

# Imaging of ruptured endocyst in an isolated intramuscular hydatid cyst - The Scroll appearance

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## ABSTRACT

The present article reports a case of a 21 years male that was diagnosed to have isolated intramuscular hydatid cyst of the biceps brachii on Ultrasound and MRI. The 'Scroll appearance' of the ruptured endocyst in this case is likely to be an intervening transient stage in evolution of the disease and also indicates recent rupture of the endocyst.

## CASE REPORT

### CASE REPORT

A 21 years young male from an endemic area with a long-standing gradually progressive focal swelling in the region of right arm, along the anterior aspect presented to our centre for Ultrasound examination. The patient first noticed the swelling at least six months back and was painless at that time. The patient developed pain and tenderness in the preceding 2 weeks. The pain did not have any aggravating or relieving factors. There was no definite clinical history of tuberculosis, diabetes or hypertension or any similar complaints in the past were suggested. On clinical examination, the overlying skin was within normal limits. The laboratory tests, including white blood cell count and urinalysis, were within normal limits. High-frequency Ultrasound (US) of the arm swelling was performed which showed a well-defined oval-shaped predominantly cystic intramuscular lesion in the biceps brachii measuring approximately 12 cm in long axis and 5 cm in short axis. The lesion showed thick-hypoechoic walls. The interior of the lesion showed thick membrane-like structure in the anterior part with wavy contour (Figure 1). The membrane-like structure showed coiled configuration at both ends with an appearance akin to 'scroll'. There was an area of thick laminated membrane in the anterior part of the lesion seen on the ultrasound image with extended-field of view (Figure 2). These were avascular on Doppler US (Figure 3). Though, the diagnosis of hydatid cyst with a detached endocyst was evident on US itself, non-contrast MRI study was also performed for the right arm, chest & abdomen for further evaluation. The morphology of the lesion on MRI precisely corresponded with

that shown on Ultrasound. The cyst was hypointense on T1-weighted and hyperintense on Proton-density & T2-weighted MR images with presence of detached endocyst which was coiled at both ends (Figure 4 & 5). MRI also confirmed the intramuscular location of the lesion in the biceps muscle which also showed significant edematous changes. No other focal intra or extra-muscular lesion was seen in the MRI study of chest and abdomen. The diagnosis of isolated intramuscular hydatid cyst of the biceps brachii with detached endocyst was given. Subsequently, the patient was operated and the cyst was excised uneventfully. Post-operative follow-up at 6 months interval was within normal limits.

### DISCUSSION

Though still more common in endemic areas, the human hydatid disease caused by *Echinococcus granulosus* is increasingly been recognized as an important public health problem of global significance [1]. The parasite has a 'dog-sheep' cycle with man being an intermediate accidental host. Human infection occurs through food and water contaminated with faeces of infected dogs which carry Echinococcal eggs. Liver (65%) is reported to be the commonest site of hydatid cyst in human followed by the lungs (25%), though it is also reported at several uncommon locations including the brain, heart, bone etc [2]. Musculoskeletal involvement is reported in approximately 1-4% cases [3]. Preoperative diagnosis of musculoskeletal hydatid disease is not always an easy task, due to unusual locations, low prevalence and as the soft tissue

involvement often mimics a tumor. High suspicion index in cystic soft tissue lesions mainly if the patient belongs to an endemic area or had travelled to such an area; often facilitates timely diagnosis [4]. The differential diagnosis in such cases also includes chronic hematoma, and malignant soft-tissue tumors such as myxoid liposarcoma.

On Ultrasound, the hydatid cyst typically shows thick concentric hypoechoic walls. Multiple echogenic foci due to hydatid sand render a 'snow storm' appearance [5]. Lewell classified hydatid cysts into three types according to their imaging appearance [6]. Type I is a fluid filled cyst-like structure with clear interior, which may evolve to a Type II lesion if daughter cysts and/or matrix develop. Type III is an inert calcified lesion. Magnetic Resonance Imaging is reported to precisely demonstrate different morphological aspects of musculoskeletal hydatid cyst, except calcifications. Multi-vesicular lesions are reported to be commonest presentation. Low-signal-intensity rim on T2-weighted MR images has been described as characteristic sign to suggest hydatid etiology rather than non-parasitic origin in the liver and lungs. This finding represents the parasitic membranes and pericyst. Low-signal-intensity rim on T2-weighted MR images is more frequently seen in musculo-skeletal locations as compared to other locations [7,8]. An unusual case of intramuscular hydatid cyst in biceps brachii muscle accompanied by an echinococcus tapeworm in brachialis muscle was also reported [9] which was however, strongly challenged [10].

Hydatid cysts are composed of outermost pericyst, a layer derived from compressed host tissue and inner true cyst wall. The true cyst wall is derived from the parasite and includes acellular outer laminated (ectocyst) and one-cell-thick germinal membrane (endocyst). High intra-cystic fluid pressures of approximately 20-80 cm of water inside the endocyst keep the true membranes tightly applied to the pericyst. The endocyst may gradually detach from the pericyst causing 'detached membrane' sign or 'floating membrane' sign, which are specific for hydatid disease. Complete detachment has been referred to as the "floating water lily sign" [11]. This is associated with negligible intra-cystic pressure inside the endocyst. The presence of 'ruptured endocyst with coiled margins' in the present case resembles a 'scroll' and appears to be an intervening stage in the evolution of hydatid cyst between the stage of early detachment of the endocyst ('detached membrane' sign) and the complete detachment ('floating water-lily' sign). During this intervening stage, the intra-cystic pressures are still maintained. The 'scroll appearance' of the endocyst also suggests recent rupture, as endocyst cannot retain this appearance for long duration due to decreasing intra-cystic pressures following its rupture. A previous ultrasound-based study had reported gradual loss of intra-cystic pressure with appropriate response to medical therapy with formation of 'Floating water lily' followed by 'congealed water lily sign' [12]. The folded membranes in a treated hydatid cyst have also been named as 'ball of wool' or 'yarn sign' or 'spin/whirl' sign [13, 14]. Calcification of the wall is seen in late stages which is often curvilinear in shape. Conservative therapeutic approach is often advised in soft tissue lesions mainly due to slow growth secondary to muscle

contractility and presence of lactic acid. The surgical treatment options include excision and simple drainage.

The present case thus illustrates the 'Scroll appearance' of the ruptured endocyst in an isolated intramuscular hydatid cyst of the biceps brachii muscle on Ultrasound and MRI. This is likely to be an intervening stage in the evolution of disease between the stage of early detachment and complete detachment of the endocyst.

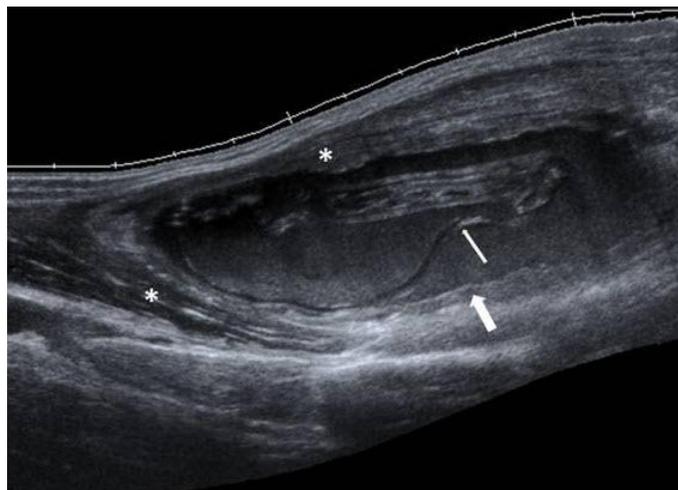
#### TEACHING POINT

The case report provided an illustrative depiction of an isolated intramuscular hydatid cyst in biceps brachii muscle. The 'Scroll appearance' of the detached endocyst in this case is not previously reported. This is likely to be an intervening stage in the evolution of disease between the stage of early detachment of endocyst and its complete detachment. The appearance also suggests recent rupture of endocyst. Hydatid cyst is an important differential diagnosis in the work-up of cystic musculoskeletal lesions.

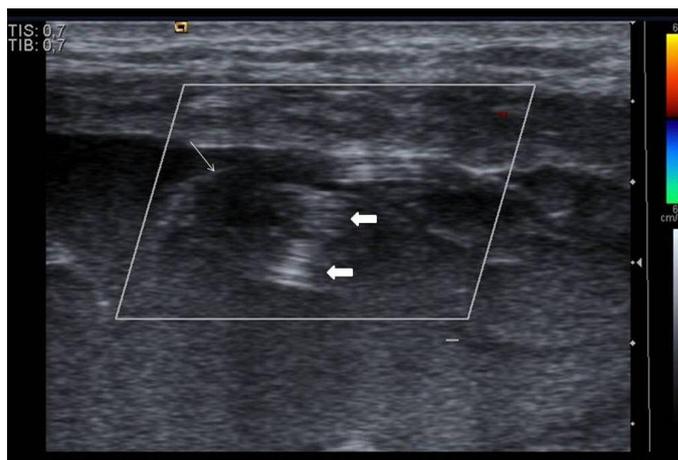
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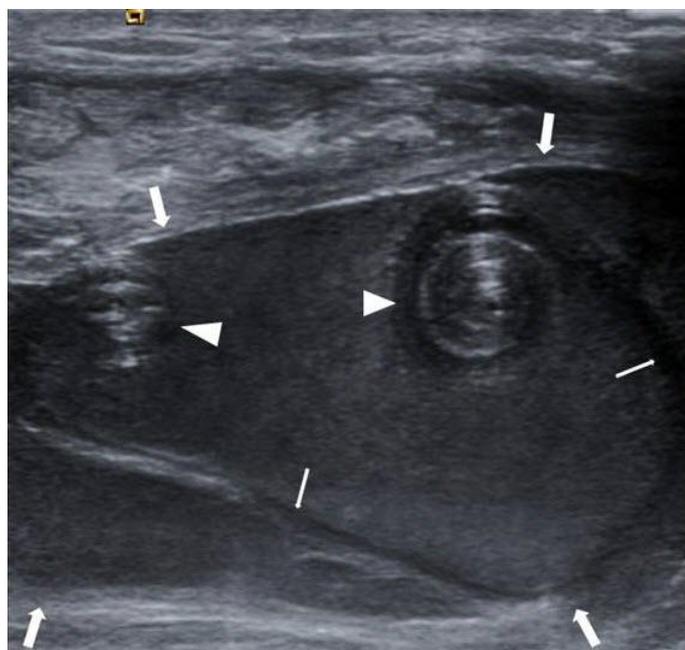


**Figure 2:** 21 years male with ruptured hydatid cyst of right biceps brachii muscle. B-mode US (linear transducer, high frequency - 11.43 MHz) 'extended field-of-view image showing the complete lesion with outer pericyst (arrow) and the detached endocyst (thin arrow) within the biceps belly (\*).

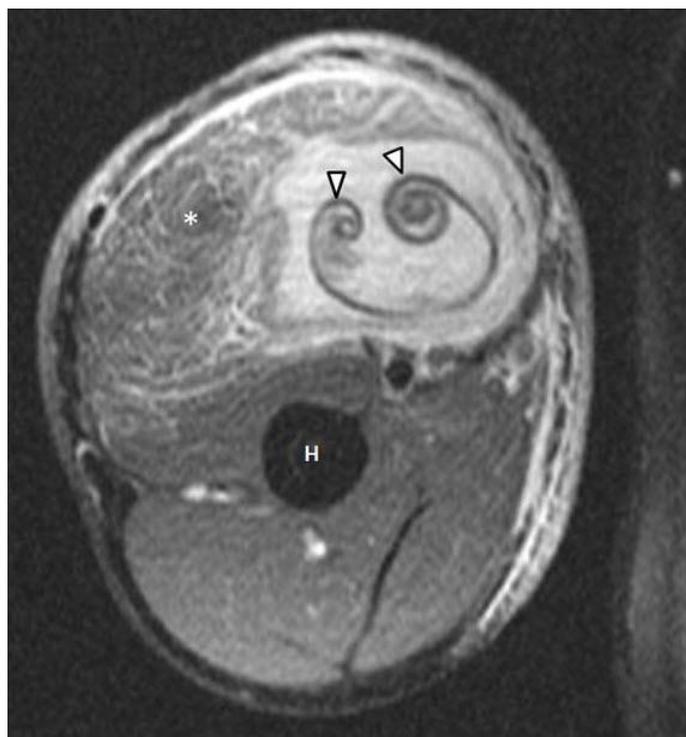


**Figure 3:** 21 Years male with ruptured hydatid cyst of the right biceps brachii muscle. Color Doppler image shows avascular nature of the detached membranes (thick arrows) and the wall of the cyst (thin arrow) [PRF 1220].

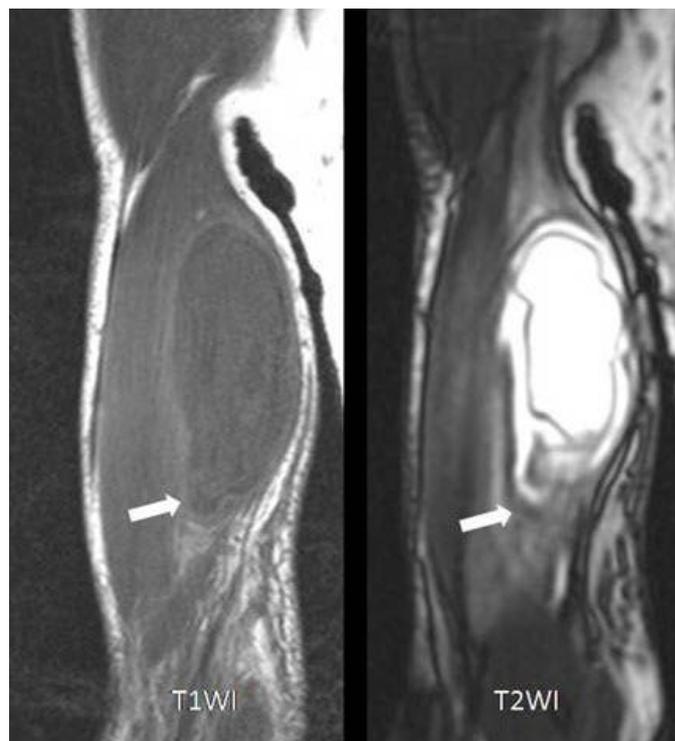
FIGURES



**Figure 1:** 21 years male with ruptured hydatid cyst of right biceps brachii muscle. B-mode US (linear transducer, high frequency - 11.43 MHz) image showing thick-walled intramuscular cystic lesion in biceps brachii. The arrows define the pericyst which shows layered appearance. The detached endocyst (thin arrow) with coiled margins (arrowheads) resembles a 'Scroll'.



**Figure 4:** 21 years male with ruptured hydatid cyst of right biceps brachii muscle. Fat-suppressed axial PD-T2 weighted TSE image (1.5 T, TR - 4590, TE - 24, FA 150) showing the predominantly hyperintense signal within the cystic lesion. Coiled margins of detached endocyst are noted (arrowhead) with 'Scroll appearance'. Edema is noted in the biceps muscle (\*). [H:Humerus].



**Figure 5:** 21 years male with ruptured hydatid cyst of right biceps brachii muscle. Fat-suppressed coronal T1-weighted TSE image (left panel - 1.5 T,TR - 550,TE - 20, FA - 145) and coronal T2-weighted tru-FISP image (right panel - 1.5 T,TR - 3.5, TE - 1.5, FA - 60) showing pericyst of the lesion which appears intermediate to hyperintense on T1-weighted image and hypointense on T2-weighted image (white arrows).

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Differential Diagnosis	US	CT	MRI		
			T1	T2	Contrast enhancement
<b>Intramuscular Hydatid disease</b>	Hypoechoic lesion with signs of endocyst rupture or daughter cysts.	Hypodense lesion. Curvilinear calcification.	Hypo intense.	Hyper intense with hypointense rim. Signs of endocyst rupture / daughter cysts.	Mild peripheral enhancement may be seen.
<b>Hematoma</b>	Heterogeneous echogenicity with temporal changes	Heterogeneous density lesion.	Variable signal depending upon the stage.	Variable signal depending upon the stage. Surrounding edema.	Mild peripheral enhancement may be seen.
<b>Soft tissue tumors.</b>	Hypoechoic lesion. Doppler may show vascularity.	Enhancing heterogeneous lesion.	Hypointense with intermediate signal foci.	Hyperintense signal with intermediate signal foci.	Central and peripheral enhancement.

**Table 1:** Differential diagnosis table of intramuscular hydatid disease

<b>Etiology</b>	Echinococcus granulosus			
<b>Incidence</b>	1-4 %			
<b>Gender ratio</b>	M:F – 1.04:1			
<b>Age predilection</b>	20-40 years			
<b>Risk factors</b>	Ingestion of contaminated food and drinks containing Echinococcus eggs passed in faeces of infected definitive hosts.			
<b>Treatment</b>	Surgical removal of the cysts combined with chemotherapy using albendazole and/or mebendazole before and after surgery.			
<b>Prognosis</b>	Good			
<b>Imaging findings</b>				
<b>US</b>	<b>CT</b>	<b>MRI</b>		
		<b>T1</b>	<b>T2</b>	<b>Contrast enhancement</b>
Hypochoic lesion with signs of endocyst rupture or daughter cysts.	Hypodense lesion. Curvilinear calcification.	Hypointense	Hyper intense with hypointense rim. Signs of endocyst rupture / daughter cysts.	Mild peripheral enhancement may be seen.

**Table 2:** Summary table of intramuscular hydatid disease

**ABBREVIATIONS**

MRI - Magnetic resonance imaging  
TE - Echo time  
TR - Repetition time  
US – Ultrasound

**KEYWORDS**

Intra-muscular hydatid cyst; ruptured endocyst; Scroll appearance; hydatid disease

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