

## Research Article

# High resolution ultrasonography in isolated soft tissue and intramuscular cysticercosis

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### ABSTRACT

**Background:** Cysticercosis is a common parasitic public health issue especially in developing countries. Though the extraneural tissues are usually involved synchronously or metachronously with the brain, isolated infestation of soft tissue and muscle in the absence of neural involvement is more common than previously thought. High resolution ultrasonography has evolved now as an investigation of choice with proven sonological patterns of soft tissue cysticercosis which can entirely negate the need for invasive interventions.

The aim of the study is to: a) evaluate the diagnostic utility of HRUSG in isolated soft tissue- intramuscular cysticercosis; and b) evaluate and emphasized the role of the non-surgical conservative medical management in these cases.

**Methods:** Prospective evaluation of total 15 cases of extraneural cysticercosis over a period of 2 years at DMIMS Sawangi. HRUSG analysis of 15 cases was done to evaluate and classify the various classic sonomorphological features of isolated cysticercosis involving soft tissue and muscles. FNAC was done in 3 cases. 12 out of 15 patients were followed up closely over serial ultrasound after initiation of medical therapy at 15 days, 1 month and at 3 months interval. Tablet Albendazole with or without steroid cover was given to each of 12 patients and treatment response was recorded.

**Results:** Out of 15 cases, 7 were male and 8 were female patients. Nine individuals were vegetarian and six were non vegetarian. Mean age was 28 years. All cases were diagnosed on HRUSG. Intramuscular lesion was identified in 11 cases and 4 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. 12 patients were treated with medical therapy and showed complete resolution at 3 month ultrasound follow up.

**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, Albendazole

### INTRODUCTION

Cysticercosis is the infection of human tissue with the larval form of the pork tapeworm, *Taenia Solium* and is endemic in Asia, Africa, Latin America and China.<sup>1</sup>

Unlike infestation with adult *Taenia*, cysticercosis does not require the patient to eat infected pork as the route of transmission is feco oral. This also raises the possibility of auto infection.

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>2</sup>

Isolated cases of intramuscular and subcutaneous cysticercosis are uncommon due to varied clinical presentations, however in these cases ultrasonography provides means of definitive diagnosis and in recent years has emerged as the initial investigation of choice.<sup>3</sup> Non-invasive intervention with medical management has evolved as definitive line of management. Surgical interventions are indicated only in cases with larger associated abscess.

**METHODS**

Over period of two years, from March 2013 to April 2015, 15 cases of isolated soft tissue and intramuscular cysticercosis were diagnosed on high resolution ultrasonography in department of Radio diagnosis, DMIMS Sawangi.

Ultrasonography was performed on Aloka Alpha-7 scanner using 12 MHz linear array transducer. The 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
- Signs of inflammations in the adjoining soft tissue and muscles

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.

Medical treatment Albendazole (400 mg twice a day) with or without steroid (tapering prednisolone 1mg/kg once daily) was given for three weeks in 12 patients under serial ultrasound follow up at 15 days, 1 month and at 3 months interval.

Three cases requiring FNAC were treated with surgical excision. Patients demographic profile especially the dietary habits and clinical diagnosis was also recorded.

Those patients with positive history of seizures and other concomitant medical issues were excluded from the study.

**RESULTS**

Out of the total 15 cases, there were seven male and eight female patients with mean age of 28 years (range: 12-55 years). Nine individuals were vegetarian, while six were non vegetarian food habit. All of the patients are from predominate rural setup. Intramuscular lesion was

identified in 11 cases and 4 cases had subcutaneous involvement.

The commonest site was anterior abdominal wall in muscular plane involving rectus abdominus in 3 patients. Patients’ details and site of the lesion are depicted in (Table 1).

**Table 1: Patient Distribution.**

Sr. No	Patients Distribution	No. of cases
A	Sex	Male 7
	Distribution	Female 8
B	Dietary Habits	Vegetarians 9
		Non-vegetarians 6
C	Location	Ant. Abd. wall (Rectus Abdominus) 3
		Triceps 2
		Biceps 2
		Brachialis 1
		Pectoralis major 1
		Gastrocnemius 1
		Breast 1
		Subcutaneous back scapular region 1
		Subcutaneous post. cervical region 2
		Subcutaneous chest wall 1

The most common USG morphology seen in 8 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 5 cases. The least common feature was an irregular cyst with minimal fluid without any scolex in 2 patients (Table 2).

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

Sr. No.	Pattern of ultrasound imaging	No. of cases
A	Cysticercal cyst with echogenic scolex and mild inflammation (No Abscess)	8
B	Irregular cyst with minimal fluid. No scolex within the cyst	2
C	Irregular collection of exudative fluid within muscle with cysticercal cyst containing scolex	5

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.

After due consultation with the treating physicians, 12 patients were put on medical therapy of Albendazole with or without steroid and follow up USG was done initially at 15 days interval and then at 1 and 3 months. All of the 12 patients showed good response at 15 days ultrasound scan with complete resolution of the cystic lesion and associated inflammation and collection at 3 months follow up.

The three cases undergoing FNAC were also diagnosed for cysticercosis on USG and underwent surgical excision. On follow up ultrasound study no recurrence was noted in any of the cases.

## DISCUSSION

Cysticercosis was first described in pigs by Aristophanes and Aristotle in 3<sup>rd</sup> century BC, latter it was noticed in human by Parunoli in 1550. 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 designated as a biological marker of the social and economic development of a community.<sup>4</sup>

Cysticercosis is an infection with larval form of pork tapeworm *Taenia Solium* and is transmitted through feco-oral route.<sup>2</sup> Humans normally act as definitive hosts. Ingestion of inadequately cooked infected pork, the intermediate host, leads to the development of adult worm in human small intestine. The eggs are excreted in feces, ingested by the intermediate host, pig which hatch in the small intestine and result in cysticercosis. 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.<sup>5</sup>

The eggs hatch in the small intestine releasing oncospheres that penetrate the bowel mucosa and enters the blood stream to reach various tissues where they develop to form *Cysticercus Cellulosae*. These can remains viable in this stage for 10 years in human.

Usually the living larvae evade immune recognition and do not elicit inflammation but after death it induces vigorous granulomatous response producing symptoms depending on the anatomic location.

The occurrence of cysticercosis in human in order of frequency is central nervous system, eye, muscle, subcutaneous tissue, heart, pleura and peritoneum.<sup>6</sup> 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 usually depend on the locations of the cyst, the cyst burden and the host immune response.<sup>7</sup>

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.<sup>8</sup>

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 well described in literature.<sup>9</sup>

Four different sonographic appearances of muscular cysticercosis have been described which are pathognomonic.<sup>8,10</sup>

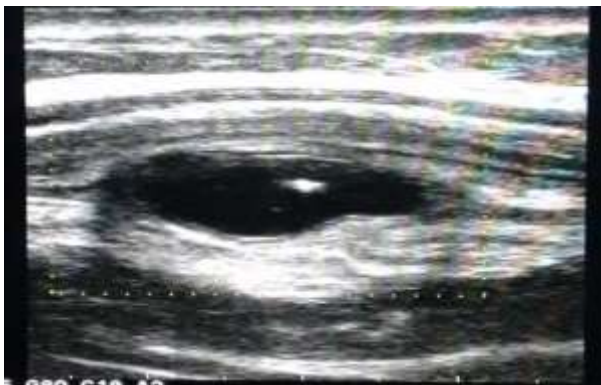
The first type is a cysticercal cyst with an echogenic scolex and an inflammatory mass around it. This occurs due to death of the larva.

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.

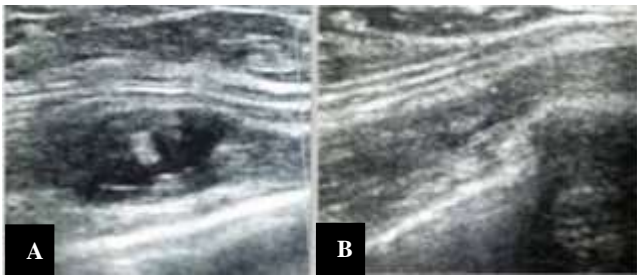
The third appearance is a large irregular collection of exudative fluid within the muscle with cysticercus cyst containing an eccentric scolex. This is due to chronic intermittent leakage of fluid from the cyst leading to florid inflammatory exudates. This is similar to an abscess; however the absence 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 in 8 cases was that of a hypoechoic- anechoic cyst with an echogenic scolex with mild inflammation around it, without any abscess formation (Figure 1 and 2). These cases were of type one and occurs due to death of the larva.

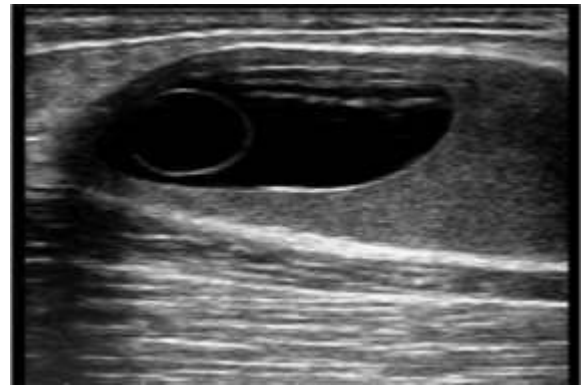


**Figure 1: HRUSG shows a cyst within rectus abdominus muscle with echogenic scolex and mild inflammation.**



**Figure 2: (A) HRUSG shows a well defined cyst within pectoralis muscle with echogenic scolex. (B) Follow-up USG scan showing complete resolution of the lesion without any residual inflammation.**

The second common imaging finding was irregular hypoechoic collection of exudative fluid within the muscles and subcutaneous tissue with cysticercal cyst containing echogenic scolex, seen in 5 cases (Figure 3). These are due to leakage of the cystic fluid inciting inflammatory exudates.



**Figure 3: HRUSG with cystic lesion in triceps muscle with thick abscess.**

The least common feature was an irregular cyst with minimal fluid without any scolex in 2 patients. 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>7</sup>

Lohra S et al in 2014 described 7 consecutive cases of isolated soft tissue cysticercosis diagnosed on USG. They stated that the tissue diagnosis is not recommended in every case, resorted only when response to therapy is poor or when surgical intervention is contemplated.<sup>11</sup>

It's worth mentioning that the vast majority of the differential diagnosis of soft tissue cysticercosis like lymphadenopathy, lipoma, neurofibroma are predominantly solid lesion and ultrasonography is most sensitive in identifying the cystic nature of the cysticercosis.

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>9</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>3</sup>

MRI is another diagnostic modality commonly used for the evaluation of soft tissue cysticercosis. Cystic lesion usually oriented along the muscle fibers, displays hyperintense signal of T2W and hypointensity on T1W

with or without thin peripheral wall enhancement. The scolex appears as tiny hypointensity foci within a hyperintense cystic cavity.

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

Jhankaria BG et al presented the MRI and Ultrasound findings in six patients with solitary muscular and soft tissue cysticercosis. Five of them had clear cysts with scolices in four cases. Ultrasound also showed similar findings, with the scolices being more clearly appreciated on USG.<sup>12</sup>

Patients with isolated subcutaneous, muscular cysticercosis can be managed successfully on conservative therapy of anti-helminthics like albendazole or praziquantel and steroid.<sup>13</sup>

Treatment response is evaluated on serial USG scan. Surgical intervention is done for isolated cases associated with large collection or abscess.

## 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. With classic sonomorphology of soft tissue and muscular cysticercosis, more often patients can be managed conservatively

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