

# Diagnosis of Intramuscular Cysticercosis by High-resolution Ultrasonography: A Prospective Hospital Based Study

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## ABSTRACT

**Background:** Cysticercosis is one of the common infectious disease, the extraneural tissues are usually involved synchronously or metachronously with the brain in this disease. Isolated infestation of soft tissue and muscle in the absence of neural involvement is more common than previously known. High resolution ultrasonography has evolved now as an investigation of choice with proven sonological patterns of soft tissue cysticercosis which has reduced the need for invasive interventions.

**Methods:** Prospective evaluation of total 9 cases of extraneural cysticercosis over a period of 6 months at Prakash institute of Medical Sciences and Research. HRUSG analysis of 9 cases was done to evaluate and classify the various classic sonomorphological features of isolated cysticercosis involving soft tissue and muscles. FNAC was done only in 3 cases.

**Results:** Around 9 patients were selected on the basis of inclusion and exclusion criteria. Among 9 cases, 5 were male and 4 were female patients. Three individuals were vegetarian and five were non vegetarian. Mean age was 35 years. All cases were diagnosed on HRUSG. Intramuscular lesion was identified in 7 cases and 2 cases had subcutaneous involvement with anterior abdominal wall in muscular plane as the commonest site in three patients. FNAC was done in 3 cases confirming the cysticercosis and was treated surgically.

**Conclusions:** With the advent of high resolution ultrasonography and increased clinical awareness of the isolated soft tissue-intramuscular cysticercosis especially in endemic zone, a more conservative non-invasive approach can be applied both in diagnosis and treatment of these isolated cases of cysticercosis.

**Keywords:** Isolated cysticercosis, High resolution ultrasound, FNAC

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## INTRODUCTION

Cysticercosis infects the human tissue with the larval form of the pork tapeworm, *Taenia Solium*. It is the most common parasitic infection of the central nervous system worldwide, but the involvement of other organ system, excluding the orbits, has been described only infrequently in the literature.<sup>[1]</sup>

Isolated cases of intramuscular and subcutaneous cysticercosis are uncommon due to varied clinical presentations, however in these cases ultrasonography plays important role in definitive diagnosis and has emerged as the initial investigation of choice.<sup>[2]</sup> As far as medical management is considered, Non-invasive intervention has evolved as definitive line of management. Surgical

interventions come into picture only in cases with larger associated abscess.

This was a maiden study in our set up and therefore this prospective study was planned and conducted to evaluate the diagnostic utility of HRUSG in isolated soft tissue-intramuscular cysticercosis.

## METHODS

This prospective study was done over a period of 6 months, at Prakash institute of Medical Sciences and Research. Around 9 cases of isolated soft tissue and intramuscular cysticercosis were diagnosed on high resolution

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ultrasonography in department of Radio-Diagnosis in collaboration with department of Pathology, Prakash institute of Medical Sciences and Research.

Ultrasonography was performed and sonological features were evaluated in terms of: Site of the lesion: Soft tissue or Intramuscular, Anatomical location, Presence of cystic lesion with or without echogenic foci, Presence of any collection/Abscess. FNAC was done in 3 cases, two of them showed cyst without scolex and the third patients presenting with abscess/collection which was out of proportion to the primary cystic lesion. Three cases requiring FNAC were treated with surgical excision.

## RESULTS

Out of the total 9 cases, there were 5 males and 4 female patients with mean age of 38 years (range: 14-60 years). As far as dietary habits were concerned, three individuals were vegetarian, while six were non-vegetarian food habit. All of the patients belong to rural setup. Most of the lesion were found to be Intramuscular as was evident in 7 cases and 2 cases had only subcutaneous involvement.

The commonest site was anterior abdominal wall in muscular plane involving rectus abdominus in 4 patients. Patients' details and site of the lesion are depicted in (Table 1). The most common USG morphology seen in 4 cases was that of a hypoechoic- anechoic cyst with an echogenic scolex with mild inflammation around it, without any abscess formation. This was followed by irregular hypoechoic collection of exudative fluid within the muscles and subcutaneous tissue with cysticercal cyst containing echogenic scolex, seen in 3 cases. The least common feature was an irregular cyst with minimal fluid without any scolex in 1 patient (Table 2).

FNAC was done in 3 cases, two of them showed cyst without scolex and the third patient presenting with abscess/collection which was out of proportion to the primary cystic lesion. FNAC showed inflammatory background with predominant eosinophils and histiocytes, consistent with cysticercosis. The three cases undergoing FNAC were also diagnosed for cysticercosis on USG and underwent surgical excision.

**Table-1: Patient Distribution.**

Patient Distribution		No. of cases
Sex distribution	Male	5
	Female	4
Dietary Habits	Vegetarians	3
	Non- vegetarians	6
	Ant. Abd. wall (Rectus Abdominus)	4
Location	Triceps	2
	Biceps	2
	Brachialis	1

**Table 2: HRUSG features in isolated soft tissue and intramuscular cysticercosis**

Pattern of ultrasound imaging	No. of cases
Cysticercal cyst with echogenic scolex and mild inflammation (No Abscess)	5
Irregular cyst with minimal fluid. No scolex within the cyst	1
Irregular collection of exudative fluid within muscle with cysticercal cyst containing scolex	3

## DISCUSSION

Cysticercosis was first described in pigs way back by Aristophanes and Aristotle in 3rd century BC, latter it was noticed in human by Parunoli in 1550. Later in 1912, Krishnaswamy reported cysticerci related cases of muscle pain and subcutaneous nodules with abundant cysticerci in the muscles, heart, and brain at autopsy.

Cysticercosis has been known to be as a biological marker of the social and economic development of a community.[3] As we know that, Cysticercosis is an infection with larval form of pork tapeworm *Taenia Solium* and is transmitted through feco- oral route.[1] Humans normally act as definitive hosts. However man may become an intermediate host manifesting as cysticercosis in one of the ways: i) by Hetroinfection, commonest through contaminated water, food (like vegetables); ii) by exogenous autoinfection due to ano- oral contamination in patient harbouring the adult worm; iii) by endogenous autoinfection in which internal regurgitation of eggs occurs into the stomach due to reverse peristalsis from small intestine harbouring a gravid worm.[4]

The occurrence of cysticercosis in human in order of frequency is central nervous system, eye, muscle, subcutaneous tissue, heart, pleura and peritoneum.[5] In this study we have described isolated soft tissue and intramuscular cysticercosis.

The clinical presentation is usually non-specific with varied differentials like lipoma, abscess, lymphadenitis, and neurofibroma. The symptoms of this disease usually depend on the locations of the cyst, the cyst burden and the host immune response.[6]

Muscular cysticercosis may present clinically with three distinct types: i) the Myalgic-myopathic type; where during the death of the larva there is leakage of fluid from the cyst resulting in acute inflammatory response; ii) the Nodular-mass like or pseudotumor; in which degeneration of cyst results in intermittent leakage of fluid eliciting a chronic inflammatory response with fluid collection around the cyst; iii) the rare Pseudo hypertrophic type; where multilocular cyst formation occurs in groups of muscle.[7]

The subcutaneous cysticercosis may present as painless or painful subcutaneous nodules.

With the above clinical presentations, it is necessary for clinicians to keep the differential diagnosis of soft tissue cysticercosis in patients with soft tissue nodules.

This study which was based on ultrasonography highlighting again the importance of ultrasonography in making a definitive diagnosis of isolated disease which usually present with a clinical diagnostic dilemma with varied differentials. Ultrasonographic spectrum of isolated subcutaneous and intramuscular cysticercosis is already well described in literature.[8]

There can be four different sonographic appearances of muscular cysticercosis which are pathognomonic.8,10 The first type is a cysticercal cyst with an echogenic scolex and an inflammatory mass around it. This mainly occurs due to death of the larva. The second type is an irregular cyst with very minimal fluid on one side, indicating fluid leakage. The eccentric echogenic protrusion from the wall caused by the scolex is not seen within the cyst, due to either escape of the scolex or partial collapse of the cyst. The third appearance is a large irregular collection of exudative fluid within the muscle with cysticercus cyst containing an eccentric scolex. This is due to chronic intermittent leakage of fluid from the cyst leading to florid inflammatory exudates. This is similar to an

abscess; however, the absence of cysticercus cyst within the collection separates the two. The fourth appearance is that of a calcified cysticercosis, as multiple elliptical echogenic calcifications similar to millet seed calcification seen classically on plain radiograph.

The commonest ultrasound features in our study noted was that of a hypoechoic- anechoic cyst with an echogenic scolex with mild inflammation around it, without any abscess formation. These cases were of type one and occurs due to death of the larva.

The second common imaging finding was irregular hypo echoic collection of exudative fluid within the muscles and subcutaneous tissue with cysticercal cyst containing echogenic scolex. These are due to leakage of the cystic fluid inciting inflammatory exudates.

The least common feature was an irregular cyst with minimal fluid without any scolex only in 1 patient. The non-visualisation of scolex may be due to escape of scolex or due to collapse of cyst. Naik D et al in 2011 reported 17 cases of isolated soft tissue cysticercosis diagnosed solely by USG with utilisation of medical approach to treat these cases. The most common ultrasound appearance was that of a cyst containing a scolex within and with surrounding abscess. They also concluded that HRUSG is reliable diagnostic modality for the diagnosis of soft tissue cysticercosis which can be treated with drugs without much need of surgical intervention.<sup>[6]</sup>

Lohra S et al in 2014 also showed 7 consecutive cases of isolated soft tissue cysticercosis diagnosed on USG.<sup>[10]</sup>

Mittal A et al describe two cases of isolated cysticercosis one of them involving the pectoralis muscle which were clinically diagnosed as abscess but ultrasonography revealed a cyst with small echogenic scolex in it with surrounding hypoechoic area suggestive of cysticercosis.<sup>[8]</sup>

Sidhu R et al concluded that high resolution ultrasonography plays an important role in establishing the diagnosis of muscular cysticercosis, describing the classic morphologic characteristics.<sup>[2]</sup>

MRI is another diagnostic modality commonly used for the

evaluation of soft tissue cysticercosis. The drawbacks with the MRI are mainly the availability and the cost effectiveness. MRI also required dedicated body coils to imaged specific localised anatomical sites. The presence of scolex is the commonest and specific diagnostic clue which is more clearly appreciated on the ultrasound.

## CONCLUSION

Although isolated myocysticercosis is uncommon manifestation of *Taenia Solium* infestation, it should always be considered as differential for soft tissue, muscular lesions especially in endemic zone. Noninvasive, non-ionizing advantages of ultrasonography play an important role in establishing the diagnosis of myocysticercosis with greater confidence curtailing the need for further investigation. The limitation of the study was duration of study was less, more such type of studies should be conducted with more duration of study.

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