

Pre- and postoperative diagnostic of giant hepatic hydatid cyst: a case report and brief literature review

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Abstract

Objectives. The presentation of case report of preoperative ultrasound and postoperative histological diagnostic of giant hydatid liver cyst. **Material and methods.** A 58-year-old female with a chronic right upper quadrant abdominal pain, nausea, vomiting and a history of contact with pets was admitted to hospital. Preoperative sonography, blood profile including serological testing were conducted. Pathomorphological studying was carried out after surgical treatment. **Results.** Abdomen ultrasonography revealed giant cyst (size: 143 x 160 x 145 mm; volume: 1728 cm³) in the right liver lobe, with presence of peripheral “daughter” cysts, intracavitary echogenic linear septa and sharply defined outer borders containing the features of calcification. Postoperative gross examination of resected tissues showed: well-defined round parasitic cyst up to 18 cm in diameter with smooth yellowy-brown wall surface. Wall thickness was 4 mm. Microscopically the cyst wall consisted of rough fibrous connective tissue with chronic nonspecific inflammatory features. **Conclusions.** Our case presentation confirmed an important and key role of ultrasonography and ancillary role of serological testing for preoperative diagnostic of giant liver hydatid disease with following histologic study of postoperative biomaterial.

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Introduction.

Liver hydatid disease (LHD) is a zoonotic parasitic infection caused by *Echinococcus granulosus* with following cyst formation predominantly in the right hepatic lobe of human who is a dead-end intermediate host, interrupting tapeworm’s life transmitting cycle [1, 2]. LHD can be asymptomatic for several years. Ultrasonography screening is affordable, non-invasive informative method with a high

resolution and diagnostic accuracy [3]. Sonography pathologic signs are the main criteria of the current international WHO-IWGE (Informal Working Group on Echinococcosis) classification of cystic echinococcosis [4]. Surgical treatment is a gold standard in LHD management, especially in older cysts and it includes radical, conservative, and laparoscopic options. A percutaneous technique of LHD

treatment is widely used for type I and II of hydatid cysts due to Gharbi classification. Non-operative management of LHD with chemotherapy provides for early stages but such treatment can be hepatotoxic and very often ineffective in curing [5,6]. Postoperative histomorphological study allows to learn about the influence of the parasite pathogen on the host's involved tissues [7]. In this manuscript we report the case of patient with a huge liver echinococcal cyst. We summarize and underline the informative value of pre- and postoperative diagnostic methods of LHD. This study was carried out in accordance with the ethical principles for medical research involving human subjects developed by the World Medical Association Declaration of Helsinki.

Objectives.

The presentation of case report of preoperative ultrasound and postoperative histological diagnostic of giant hydatid liver cyst.

Material and methods (Case presentation).

A 58-year-old female from non-endemic region with unremarkable past pharmacological and surgical history presented to hospital with complaints of chronic right upper quadrant abdominal pain in the last 6 months, nausea, and vomiting episodes after a meal. Upon clinical examination a large mass was palpable in the current painful location. The patient kept pets (dogs and cats) throughout her life. The patient gave a written informed consent for the publication of this case report and following data results. Ultrasound of abdomen revealed giant liquid mass (size: 143 x 160 x 145 mm; volume: 1728 cm³) round shape with posterior acoustic enhancement and presence of peripheral "daughter" cysts, intracavitary echogenic linear septa formation and sharply defined outer borders (pericystic wall) containing the features of calcification (Figure 1).

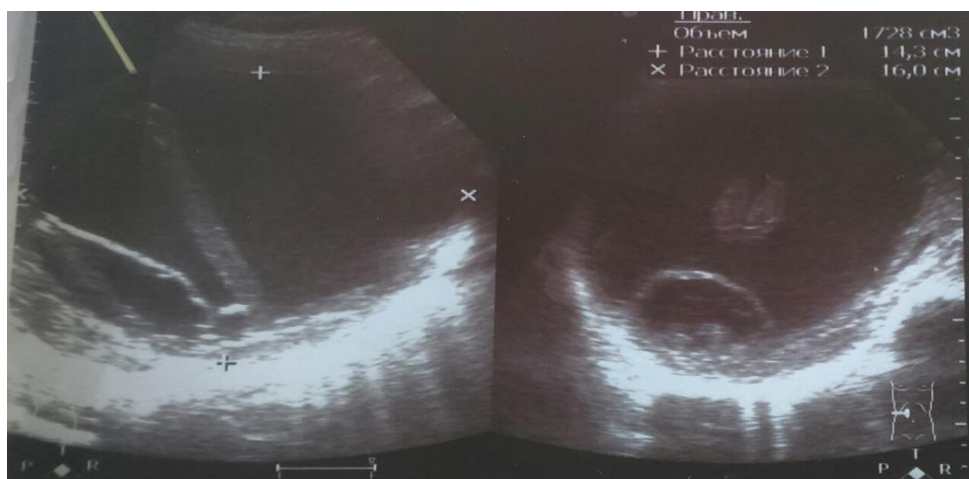


Figure 1. Ultrasonography showing a giant hepatic cyst (size: 143 x 160 x 145 mm; volume: 1728 cm³). The cystic mass had well-defined round shape with sharply defined outer borders and posterior acoustic enhancement. Cyst contained the characteristic "daughter" cysts, intracavitary hyperechogenic linear septa formation.

The cystic mass was observed in the right hepatic lobe. Liver echostructure was homogeneous, slightly hyperechogenic. Portal vein diameter was 10 mm. Sonographic patterns of pancreas, kidneys, spleen, and gall bladder were unremarkable. Suspicion of LHD was confirmed by positive results of serological testing (semi-quantitative enzyme-linked immunosorbent assay) for *Echinococcus granulosus* serum antibodies (IgG). Enhanced computed tomography was contraindicated in this case because of increased serum

urea and creatinine levels. Blood tests on admission also revealed marked changes of hemoglobin, red blood cell count, white blood cell count, lymphocytes, eosinophils, monocytes, segmented and band neutrophils, prothrombin index, international normalized ratio, hematocrit, total protein, total bilirubin, conjugated bilirubin, aspartate aminotransferase, alanine aminotransferase, potassium, sodium, chloride, glucose, alpha-amylase (Table 1).

Table I. Blood tests findings on admission to hospital.

No	Parameters	Result	Units	Reference Interval
Complete blood count				
1	Hemoglobin	126.5	g/L	130-160 g/L
2	Red blood cell count	3.79	$\times 10^{12}/L$	$4.0-5.0 \times 10^{12}/L$
3	White blood cell count	11.2	$\times 10^9/L$	$4.0-9.0 \times 10^9/L$
4	Lymphocytes	14	%	19-37%
6	Eosinophils	18	%	0.5-5.0%
7	Monocytes	13	%	3-11%
8	Segmented neutrophils	32	%	47-72%
9	Band neutrophils	15	%	1-6%
10	Erythrocyte sedimentation rate	3	mm/hour	1-10 mm/hour
Blood chemistry profile				
1	Total protein	58.0	g/L	66-87 g/L
2	Total bilirubin	27.3	$\mu\text{mol}/L$	$2.0-21.0 \mu\text{mol}/L$
3	Conjugated bilirubin	7.8	$\mu\text{mol}/L$	Up to $3-4 \mu\text{mol}/L$
4	Urea	9.3	mmol/L	$2.76-8.07 \text{ mmol}/L$
5	Creatinine	91.3	$\mu\text{mol}/L$	$44-80 \mu\text{mol}/L$
6	Aspartate aminotransferase	93.0	U/L	Up to 50 U/L
7	Alanine aminotransferase	85.5	U/L	Up to 41 U/L
8	Potassium	6.32	mmol/L	$3.44-5.3 \text{ mmol}/L$
9	Sodium	159.7	mmol/L	$130.5-156.6 \text{ mmol}/L$
10	Chloride	122.9	mmol/L	$95-110 \text{ mmol}/L$
11	Glucose (enzymatic method)	9.6	mmol/L	$4.11-6.05 \text{ mmol}/L$
12	Alpha-amylase	107.0	U/L	28-100 U/L
Serological testing				
1	Echinococcus granulosus antibodies (IgG)	4.23	U/L	0-0.9 – negative. 0.9-1.1 – equivocal. > 1.1 – positive.
Coagulation profile				
1	Activated partial thromboplastin time	34	sec	24-34 sec
2	Prothrombin index	67	%	87.6-111.3%
3	International normalized ratio	1.65		0.93-1.16
4	Fibrinogen	2.6	g/L	1.5-3.75
5	Hematocrit	0.37	L/L	0.42-0.5

Taking the above significant blood changes into account the patient was scheduled surgical treatment that included laparotomy, right hemihepatectomy with hydatid mass resection, abdominal drainage followed by postoperative pharmacotherapy. Gross and microscopic examination of surgically resected tissues showed: regular

well-defined round parasitic cyst up to 18 cm in diameter with smooth yellowy-brown wall surface. Wall thickness was 4 mm. Microscopically the cyst wall consisted of rough fibrous connective tissue with chronic nonspecific inflammatory features and adjoining liver structural disorder (probably because of external pressure) (Figure 2).



Figure 2. a,b. Postoperative resected gross specimen. Parasitic cyst had regular round shape up to 18 cm in diameter. The cyst wall had smooth yellowy-brown surface with thickness up to 4 mm. c. Histologic findings (hematoxylin and eosin-stained section; original magnification x 20): the cyst wall consisted of rough fibrous connective tissue with the pattern of chronic nonspecific inflammation and destruction of adjoining liver parenchyma (probably as a result of cyst permanent expansive pressure).

Case Discussion.

In the current case we report about pre- and postoperative diagnostic findings in patients with LHD. Aggravating hepatic and renal disorders were eliminated after intensive pharmacologic treatment in the early postoperative care. Some changes in biochemical and coagulation profile can be due to long-lasting permanent pressure from the growing cyst. Mass effect on surrounding tissues additionally predetermines the severity of clinical pattern [8]. As mentioned in the literature review, echinococcal cyst in the liver grows about 10 mm in diameter for the first six month and continues to enlarge expansively 20-30 mm each year thereafter [9]. Such chronic compression often causes inflammatory reaction and liver fibrosis [10]. Lobar liver atrophy may also be observed in the cyst-bearing lobed, but not so often as portal vein or bile duct obstruction following grown cyst pressing [11, 12]. Regarding inflammation, it is typical and classic sign of immune response to parasite's persistent presence: hematological parameters like segmented and band neutrophils, lymphocytes, monocytes, eosinophils, and other ones can be reactively changed [13]. On the question of serology for diagnosis of LHD, it is recommended as additional option in obscure cases, while immunoassay testing may be challenging according to high possibility of false negative findings and cannot be therefore applied as the only one crucial method [14]. M. Akil et al. (2021) showed in their research that LHD caused a higher antibody production than echinococcal cysts in other anatomical locations [15]. The scientific consensus on diagnostic fine needle aspiration cytology application still remains debatable. Although the last one is considered useful and safe method, its routine practice should be applied with caution because of risk of dissemination and

anaphylactic shock [16, 17]. As was pointed out in the case description, the echinococcal cyst has grown to the giant size. In review the literature no uniform agreement on what size of cyst should be viewed as large and giant mass. World Health Organization (2001) determined a cyst over 10 cm as a large lesion [18]. M. Murariu et al. (2020) defined hydatid cysts over 15 cm as giant mass [19]. E.T. Pavlidis et al. (2021) classed as giant cyst that was greater than or equal to 10 cm [2]. Some researchers (G.M. Ettore et al., 2012; D. Chatzifotiou et al., 2021) do not associate definition "large" or "giant" with some exact cyst size, because any significant cystic enlargement that occupies space of an appropriate organ or has exophytic growth through the natural routes provided by the organ capsule, peritoneum and ligaments can be identify as a giant hydatid cyst [20, 21]. Having defined what is meant by giant cyst, we will now move on to discuss different diagnostic methods advantages for visualization and detection of LHD. Ultrasound imaging is non-invasive, widely available, portable technique that can be repeated as often as required, both for LHD screening in the population and diagnosis in each individual case [14, 22]. The cyst staging is determined on the basis of sonography and the latter is the cornerstone for clinical decision regarding the subsequent treatment [23, 24, 25]. Ultrasound active surveillance as an alternative to treatment can be also conducted as "watch-and-wait" approach. This follow-up option is carried out regularly over time with additional control by serological tests. This management of LHD is recommended for inactive, uncomplicated hepatic cysts by WHO-IWGE expert consensus guidelines [26]. Moreover, as noted by M. Stojkovic et al. (2012), ultrasound diagnostic has higher informative value than computed tomography (CT) and magnetic resonance imaging (MRI) [23]. Unlike M.

Stojkovic, G. Pascal et al. (2017) and B. Keong et al. (2018) claim that MRI is more more specific method and provides more visual informative details in cases of cysts with biliary complications [12, 27, 28]. Both MRI and CT share a number of key features. First of all, MRI or CT can be pevotal for differentiation of echinococcal cyst from liver abscess or various hepatic mass lesion. CT prevails in detection of cyst calcification and can be choice modality in peritoneal seeding whereas MRI has better tissue characterization and absence of radiation exposure [9, 29]. The possibilities of CT in the visualization of accurate, detailed findings and anatomical relationships without superposition of adjacent tissues are similar in informativeness to MRI images. Calcificated radiopaque cyst silhouette also can be an

Conclusions.

Our case presentation confirmed an important and key role of ultrasonography and ancillary role of serological testing for preoperative diagnostic of giant liver hydatid disease with following histologic study of postoperative biomaterial.

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incidental finding in the plain abdominal X-ray image but requires subsequent differential diagnosis of the underlying cause by more precise methods. Another significant aspect of diagnostic is a postoperative morphological examination of the cyst. Since the above preoperative diagnostic methods allow to get a proper diagnosis, the postoperative histological study is additional necessary tool confirming the cyst origin and surround tissues involving. It is required after any surgical treatment with taking out of pathological biomaterials. The most valuable scientific aspect in pathoparasitology is possibility for researcher to get sections of any parasite part at various angles that gives multiple polipositional aspects of the same parasite and thus get more its details [30].

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