



Advanced Magnetic Resonance Imaging Findings of Renal Hydatid Cyst

Gülnur Erdem¹, Veysel Burulday¹, Alpay Alkan²

¹ Inonu University, School of Medicine, Department of Radiology, Malatya, Turkey

² Bezmialem University, School of Medicine, Department of Radiology, İstanbul, Turkey

Abstract

Hydatid Cyst, a serious health problem in the developing countries, is a zoonotic infection formed by echinococcus. Though liver or lung involvement is often, kidney involvement is rarely seen and represents for only 2 to 3 per cent of all cases of hydatid disease. An adult case referred who had multiple cysts in liver and large, solitary cyst in the kidney. We aimed to present magnetic resonance spectroscopy (MRS) and diffusion weighted magnetic resonance (DWI) findings of the hydatid cyst's. This is the first study that shows the MRS and DWI results of the renal hydatid disease. The mean ADC (apparent diffusion coefficient) value of the renal hydatid cyst was $2554 \times 10^{-6} \text{ mm}^2/\text{s}$ on DWI and high signal intensity was detected compared with the renal parenchyma. MR spectroscopy at TE of 31 shows prominent alanine peak in addition to small amino acid peaks. Advanced MRI studies such as DWI and MRS can provide supplementary information both in the post-treatment period and in the diagnosis by bringing non-invasive approaches.

Key words: Hydatid Cyst, magnetic resonance imaging, magnetic resonance spectroscopy, diffusion weighted imaging

(Rec.Date: May 26, 2014 Accept Date: May 27, 2014, 2014)

Corresponding Author: Gülnur Erdem, Inonu University, School of Medicine, Department of Radiology, Malatya, Turkey

E-mail: drgulnurerdem@gmail.com

Introduction

Hydatid Cyst, a serious health problem in the developing countries, is a *zoonotic* infection formed by echinococcus. The infection in this disease, in which people are accidental *intermediate host*, occurs by way of the oral intake of the contaminated water and vegetables or the contact to the *hosts* such as cats or dogs. Kidney involvement is rare and it has seen in most of the cases with liver or lung involvement. The disease represents for only 2 to 3 per cent of all cases of hydatid disease. It's not clear how the echinococcus reach the kidney; however, it's thought that it passes through the portal system into the retroperitoneal lymphatics. In general, renal hydatid cysts are not observed alone but also along with the other organ involvements. Imaging findings change depending on the stage of the growing cyst [1-3].

The presented case had multiple cysts in the liver and large, solitary cyst in the kidney. We aimed to present magnetic resonance spectroscopy (MRS) and diffusion weighted magnetic resonance (DWI) findings of renal cyst. There are many MRS studies in brain involvement and diffusion weighted MR images studies in the liver and brain involvement; whereas, no MRS and DWI studies have been detected in the renal hydatid disease.

Case Report

A 32-year-old woman complaining with flank pain was admitted to our hospital. She had an operation story 6 years ago due to the liver hydatid cyst in her history. The case was examined by DWI and MRS in addition to the conventional methods.

On MR images a cyst at the middle zone of the right kidney, sizing 10x 7 cm, which was hypointense on T1-weighted images and heterogeneous hyperintense on T2-weighted images, containing collapsed germinative membranes and cysts which were supposed to be daughter vesicles within the lateral region of cyst, was detected (Figure 1a-b). Intravenous gadolinium administration showed no contrast enhancement around the lesion; however, thick capsule in the medial part of the lesion was determined hypointense on T2-weighted images. Moreover, 5 or 6 cystic lesions with capsules, the biggest was 5 cm, was observed in the liver. The mean ADC (apparent diffusion coefficient) value of the renal hydatid cyst was $2554 \times 10^{-6} \text{ mm}^2/\text{s}$ on DWI and high signal intensity was detected compared with the renal parenchyma. MR

Spectroscopy at TE of 31 shows prominent alanine peak in addition to small amino acid peaks (Figure 2).

Figure 1: On Axial T2A (a), and coronal T2A (b) MR images a cyst at the middle zone of the right kidney, is hypointense on T1-weighted images and heterogeneous hyperintense on T2-weighted images, containing collapsed germinative membranes and daughter vesicles within the lateral region of it, was detected.

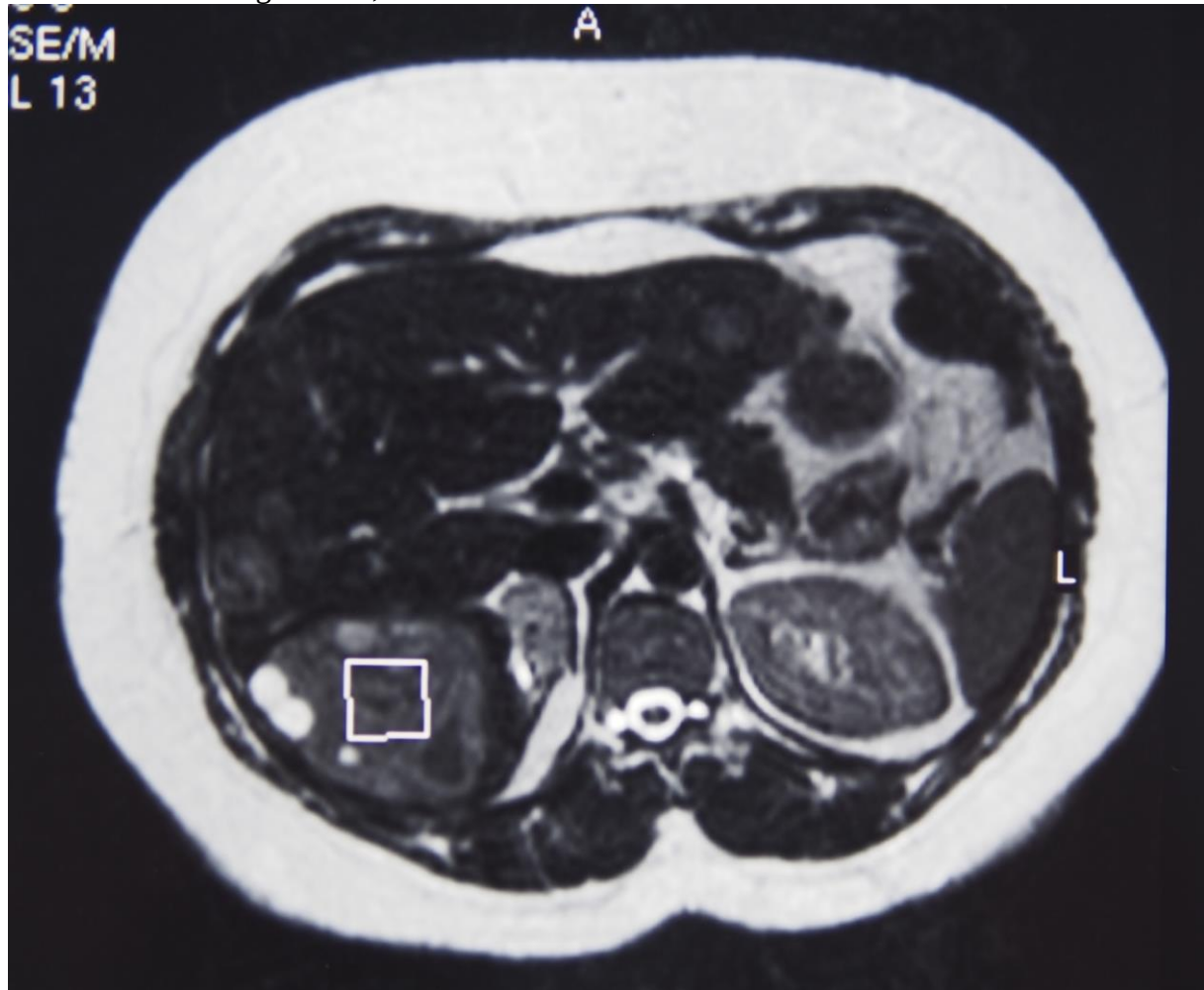


Figure1a.

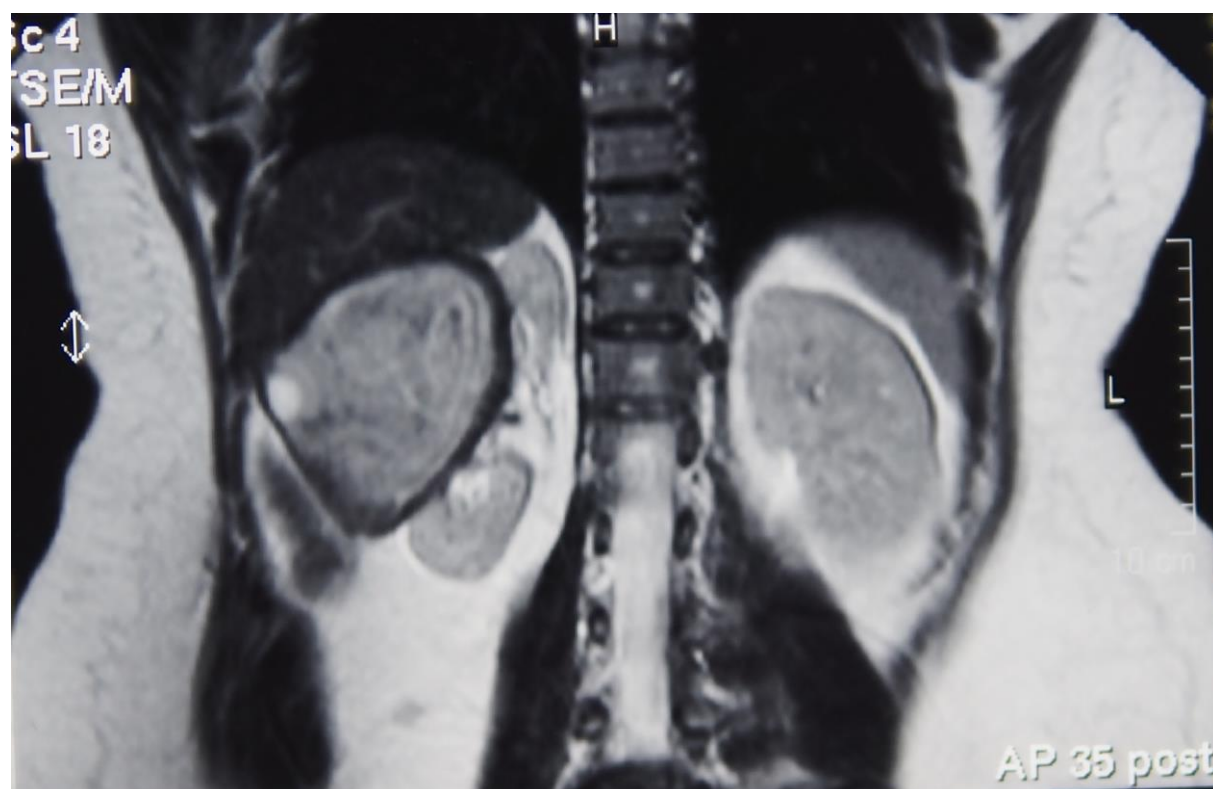


Figure 1b.

Figure 2: MRS shows prominent alanine peak at 1.4 ppm in addition to small amino acid peaks.

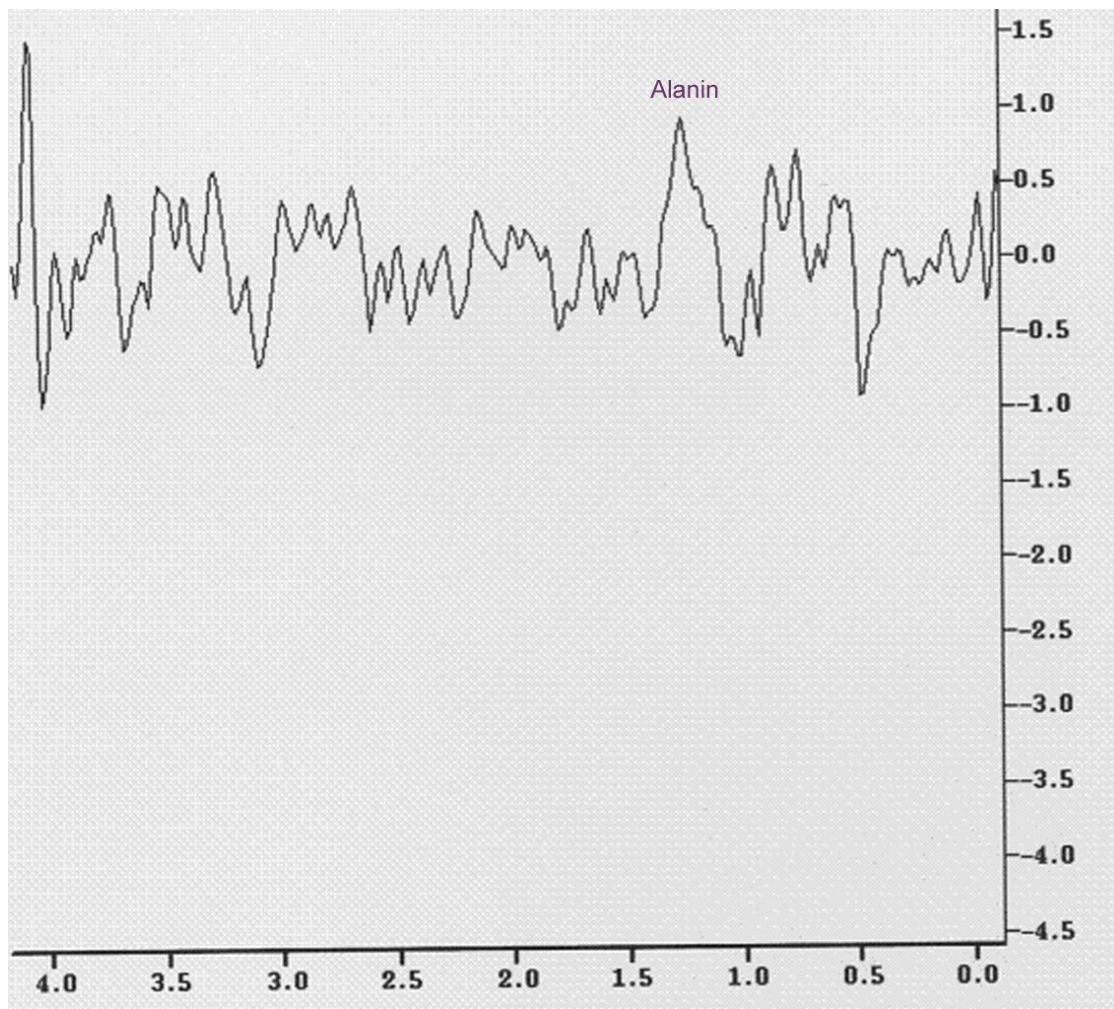


Figure 2.

Discussion

Hydatid cyst is a zoonotic infection caused by *E. granulosus* and rarely by *E. multilocularis*. The embryos coming out of the eggs, which reach the intestine, spread to the other organs by means of portal and systematic circulation and then form the typical hydatid cyst by changing in the larval stage [1-5].

The disease shows itself in the shape of the cystic masses growing slowly. The imaging findings differ from pure cystic lesions to solid appearing masses. Ring-like or total calcification is common in the liver, spleen and kidney. Cyst is usually unilateral and located

in the upper or lower pole of kidney. Simple or infected cyst, abscess and necrotic neoplasm must be considered in the differential diagnosis of the renal hydatidosis [6].

The renal cyst hydatid can remain asymptomatic for many years. Renal colic, hematuria, pyuria and also fever can be seen. Cystic rupture into the collecting system, which is pathognomonic, leads to hydatiduria. This can be seen in up to 10 to 20 per cent of the renal hydatidosis and is usually microscopic [7].

Radiologic imaging has an important role in the diagnosis of renal hydatid disease [2,4]. In all stages, calcification occurs in up to 50 % of cysts. Caliceal distortion, caliectasis and non-functional kidney can be seen on intravenous urography [8]. Sonography is the most sensitive technique in detecting the hydatid sand, septa and cystic membranes [9]. A ring-like calcification on the cyst hydatid wall, a cyst with a thick and calcific wall, unilocular kist including separate membrane, multi-locular cyst with mixed internal density and daughter cysts more hypodense than maternal matrix are typical CT findings for the renal hydatidosis. Furthermore, other organ involvements can be shown on CT [1,2,6,9].

Although hydatid fluid is hypointense on T1-weighted and hyperintense on T2-weighted on MR images, heterogeneous signal intensity on T2-weighted images may also be detected. The characteristic hypointense rim of the hydatid cyst is more pronounced on T2-weighted images [1,2,6,9].

The fluid within the daughter cysts associated with maternal matrix may be hypointense, isointense or hyperintense on T1-weighted and T2-weighted images. Calcification on the wall of the cyst and membrane can be seen. Collapsed parasitic membranes are seen hypointense in the shape of linear structures with all sequences. Furthermore, contrast enhancement of the collapsed membranes and cyst wall can be seen on a contrast study [6].

MRS and DWI are advanced MRI methods. The metabolisms of the lesions by measuring the different chemical metabolites are evaluated by MRI. Additionally, by means of DWI, the diffusion features of the lesions are assessed by measuring increased or restricted diffusion motion of tissue water molecules.

The parasite supplies its energy demand by using anaerobic glycolysis or partial reverse TCA (tricarboxylic acid) cycle. The last two products of the glucose metabolism are succinate and acetate [10]. On MR spectroscopy studies carried out in the brain cyst hydatids; while some authors indicated alanine, acetate and lactate peaks, the others determined lactate, pyruvate

and Myo-inositol peaks [10-12]. In another study, alanine, pyruvate and acetate were observed in all cyst hydatids and pyruvate was described at 2.4 ppm as a marker of metabolite of hydatid cyst [13]. We also detected markedly alanine peak at 1.4 ppm and accompanying small aminoacid peaks in our renal cyst hydatid case.

The diffusion studies concerning cyst hydatids are carried out in the cysts of the liver and the brain [14,15]. On DWI study for the liver masses, the mean ADC value of the two cysts hydatid lesions was detected $2990 \times 10^{-6} \text{ mm}^2/\text{s}$ and no significant difference was found between the simple cysts ($n=6$) [14]. On an another DWI study made in the liver for the simple ($n=43$) and hydatid cysts ($n=39$), the mean ADC value of the cyst hydatids was measured as 2900×10^{-6} and was found noticeably lower than simple cysts [15]. On another DWI study performed in the intracranial cystic masses which were isointense with CSF, high ADCs were detected in two cyst hydatid cases (the mean ADC value $3210 \times 10^{-6} \text{ mm}^2/\text{s}$) [16]. In our case the mean ADC value of the renal cyst hydatid measured as $2554 \times 10^{-6} \text{ mm}^2/\text{s}$ and high signal intensity was detected compared with the normal renal parenchyma. On the other hand, the mean ADC value of the liver cysts was measured as $2852 \times 10^{-6} \text{ mm}^2/\text{s}$.

The cyst hydatid affects the liver first and the imaging findings of the liver cyst hydatid have been described well. Secondary involvement due to hematogenous dissemination can be seen in any anatomic location. The kidney involvement is rarely seen as a secondary involvement region. Complications such as peritoneal dissemination, infection, cyst rupture and the damage on kidney due to compression of the cyst are assessed on MR images and the treatment process is planned according to these imaging findings. Advanced MR images studies such as DWI and MRS can provide supplementary information both in the post-treatment period and in the diagnosis by bringing non-invasive approaches.

References

1. Pedrosa I, Saiz A, Arrazola L, Ferreiros J, Pedrosa CS. Hydatid disease: radiologic and pathologic features and complications. Radiographics. 2000;20(3):795-817.
2. Odev K, Kilinc M, Arslan A, Aygün E, Güngör S, Durak AC, Yilmaz K. Renal hydatidosis cyst and the evaluation of their radiologic images. Eur Urol. 1996;30(1):40-9.
3. Afsar H, Yagci F, Aybasi N, Meto S. Hydatid disease of the kidney. Br J Urol. 1994;73(1):17-22.

4. Beggs I. The radiology of hydatid disease. *AJR Am J Roentgenol.* 1985;145(3):639-48.
5. Lewall DB. Hydatid disease: biology, pathology, imaging and classification. *Clin Radiol.* 1998;53(12):863-74.
6. Polat P, Kantarci M, Alper F, Suma S, Koruyucu MB, Okur A. Hydatid disease from head to toe. *Radiographics.* 2003;23(2):475-94.
7. Unsal A, Cimentepe E, Dilmen G, Yenidunya S, Saglam R. An unusual cause of renal colic: Hydatiduria. *Int J Urol.* 2001;8(6):319-21.
8. Amin MU, Siddique K, Aftab PA. Imaging features of renal hydatid cyst presenting with hydatiduria. *J Radiol Case Rep.* 2009;3(3):6-11.
9. Gharbi HA, Hassine W, Brauner MW, Dupuch K. Ultrasound examination of the hydatid liver. *Radiology.* 1981;139(2):459-63.
10. Seckin H, Yagmurlu B, Yigitkanli K, Kars HZ. Metabolic changes during successful medical therapy for brain hydatid cyst: case report. *Surg Neurol.* 2008;70(2):186-9.
11. Rumboldt Z, Jednacak, Talan-Hranilovic J, Rumboldt T and Kalousek M. Unusual appearance of a cisternal hydatid cyst. *AJNR Am J Neuroradiol.* 2003;24(1):112-4.
12. Sreedhar M. Disseminated hydatid disease a case report with MR spectroscopic correlation. *Ind J Radiol Imag.* 2006;16(4):771-4.
13. Jayakumar PN, Srikanth SG, Chandrashekar HS, Kovoov JM, Shankar SK, Anandh B. Pyruvate: An in vivo marker of cestodal infestation of the human brain on proton MR spectroscopy. *J Magn Reson Imaging.* 2003;18(6):675-80.
14. Demir OI, Obuz F, Sagol O, Dicle O. Contribution of diffusion-weighted MRI to the differential diagnosis of hepatic masses. *Diagn Interv Radiol.* 2007;13(2):81-6.
15. Inan N, Arslan A, Akansel G, Anik Y, Sarisoy HT, Ciftci E, Demirci A. Diffusion-weighted imaging in the differential diagnosis of simple and hydatid cysts of the liver. *AJR Am J Roentgenol.* 2007;189(5):1031-6.
16. Güney B, Kitiş Ö, Çallı C, Yünter N. Diffusion-weighted MR imaging of intracranial cystic lesions. *Ege Journal of Medicine [Intrakranial kistik lezyonlarda difüzyon-ağırlıklı MR Görüntüleme. Ege Tıp Dergisi].* 2003;42(2):107-113.