A Classic Case of Subcutaneous Cysticercosis: A Rare Case with Sonological Findings and Review of Literature

Naren Satya Srinivas M.1, Kamala Retnam Mayilvaganan1, Amogh V.N.1, Balakrishna B.V.12, Munnangi Satya Gautam2, Ivvala Sai Prathyusha3

1 Department of Radiodiagnosis, MV Jayaram Medical College and Research Hospital, Bangalore Rural, India
2 Department of Radiodiagnosis, Jawaharlal Nehru Medical College, Belgaum, India
3 Department of Obstetrics and Gynecology, Rajarajeswari Medical College and Hospital, Bengaluru, India

Author’s address: Naren Satya Srinivas M., Department of Radiodiagnosis, MV Jayaram Medical College And Research Hospital, Hosakote, Bangalore, India, e-mail: naren.amc@gmail.com

Summary

Background: Cysticercosis is a parasitic infection caused by the larval stages of the pork tapeworm, Taenia solium. The subcutaneous form of the disease is a relatively rare clinical entity. Despite its rarity, it is imperative for a radiologist to be aware of this subcutaneous form of the disease and its various radiological patterns while evaluating any subcutaneous swelling. In this paper, we aimed to describe a typical case of ‘subcutaneous cysticercosis involving the left anterior chest wall’ with high resolution ultrasound findings. We also discussed the role of other imaging modalities in a case of subcutaneous cysticercosis. To the best of our knowledge, our case is only the second documented case report of sonological evaluation of subcutaneous cysticercosis involving the left anterior chest wall and the first case with high resolution ultrasound images of the lesion.

Case Report: An 11-year-old male presented with a painless, subcutaneous swelling over the left anterior chest wall for the last 2 months. High resolution ultrasound showed a well-defined, thin-walled, cystic lesion with an eccentric, echogenic focus in the subcutaneous plane. On change of the posture of the patient, this focus showed mobility. The hypoechoic area surrounding this cyst showed significant exudative fluid collection with diffuse, floating echoes and thin, incomplete internal septations. The adjacent soft tissues were thickened and irregular, suggestive of edema. This was followed by an excision biopsy. Histopathological examination revealed cysticercus cellulose parasite with an extensive mixed inflammatory cell infiltrate in the surrounding tissue. The patient was also administered oral antihelminthic therapy. Repeat ultrasound examination at the end of this management regimen showed complete healing with no e/o any remnant or recurrent cystic lesion, abscess or edema in the subcutaneous plane.

Conclusions: Subcutaneous cysticercosis is a relatively rare form of cysticercosis but should always be born in mind during the evaluation of subcutaneous swellings. High resolution ultrasound is a valuable, safe, nonionizing, cost-effective, widely-available, and easily-reproducible imaging tool for diagnosis of subcutaneous cysticercosis. There is a wide spectrum of ultrasound patterns of subcutaneous cysticercosis. In classic cases with a cyst containing a scolex within and with a surrounding abscess, high resolution ultrasound should always be the primary mode of diagnosis, thus avoiding unnecessary fine needle aspiration cytologies.

MeSH Keywords: Cysticercosis • Taenia solium • Ultrasonography

PDF file: http://www.polradiol.com/abstract/index/idArt/898408

Background

Cysticercosis is a parasitic infection caused by the larval stages of the pork tapeworm, Taenia solium. Though it is endemic in virtually all developing countries in Central and South America, Asia, and Africa, the subcutaneous form of the disease is a relatively rare clinical entity. Despite its rarity, it is imperative for a radiologist to be aware of this
subcutaneous form of the disease and its various radiological patterns while evaluating any subcutaneous swelling. High resolution ultrasound is a valuable, safe, non-ionizing, cost-effective, widely-available, and easily-reproducible imaging tool for diagnosis of subcutaneous cysticercosis. In this paper, we aimed to describe a typical case of ‘subcutaneous cysticercosis involving the left anterior chest wall’ with high resolution ultrasound findings. We also discussed the role of other imaging modalities in a case of a subcutaneous cysticercosis. To the best of our knowledge, our case is only the second documented case report of sonological evaluation of subcutaneous cysticercosis involving the left anterior chest wall and the first case with high resolution ultrasound images of the lesion.

Case Report

An 11-year-old male presented to the Department of General Surgery with a painless, subcutaneous swelling over the left anterior chest wall for the last 2 months. He gave a history of gradually increasing size of this swelling over the last 1 month. There was no history of fever or trauma. At physical examination, there was a soft, non-tender, ovoid, sessile, non-pulsatile, subcutaneous swelling measuring 4.5×3.0 cms approximately over the left anterior chest wall, around 2.5 cms inferior to the medial end of the left clavicle (Figure 1). The skin over the swelling appeared tense and glossy. There was no e/o similar swelling elsewhere in the body. Preliminary laboratory investigations revealed high sedimentation, C-reactive protein (CRP) and leukocytosis. The clinical differential diagnoses included a subcutaneous lipoma and an abscess. He was referred to our Radio-Diagnosis Department for high resolution ultrasound evaluation of the swelling.

High resolution ultrasonography was performed on GE VOLUSON 730 PRO machine (GE healthcare, Milwaukee, USA) equipped with a 7.5–12 MHz high frequency linear array transducer. The images were examined on real-time two-dimensional gray-scale and Doppler imaging. All sonograms obtained were saved in a picture-archiving and communication system. Ultrasound showed a 9×8-mm, well-defined, thin-walled, cystic lesion with an eccentric, echogenic focus measuring around 1.5 mm in diameter in the subcutaneous plane (Figure 2). On change of the posture of the patient, this focus showed mobility. However, the echogenic focus did not cast any distal acoustic shadowing (Figure 3). The hypoechoic area surrounding this cyst showed significant exudative fluid collection (asterix) with diffuse, floating echoes and thin, incomplete internal septations (white, filled arrows) with few floating, echogenic foci. The adjacent soft tissues appear thickened and irregular, suggestive of edema (black arrows). The underlying rib is denoted as ‘R’ in the image.

Fine needle aspiration cytology (FNAC) was further performed using a 22-G needle and 10-mL syringe. There were
Ingestion of the undercooked pork containing these cysticerci is the exclusive path to the development of human intestinal *Taenia solium* tapeworms (Step 4). By means of a single scolex or head, these cysts attach to the small intestine (Step 5). Adult tapeworms develop and reside in the small intestine for a period varying from months to years (Step 6). Basically, all the clinical symptoms can be attributed to the vigorous granulomatous inflammatory reaction that occurs when the larvae die [3,14].

Cysticercosis is commonly seen in the brain and eyes, which together constitute 86% of these cases [12,16,17]. The remainder is mainly located in the muscles, heart, lungs, peritoneum and breast [3,7,8,18,19]. Subcutaneous cysticercosis is a relatively rare form of cysticercosis but should always be born in mind during the evaluation of subcutaneous swellings. It can be confused with other clinical entities depending upon the location of the swelling like a lipoma, ganglion cyst, sebaceous cyst, dermoid, abscess, pyomyositis, tuberculous lymphadenitis, neuroma, sarcoma, myxoma, neurofibroma or fat necrosis [3,4,10,13,15,20]. The clinical features of subcutaneous cysticercosis depend on the location of the cyst, the cyst burden, and the host reaction [14,21,22]. It may cause painless or painful subcutaneous nodules [15]. Lymphadenopathy is a rare mode of presentation of cysticercus infestation [18]. Very few previous studies have mentioned the entity of subcutaneous cysticercosis involving the chest wall. To the best of our knowledge, our case is only the second documented case report of sonological evaluation of subcutaneous cysticercosis involving the left anterior chest wall and the first case with high resolution ultrasound images of the lesion. Lohra S. et al. first documented a case of subcutaneous cysticercosis involving the left anterior chest wall with ultrasound evaluation [4].

The diagnosis is relatively difficult to make solely on a clinical basis because the manifestations are not specific, and visualization of the organism usually is not feasible [23].

**Discussion**

Cysticercosis is a parasitic infection caused by the larval stages of the pork tapeworm, *Taenia solium* [1,2]. The disease is endemic in virtually all developing countries in Central and South America, Asia, and Africa, with the exception of Muslim countries where pork is not consumed [3–9]. The perpetuation of this parasitic disease is related to poor sanitation and hygiene [10,11].

Cysticercosis usually occurs as a result of consumption of food or water contaminated by human faeces containing *Taenia solium* eggs. Humans are the only definitive host in the lifecycle of *Taenia solium* (Figure 4) [Step 1] [9,12,13]. Humans can become infected by consuming gravid proglottids either through feco-oral route or by autoinfection (Step 2) [2,14,15]. There is also a high risk of infection by reverse peristalsis resulting in internal regurgitation of the eggs into the stomach when the intestine harbours a gravid worm [7]. The oncospheres penetrate the intestinal mucosa (Step 3) and develop into cysticerci after getting carried to various parts of the body including brain, eyes, striated muscles, liver, heart, lungs, peritoneum, breast and subcutaneous tissues. Ingestion of the undercooked pork containing these cysticerci is the exclusive path to the development of human intestinal *Taenia solium* tapeworms (Step 4). By means of a single scolex or head, these cysts attach to the small intestine (Step 5). Adult tapeworms develop and reside in the small intestine for a period varying from months to years (Step 6). Basically, all the clinical symptoms can be attributed to the vigorous granulomatous inflammatory reaction that occurs when the larvae die [3,14].

Cysticercosis is commonly seen in the brain and eyes, which together constitute 86% of these cases [12,16,17]. The remainder is mainly located in the muscles, heart, lungs, peritoneum and breast [3,7,8,18,19]. Subcutaneous cysticercosis is a relatively rare form of cysticercosis but should always be born in mind during the evaluation of subcutaneous swellings. It can be confused with other clinical entities depending upon the location of the swelling like a lipoma, ganglion cyst, sebaceous cyst, dermoid, abscess, pyomyositis, tuberculous lymphadenitis, neuroma, sarcoma, myxoma, neurofibroma or fat necrosis [3,4,10,13,15,20]. The clinical features of subcutaneous cysticercosis depend on the location of the cyst, the cyst burden, and the host reaction [14,21,22]. It may cause painless or painful subcutaneous nodules [15]. Lymphadenopathy is a rare mode of presentation of cysticercus infestation [18]. Very few previous studies have mentioned the entity of subcutaneous cysticercosis involving the chest wall. To the best of our knowledge, our case is only the second documented case report of sonological evaluation of subcutaneous cysticercosis involving the left anterior chest wall and the first case with high resolution ultrasound images of the lesion. Lohra S. et al. first documented a case of subcutaneous cysticercosis involving the left anterior chest wall with ultrasound evaluation [4].

The diagnosis is relatively difficult to make solely on a clinical basis because the manifestations are not specific, and visualization of the organism usually is not feasible [23].
High resolution ultrasound is a valuable, safe, nonionizing, cost-effective, widely-available, and easily-reproducible imaging tool for diagnosis of subcutaneous cysticercosis. Naik, et al. in their study involving the evaluation of soft tissue cysticercosis observed that the most common ultrasound appearance was that of a cyst containing a scolex within and with a surrounding abscess [16,24]. The ultrasound appearance in our study fits into this pattern. This appearance may be due to chronic intermittent leakage of fluid from the cyst due to degeneration of the cyst, resulting in a chronic inflammatory response with a fluid collection around the cyst [14,25–27]. The other common ultrasound appearance is that of a cyst containing a scolex within and with a surrounding edema but without an obvious abscess. Less commonly, it can also present as an irregular cyst with no scolex within but just with a surrounding edema [24]. Plain radiographs rarely show cysticerci except in chronic cases when they calcify. Plain radiography in a case of subcutaneous cysticercosis can reveal single or multiple radio-dense foci giving a characteristic rice grain appearance [10,28]. However, in case of subcutaneous cysticercosis involving the chest wall, any underlying pulmonary or pleural lesions can superimpose over these tiny foci in the subcutaneous plane and obscure the subcutaneous involvement. Also, radiographs are insensitive in few cases of cysticercosis, where only an irregular cyst with a surrounding edema but no scolex within is seen. Computed tomography (CT) and magnetic resonance imaging (MRI) scans are the other imaging modalities used for evaluating subcutaneous cysticerci. They help in showing the location, number, and relationship of the cysticerci to the surrounding structures. The diagnosis in our case report was suggested on the basis of sonographic findings. Although CT is sensitive in the visualization of tiny calcific foci, it has an inherent drawback of exposing the patient to ionizing radiation. MRI is a useful imaging adjunct to diagnose soft tissue and subcutaneous cysticercosis. It is a nonionising imaging tool and is more sensitive than CT as it identifies scolex and the cyst [29]. Cysticercosis is seen as a cystic lesion that appears hyperintense on T2-weighted images and hypointense on T1-weighted images [10]. Peripheral rim enhancement of the cyst wall is also seen. Intramuscular cysts are oriented in the direction of the muscle fibers. The scolex is also appreciated as a tiny hypointense speck within the hyperintense cyst [30].

Serological tests for detecting antibodies against cysticercosis are used to confirm the diagnosis. Enzyme-linked immunoblot assay is more sensitive and specific than ELISA (Enzyme linked immune sorbent assay) [31]. However, sensitivity of serological tests tends to be high for patients with multiple cysts (94%), but substantially lower for patients with a single cyst or calcified cysts (28%) [1,32].

The diagnosis of cysticercosis can be confirmed by fine-needle aspiration cytology (FNAC) or biopsy, which shows the detached hooklets, scolex, and fragments of the spiral wall of cysticercosis celluloseae [3,8,18,20,33,34]. Sometimes, the larval parts may not be seen in the specimen, but an inflammatory reaction consisting of large numbers of eosinophils and histiocytes can still be seen [1,2,7,9,16,21]. Although FNAC is an important tool for evaluation of subcutaneous lesions, it is painful, incurs health care costs, and contains the risk of infection and bruising [35]. There is also a remote chance of hypersensitivity reaction in susceptible individuals [21]. Thus, in typical cases with a cyst containing a scolex within and with a surrounding abscess, high resolution ultrasound should always be the primary mode of diagnosis.

Treatment of subcutaneous cysticercosis depends on the location of the cysts [22]. Surgical excision is done for isolated soft tissue cysticercosis associated with an abscess [36]. Cysts that are not associated with an abscess can be treated with antihelminthic medications such as albendazole or praziquantel [10,16,27,36]. Follow-up ultrasound study is usually performed after three weeks of antihelminthic medication to look for resolution of the lesion [15].

Conclusions

Subcutaneous cysticercosis is a relatively rare form of cysticercosis but should always be born in mind during the evaluation of subcutaneous swellings. High resolution ultrasound is a valuable, safe, nonionizing, cost-effective, widely-available, and easily-reproducible imaging tool for diagnosis of subcutaneous cysticercosis. There is a wide spectrum of ultrasound patterns of subcutaneous cysticercosis. In classic cases with a cyst containing a scolex within and with a surrounding abscess, high resolution ultrasound should always be the primary mode of diagnosis, thus avoiding unnecessary fine needle aspiration cytologies.

Conflicts of interest

None.

References:

1. Sawhney M, Agarwal S: Cysticercosis: Hooked by a hooklet on fine needle aspiration cytology – a case report. Case Rep Infect Dis, 2013; 2013: 315834.

2. Ghimire PG, Ghimire P, Rana R: Spectrum of typical and atypical clinico-histopathological and radiological presentation of soft tissue and muscular cysticercosis in Mid-Western and Far-Western Region of Nepal. J Clin Diagn Res, 2015; 9(9): EC01–3.

3. Suchitha S, Vani K, Sunila R, Manjunath GV: Fine needle aspiration cytology of cysticercosis – a case report. Case Rep Infect Dis, 2012; 2012: 854704.

4. Lohra S, Barve S, Lohra P et al: Subcutaneous cysticercosis: Role of high resolution ultrasound in diagnosis. Natl J Med Res, 2014; 4: 82–86.

5. Devihar, Sarita, Aggarwal, Roopak: Cysticercosis in palpable nodules – a clinico-pathological study with short review of literature. Journal of Medical Science and Research, 2013; 4: 2: 62.

6. Verma P, Verma N: Cysticercal encephalitis with disseminated cutaneous cysticercosis: A case report. Indian Journal of Child Health, 2015; 2(1): 21–23.

7. Gupta NK, Panchonia A, Jain D: Cysticercosis of breast. Trop Parasitol, 2013; 3(2): 148–50.

8. Nigam JS, Sharma A: Fine needle aspiration cytology of cysticercosis. J Clin Diagn Res, 2013; 7(12): 3123.

9. Kodiatte T, Chinalach P, Mothakapalli T, Kumar H: Cysticereus celluloseae lies in the eyes of the beholder. Annals of Tropical Medicine and Public Health, 2013; 6(2): 201.
10. Liu H, Juan YH, Wang W et al: Intramuscular cysticercosis: Starry sky appearance. QJM, 2014; 107(6): 459–61
11. Hawk MW, Shahlaie K, Kim KD, Theis JH: Neurocysticercosis: A review. Surg Neurol, 2005; 63(2): 123–32
12. Kamoji SG, Malipatil PD, Patil MN: Lumpy skin disease: An insight to epilepsy. Journal of Evolution of Medical and Dental Sciences, 2015; 4(10): 1723–26
13. Laxman R, Gupta V, Jawed A: An unusual hand swelling! A report on cysticercosis of intrinsic muscles of the palm. European Orthopaedics and Traumatology, 2014; 5:2: 165–67
14. Gupta S, Gupta S, Mittal A et al: A rare manifestation of cysticercosis infestation. Acta Med Indones, 2014; 46(1): 54–57
15. Tambre TM, Kachevar SG, Lakhkar DL: Imaging in disseminated cysticercosis: A case report and review of literature. Indian J Appl Radiol, 2015; 1(1): 105
16. Sinha S, Tiwari A, Sarin YK, Khurana N: Isolated soft tissue cysticercosis involving the trunk in children: Report of 4 cases. APSP J Case Rep, 2013; 4(3): 35
17. Venkat B, Aggarwal N, Makhnik S, Sood R: A comprehensive review of imaging findings in human cysticercosis. Jpn J Radiol, 2016; 34(4): 241–57
18. Elhence P, Bansal R, Sharma S, Bharat V: Cysticercosis presenting as cervical lymphadenopathy: A rare presentation in two cases with review of literature. Niger J Clin Pract, 2012; 15: 361–63
19. Chandler AC: Introduction to Parasitology. New York, NY: John Wiley & Sons; 1958: 350–54.
20. Jashnani KD, Desai HM, Shetty JB, Pandey I: Fine-needle aspiration cytology of subcutaneous cysticercosis: A series of five cases. Annals of Tropical Medicine and Public Health, 2010; 9(1): 73–75
21. Chakrabarti S, Rangasundari A, Roychowdhuri A, Mondal S: Incidental diagnosis of cutaneous cysticercosis on cytology: A case report. International Journal of Medical Science and Public Health, 2016; 5(6)
22. Kraft R: Cysticercosis: An emerging parasitic disease. Am Fam Physician, 2007; 75: 91–98
23. Narang S, Solanki A: A glimpse of hooklet by cytologist’s eye reflects cysticercosis: A case report. International Journal of Pharma Medicine and Biological Sciences, 2014; 3(4): 15
24. Naik D, Srinath M, Kumar A: Soft tissue cysticercosis – ultrasonographic spectrum of the disease. Indian J Radiol Imaging, 2011; 21(1): 60–62
25. Asrani A, Morani A: Primary sonographic diagnosis of disseminated muscular cysticercosis. J Ultrasound Med, 2004; 23: 1245–48
26. Vijayarghavan SB: Sonographic appearances in cysticercosis. J Ultrasound Med, 2004; 23: 423–27
27. Siddhu R, Nada R, Palta A et al: Maxillofacial cysticercosis – uncommon appearance of a common disease. J Ultrasound Med, 2002; 21: 199–202
28. Kumar BS, Mohan A: Subcutaneous cysticercosis. Indian J Med Res, 2012; 136(1): 102
29. Kumar A, Bhagwani DK, Sharma RK et al: Disseminated cysticercosis. Indian Pediatr, 1996; 33: 337–39
30. Tripathy SK, Sen RK, Sudes P, Dhatt S: Solitary cysticercosis of deltoid muscle in a child: The diagnostic dilemma and case report. Journal of Orthopaedics, 2009; 6: e11
31. Monteiro L, Almeida-Pinto J, Stocker A, Sampaio-Silva M: Active neurocysticercosis, parenchymal and extra–parenchymal: A study of 38 patients. J Neurol, 1993; 241: 15–21
32. Wilson M, Bryan RT, Fried JA: Clinical evaluation of the cysticercosis enzyme, linked immunoelectro transfer blot in patients with neurocysticercosis. J Infect Dis, 1991; 164: 1007–9
33. Smith S, Sripathi H, Naik L: Unusual location of cysticercus lesions in soft tissue – report of three cases. Indian J Radiol Imaging, 2003; 13: 157–58
34. Arora VK, Gupta K, Singh N, Bhatia A: Cytomorphologic panorama of cysticercosis on fine needle aspiration. A review of 298 cases. Acta Cytol, 1994; 38: 377–80
35. Srinivas MN, Amogh VH, Gautam MS, Prathyusha IS et al: A prospective study to evaluate the reliability of thyroid imaging reporting and data system in differentiation between benign and malignant thyroid lesions. J Clin Imaging Sci, 2016; 6: 5
36. Mittal A, Das D, Aiyer N et al: Masseter cysticercosis – a rare case diagnosed in ultrasound. Dermatolulocof Radicis, 2008; 37: 113–16