

# Importance of ultrasonography and magnetic resonance imaging in diagnosis of cysticercosis of temporalis muscle mimicking temporal space infection

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## Abstract

Cysticercosis cellulosa, caused by the larval stage of *Taenia solium* is a common parasitic infection in Indian subcontinent. Although cysticercosis is common in other parts of the human body, its involvement with temporalis muscle is an extremely rare entity and demands documentation. This paper reports a case of cysticercosis cellulosa in a 35-year-old male patient within the temporalis muscle mimicking temporal space infection; due to the presence of concomitant dental infection, which was diagnosed with the help of high resolution ultrasonography and magnetic resonance imaging and managed conservatively using oral antiparasitic medication. Here, in this case report, we are emphasizing the importance of imaging modalities in diagnosing space infection and cysticercosis.

**Keywords:** Cysticercosis cellulosa, magnetic resonance imaging, space infection, temporalis, ultrasonography

## Introduction

Odontogenic infection comprises a high percentage of maxillofacial infections, if not controlled, can spread to adjacent head and neck fascial spaces. Fascial space infections may occasionally cause morbidity and thus use of advanced imaging in detection of space infections is helpful for the clinician for better management of the patient.<sup>[1]</sup>

Cysticercosis is a parasitic infection caused by *Taenia solium*. Cysticercus cellulosa, the larval stage of *T. solium*, resides in muscles and other tissues in pigs that serve as intermediate hosts. *Taenia* eggs may be ingested through the consumption of raw or undercooked pork, contaminated water or vegetables or by autoinfection caused by egg reflux in the stomach in people infected with adult *T. solium*.<sup>[2]</sup> Human

beings serve as either a definitive or an intermediate host of the adult tapeworm.<sup>[3]</sup> Cysticercosis is endemic to developing countries India, Indonesia, China, Africa, Peru, Mexico, where there is poor access to sanitation facilities and close interaction between humans and animals.<sup>[4]</sup>

The ocular and cerebral locations account for 86% of diagnosed cases of human cysticercosis. The remaining 14% are in the subcutaneous, cardiac, pulmonary, muscular, hepatic and oral locations.<sup>[5]</sup> The reason for the preferential survival and growth of cysticerci in the human brain and skeletal muscle is not completely understood, but it may be related to increased blood supply in these tissues compared with other organs.<sup>[6]</sup> It is interesting to note that oral lesions of cysticercosis is a rare event. Sporadic cases of isolated muscle mass have been reported in literature without involvement of central nervous system or eyes. Intramuscular cysticercosis has non-specific manifestations and diagnosis can be difficult. High resolution ultrasonography (USG) can demonstrate the classical cyst with scolex within and is a convenient test for diagnosis.<sup>[7]</sup> We report the presence of cysticercosis involving the temporalis muscle. To the best of our knowledge, this is the 4<sup>th</sup> case report documenting cysticercosis involving temporalis muscle.

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## Case Report

A 35-year-old male patient reported to the Department of Oral Medicine and Radiology with the chief complaint of restricted mouth opening and heaviness on the right side of face since 1 month [Figure 1]. On examination, patient was moderately built and nourished and his vital signs were within the normal limit. He took a vegetarian diet and had no deleterious habits. Extraoral examination revealed a diffuse swelling present in the right infratemporal region measuring approximately 2 cm × 2 cm in size near the outer canthus of the eye [Figure 2]. Swelling was firm,

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compressible and non-tender on palpation. Overlying skin of the swelling was normal. On intraoral examination, there was grossly decayed mandibular right third molar with deep dental caries in it. It was tender, on probing percussion and palpation. Interincisal; opening was 30 mm. Based on history and clinical examination, a provisional diagnosis of masticator and predominantly temporal space infection secondary to carious mandibular right third molar was given. Radiographic examination revealed an ill-defined radiolucency in apical one-third of mandibular right third molar [Figure 3]. Antibiotic therapy was started, though patient responded to treatment there was a slight improvement in mouth opening, but the temporal swelling still persisted. We planned for high resolution USG on Toshiba Aplio XG USG unit (Japan) with 7.5 MHz linear array transducer probe, it revealed oval 5 mm sized cystic areas with eccentric echogenic nidus with in the right temporalis muscle [Figure 4]. There was mild adjacent edema, but no evidence of collection noted. Surprisingly no sign of infection in the form of cellulitis or edema were seen.

The right masseter muscle was normal since, ultrasound helps in detection of superficial fascial space infections. Magnetic

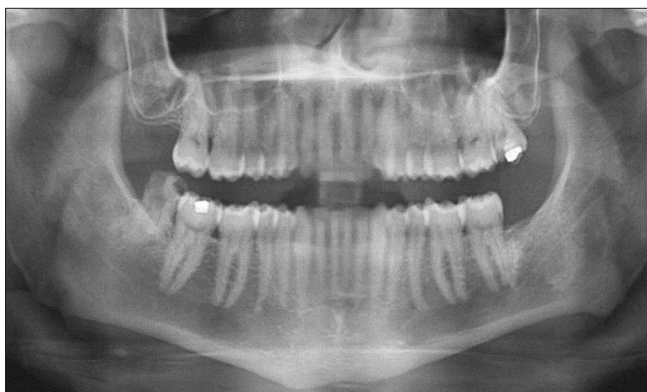
resonance imaging (MRI), which is the gold standard for fascial space infections was done by HDe Signa 1.5-T unit with a dedicated coil and revealed 12 mm × 7 mm × 8 mm cystic lesion with hypointense nidus noted with in the belly of the right temporalis muscle with hyperintensity of muscle until mandibular insertion site on image suggestive of intramuscular parasitic cyst [Figure 5]. Furthermore, inflammatory changes were seen in the right masticator space prestyloid parapharyngeal space pterygomandibular fissure and right malar region subcutaneous fat suggestive of space infection [Figure 6]. With the help of USG and MRI, we came to final diagnosis of cysticercosis of the right temporalis muscle, which was an incidental finding. MRI also helped in diagnosing fascial space infection involving masticator, parapharyngeal and pterygomandibular spaces. Empirical antibiotic therapy was given and subsequently incision and drainage was done in masticator space region, 48 was extracted. Cysticercosis was managed conservatively. Patient was given albendazole 15 mg/kg body weight/day for 14 days.



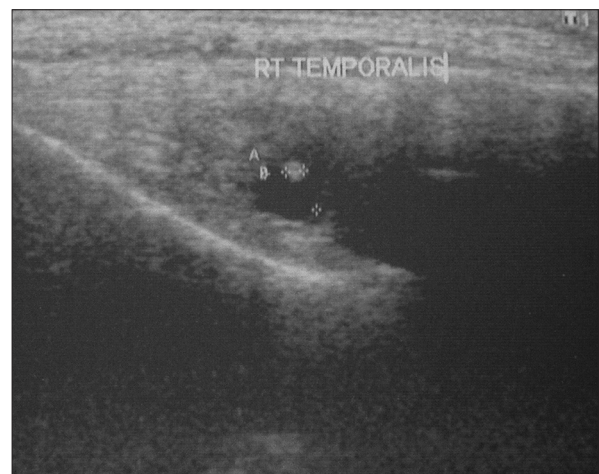
**Figure 1:** Restricted mouth opening



**Figure 2:** Clinical picture showing swelling in the right infratemporal region

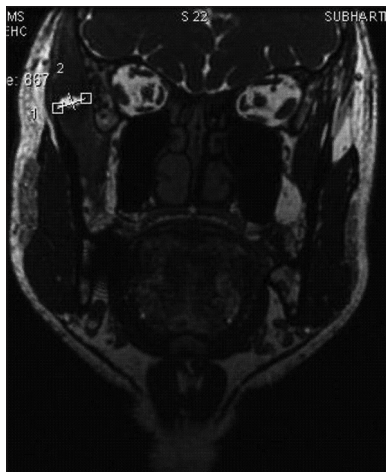


**Figure 3:** Orthopantomogram showing periapical radiolucency i.r.t 48

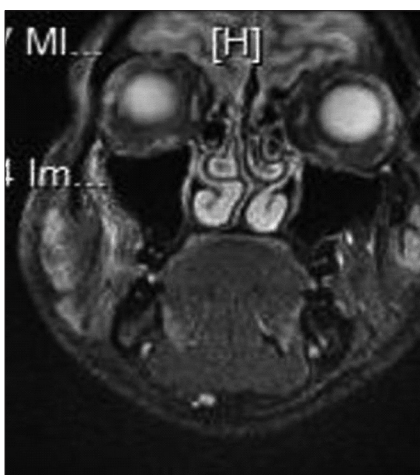


**Figure 4:** High resolution sonogram of the right temporalis muscle showing a homogenous, hypoechoic lesion with a hyperechoic scolex

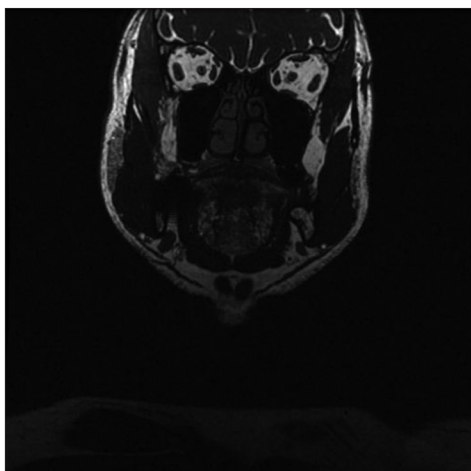
A repeat MRI was performed after 3 months, which showed no abnormality in the right temporal region [Figure 7].



**Figure 5:** Magnetic resonance imaging coronal section showing cystic lesion with nidus in superior portion of the right temporalis muscle



**Figure 6:** Magnetic resonance imaging coronal section showing hyperintensity of the right perimasseteric fascial planes



**Figure 7:** Post-treatment magnetic resonance imaging

## Discussion

The life cycle of *Platyhelminthes* is characterized by different stages of development and growth requiring various hosts that can harbor the eggs, oncospheres, larvae and adults. Usually when the larvae infest the intermediate host tissue a pathological condition called cysticercosis results.<sup>[8]</sup> The ingestion of *T. solium* eggs happens by consumption of faecally contaminated vegetables, food, water as well as self-contamination by reflux from the intestine in to stomach or contaminated hands. Human beings acquire cysticercosis through faecal-oral contamination with *T. solium* eggs from tapeworm carriers.<sup>[9]</sup> Thus, vegetarians and other people who do not eat pork can acquire cysticercosis. In the present case, it may be due to ingestion through contaminated raw vegetables as the patient was vegetarian. Cysticercosis is relatively common in developing countries of Central and South America, Asia and Africa, especially in those areas with poor sanitation where humans and animals live in close contact and in those regions where inspection of meat is not strict.<sup>[10]</sup>

In spite of the high prevalence of cysticercosis in some parts of the world, oral and perioral lesions are relatively rare. The most common locations of the reported cases are shown in [Table 1]. It can be noted that the majority have been found in the tongue (44 cases), followed by buccal mucosa (24 cases), the lower lip (19 cases) and upper lip (8 cases).<sup>[10]</sup> Isolated muscular and soft-tissue involvement is even more rare disease and produce diagnostic dilemma to the clinician.<sup>[11]</sup> as in our case cysticercosis is an incidental finding which was confused with temporal space infection. Pubmed database for the last two decades was reviewed using key words temporalis, muscle, masseter, intramuscular, cysticercosis only 9 cases were found to be documented, out of which only 3 cases of cysticercosis involved temporalis muscle [Table 2].

Diagnosis of intramuscular cysticercosis is difficult solely on a clinical basis as the manifestations are not specific and lesions may be confused with lipoma, fibroma, neurofibroma or intramuscular abscess.<sup>[12]</sup> Plain radiography rarely shows cysticerci in the active phase, but show calcified lesions in chronic phases. As plain X-ray in a patient with a solitary cyst has a poor yield, imaging modalities such as ultrasound, MRI, computed tomography are useful in diagnosing muscular

**Table 1: Case reports of oral cysticercosis**

Location	No. of cases
Tongue	44
Lip	27
Buccal mucosa	24
Other sites (gingiva, floor of mouth, retro molar, submental, subcutaneous mandible, neck midline, and soft palate)	12

**Table 2: Imaging features of intramuscular cysticercosis reviewed in last two decades**

Location	Sex	Radiographic investigations	Year	Authors
Left masseter muscle	Female	CT revealed well-defined lesion with central hypodensity	2001	Reddi <i>et al.</i> <sup>[12]</sup>
Left masseter muscle	Male	USG revealed well-defined, anechoic area of 6 mm×4 mm with a small calcified scolex	2002	Sidhu <i>et al.</i> <sup>[13]</sup>
Left temporalis muscle	Male	CT revealed enhancing soft-tissue mass	2005	Kumar <i>et al.</i> <sup>[6]</sup>
Left temporalis muscle	Male	MRI revealed cystic lesion	2007	Sethi <i>et al.</i> <sup>[14]</sup>
Left masseter muscle	Male	USG revealed well-defined cystic lesion with a small echogenic nidus	2008	Mittal <i>et al.</i> <sup>[15]</sup>
Right masseter muscle	Female	USG revealed well-defined cystic lesion with central echogenic area. MRI revealed well-encapsulated, low attenuation peripherally enhancing cyst	2011	Kumar <i>et al.</i> <sup>[3]</sup>
Temporalis muscle	Female	NA	2011	Kumar <i>et al.</i> <sup>[16]</sup>
Left masseter muscle	Female	USG revealed hypoechoic area with hyperechoic scolex	2012	Ramakrishnan <i>et al.</i> <sup>[4]</sup>
Right temporalis muscle	Male	USG revealed oval 5 mm sized cystic areas with eccentric echogenic nidus. MRI revealed 12 mm×7 mm×8 mm cystic lesion with hypointense nidus		Present case

CT: Computed tomography; USG: Ultrasonography; MRI: Magnetic resonance imaging; NA: Not available

cysticercosis.<sup>[17]</sup> USG is a, non-invasive, non-ionizing, sensitive and it is also quick to perform, easily repeated with minimum patient discomfort and at low cost.<sup>[18,19]</sup> MRI is a gold standard technique extensively used for diagnosing neurocysticercosis where it can clearly show the cyst with the scolex<sup>[7]</sup> but is an expensive modality difficult to perform with claustrophobic patients.<sup>[20,21]</sup> High resolution sonography provides all information available with MRI and more with regards to muscle pathology. Vijayaraghavan described four different sonographic patterns of muscular cysticercosis. The first type is cysticercus cyst with an inflammatory mass around it, as a result of the death of the larva. The second type is an irregular cyst with very minimal fluid on one side, indicating a leakage of fluid. The eccentric echogenic protrusion from the wall due to the scolex is not seen within the cyst. The third appearance is a large irregular collection of exudative fluid within the muscle with the typical cysticercus cyst containing the scolex, situated eccentrically within the collection. This appearance is similar to an intramuscular abscess. In all three of these types of appearances, the salient diagnostic feature is that of the cysticercus itself, which appears as an oval or round well-defined cystic lesion with an eccentric echogenic scolex in it,<sup>[4,11]</sup> as was seen in the present case. The fourth sonographic appearance is that of calcified cysticercosis.

Drugs such as praziquantel (15-20 mg/kg bodyweight 3 times daily for 15 days) and albendazole (5 mg/kg body weight 3 times daily for 1-4 weeks) are potent antihelminthics used in the treatment of cysticercosis<sup>[5]</sup> replacing niclosamide, which was the drug of choice for the treatment of the disease for a long period. In the present case, patient was managed conservatively by albendazole. Albendazole is a benzimidazole drug that prevents polymerization of tubulin and leads to the loss of cytoplasmic microtubules in the larvae of *T. solium*. Comparative studies of albendazole and praziquantel in the management of patients with

active neurocysticercosis indicate better results with albendazole.<sup>[17]</sup> Drugs should be used especially in cases where surgical treatment is risky or not possible as in neurocysticercosis. No treatment is required for patients with calcified tissue cysts.

## Conclusion

Cysticercosis in the present case is an incidental finding and we recommend that it should be considered in the differential diagnosis of solitary swellings within the oral and maxillofacial region. We also herald the role of high resolution USG and MRI as a diagnostic tool in such cases and also suggest that localized parasitic infections like cysticercosis can be treated successfully with conservative management using oral antiparasitic medication.

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