysis that compared the outcomes of 769 patients with liver hydatid disease managed by PAIR with albendazole with 952 similar patients undergoing surgery, had shown that PAIR with albendazole is associated with greater clinical efficacy, lower morbidity and mortality compared with surgery. Hospital stay and recurrence were also less in PAIR group [22].

Two pregnant patients, one in the late second trimester and other in the late third trimester who's their cysts size were ≤ 5 cm were managed by Albendazole anthelmintic drugs. The drug given for 28 days course which repeated after 14 days rest without treatment for a total of 3 treatment cycles. One of the cysts shrink and decreased in size and the other remained stable with no change in its size. Both patients had a full term normal vaginal delivery of healthy infants. Medical therapy by anthelmintic drugs including albendazole or mebendazole drugs is contraindicated in early pregnancy due to its teratogenic effects mainly facial and limbs abnormalities [14]. The efficacy of the medical therapy depends on the cyst wall thickness and the absence of calcification. Malhotra et al. [15] reported in their case study of 22 weeks pregnant woman who had hydatid cyst in the left lobe treated with albendazole therapy till delivery. She had a full-term healthy infant delivered normally and she submitted two months later to partial cystectomy. Van Vliet et al. [16] treated pregnant women with hydatid cysts in the second and third trimesters with albendazole and cover of corticosteroids during labor. Albendazole is superior to mebendazole in treatment of hydatid cystic disease due to its high degree of systemic absorption and penetration into hydatid cyst. The drugs is taken orally with meals in a dose of 10–15 mg/kg of body weight in two divided doses with total dose not to exceed 800 mg for 28 days course which may be repeated after 14 days rest to a total of 3 treatment courses. Peyvandi et al. [17] reported that treatment of hydatid disease during pregnancy with albendazole is effective in certain cases but is not used as first line treatment except when the patient is not fit for surgery or the cyst is small size, calcified or deeply located and for recurrent cysts. Albendazole is commonly used as adjunct treatment to surgical and percutaneous aspiration to prevent recurrence and potential dissemination of the parasites. Treatment of hydatid disease by anthelmintic drugs alone is not efficient and long-term results are uncertain [18].

Although surgery is gold standard treatment of for hepatic hydatid cystic diseases, such intervention during pregnancy is difficult as it may cause abortion or preterm labor. Surgery is the treatment modality of choice for type III and type IV cysts, cyst larger than 5 cm, infected cyst, and for complicated cysts. The surgery could be conservative such as evacuation and de-roofing of the cyst (cystotomy and cystotomy with capitonnage) or radical such as peri-cystectomy and rarely hepatic resection

(segmentectomy and lobectomy). The preferred and the safe time for surgery is the second trimester due to lower risk of abortion and the gravid uterus is unlikely to obstruct the surgical field as in third trimester. Two patients with large palpable symptomatic cysts) in our series were proceeded for surgery. Pericystectomy was done after aspiration and evacuation of cystic contents. Post-operative events were uneventful and patient was followed until normal vaginal delivery. Carlos et al. [23] recorded 11 pregnant patients with hydatid cystic disease of liver. Nine of them underwent surgery. They stated that the indications for surgical intervention in pregnant patients with hydatid diseases include cysts in the 3rd, 4th, 5th, and 6th hepatic segments, cyst larger than 5 cm in diameter, complicated cyst like rupture or communication with bile ducts and infected cysts. Ercetin et al. found [24] in their clinical trial of 7 pregnant patients with acute presentation of hepatic hydatid disease that urgent surgical treatment is necessary to decrease morbidity and mortality and prevent abortion. Haluk et al. [25] shown in their case study of two pregnant patients with hepatic hydatid disease who underwent surgery that radical surgical treatment is preferable treatment and superior to conservative surgery due to less chance of recurrence, Surgery for 3 pregnant patients with hydatid disease in Libya [26] had been performed synchronously with caesarean section.

Management of symptomatic hydatid disease during early gestational ages can be done by percutaneous aspiration (PAIR) if the cyst is accessible and has no biliary communications. PAIR is safe and effective procedure [20,22]. Surgery is preserved for patients who are refractory to PAIR such as those with obstructive symptoms, biliary communication. It can be conducted either open or minimally invasive (laparoscopic). Although the second trimester is the best period for operation, surgery might be very necessary for complicated cases with patient should be informed about the risk of miscarriage and fetal death [7,14,26].

Recurrence of hydatid disease is not uncommon [27,28] It can cause severe complications that could be fatal to both mother and the fetus. The recurrence of hydatid disease during pregnancy could be due to ineffective primary treatment or due to decreased cell-mediated immunity. No recurrence was reported in this study. Closed monitoring and follow up of pregnant women for hydatid disease by serial ultrasound during antenatal care is paramount and essential especially in endemic areas.

5. Conclusion

Although rare, hepatic hydatid cystic disease can present during pregnancy especially in endemic areas. Management of hydatid disease during pregnancy is challenging, problematic and not straightforward. Up to now there is no consensus of the management of hydatid disease during pregnancy and each case should be individualized. Observations with close follow up, medical treatment using anthelmintic drugs such as albendazole, percutaneous aspiration and surgery are treatment options. Observation of asymptomatic small hydatid cyst diagnosed incidentally during pregnancy is a feasible option. Anthelmintic drugs mainly albendazole is contraindicated during the first trimester due to its teratogenic effects. Albendazole can be used as adjunct treatment to surgical and percutaneous aspiration to decrease recurrence and potential dissemination of the parasites. PAIR technique can be considered an effective and safe alternative option for management of hepatic hydatid cyst disease during pregnancy in selected cases when cyst is large and accessible or when surgery is technically demanding or contraindicated. Surgery might be offered for acute presentation and complicated cases such as obstruction and biliary communication with the second trimester is the preferred period. Closed monitoring and follow up of pregnant women for hydatid

diseases by serial ultrasound during antenatal care is paramount and essential especially in endemic areas.

Ethical approval

The study was approved by ethical committee of college of medicine, university of Basrah.

Funding

None.

Author contribution

This is a single author study.

Declaration of Competing Interest

No conflicts of interest.

Guarantor

The study is under the author responsibility.

Research registration number

Although this is a retrospective cohort study and no need for registration the UIN is 0304.916.2020.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijso.2021.100324>.

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