DOI: 10.7860/JCDR/2022/55321.16296

Case Report

Radiology Section

Isolated Intramedullary Cervical Spinal Cord Cysticercosis- A Case Report

MANU SOLANKI[1], VENKATA RAVITEJA REDDY GAYAM[2], KANUPRIYA AGRAWAL[3], NIKITA JINDAL[4], KROHIT YADAV[5]

ABSTRACT

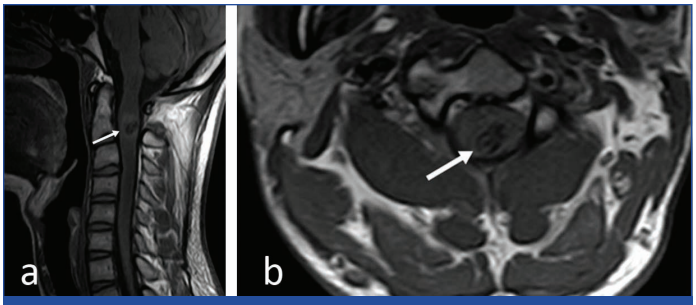
Neurocysticercosis is the most prevalent parasitic infection in developing countries, caused by the encysted larvae of taenia solium. It predominantly affects the brain alone or both the brain and the spinal cord. In spinal cysticercosis, the thoracic cord is most commonly involved. Isolated involvement of the cervical spinal cord is very rare. Authors here, report a case of 19-year-old male patient with intramedullary cysticercosis in the cervical cord. The lesion was diagnosed with magnetic resonance imaging and serology. Albendazole and steroids were used to treat the patient medically.

Keywords: Albendazole, Cystic lesion, Magnetic resonance imaging, Parasitic infection, Tenia solium

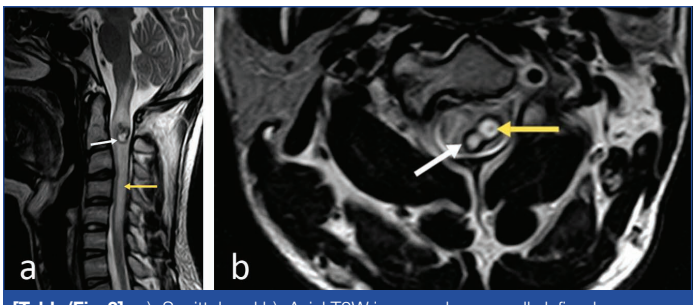
CASE REPORT

A 19-year-old male patient presented to the Neurology Outpatient Department with a chief complaint of pain originating in the neck region and radiating to the left arm. On neurological examination, the muscle power was 5/5 in all the limbs and the muscle tone was 5/5. No significant anomalies were found in pain, temperature, vibration, proprioception, and tactile sensation in all four limbs. The vital signs, general examination, and systemic examination were all normal. In view of radiating pain, radiculopathy was suspected, and Magnetic Resonance Imaging (MRI) of the cervical spine was advised.

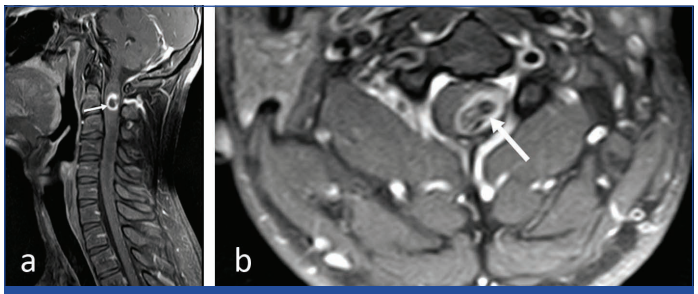
The MRI revealed a focal well-defined rounded to an elliptical intramedullary lesion in the cervical cord at the C2-C3 level with associated marked expansion of the cord. The lesion appeared hypointense on T1W images with a hyperintense rim [Table/Fig-1] and hyperintense on T2W images with a hypointense rim [Table/Fig-2a]. The lesion also had an eccentric nodule that was T1 hyperintense and T2 hypointense on imaging, indicating scolex [Table/Fig-2b]. On postgadolinium images, thick peripheral rim enhancement with an enhancement of scolex was seen [Table/Fig-3]. The lesion was associated with long segment intramedullary cord edema appearing hyperintense on T2W images, extending cranially up to the cervicomedullary junction and caudally till the lower C6 vertebral level.



[Table/Fig-1]: a): Sagittal and b): Axial T1W images show a well-defined hypointense cystic lesion with a hyperintense rim (arrows).



[Table/Fig-2]: a): Sagittal and b): Axial T2W images show a well-defined hyperintense cystic lesion with a hypointense rim (white arrows). Axial T2W images also show a hypointense eccentric nodule (yellow arrow) representing scolex. Sagittal T2W images show associated long segment hyperintense signal in intramedullary region representing edema (yellow arrow).



[Table/Fig-3]: a): Sagittal and b): axial postgadolinium T1W images showing a well defined hypointense lesion with thick peripheral rim enhancement (arrows).

Serum Immunoglobulin G (IgG) anticysticercal antibodies were detected by Enzyme-Linked Immunosorbent Assay (ELISA) confirming the diagnosis. The patient was treated with albendazole (15 mg/kg) for 6 weeks, and dexamethasone was also given to reduce inflammation and edema of the cord. The symptoms of the patient have significantly improved 6 weeks after the treatment.

DISCUSSION

Neurocysticercosis is the most prevalent parasitic infection caused by the encysted larvae of taenia solium. It predominantly affects the brain alone or both the brain and the spinal cord. Isolated spinal cysticercosis without intracranial involvement is rare and accounts for approximately upto 5.8% of all neurocysticercosis. [1]. Cysticercosis of the spine is usually seen in young patients. It is a systemic infection that affects humans as intermediate hosts after ingestion of the pork tapeworm. Clinical features vary depending on the location, size, and stage of the infection, as well as the severity of the inflammatory response. The most common clinical features include pain, spasticity, paraparesis, and bowel and bladder dysfunction [2]. Dhar A et al., in their extensive review of the literature found that majority of documented cases were located in the dorsal or dorsolumbar levels [3], while authors report a case of isolated intramedullary cysticercosis in the cervical cord region.

Spinal cysticercosis has been classified into extraspinal, which involves vertebra, and intraspinal, which includes epidural,

subdural, arachnoid, and intramedullary types [4]. It typically occurs in the intradural space following the dissemination of lesions from the brain through the cerebrospinal fluid. The intramedullary form of cysticercosis is rare and most commonly occurs as a result of the hematogenous transmission of a parasite. The thoracic spinal cord is prone to the disease due to the higher blood volume in this area compared to the other spinal segments. Neurocysticercosis in the cervical cord is extremely rare, and it occurs due to migration through the ventriculo-ependymal pathway [5].

Authors	Age/ Gender	Level	Investigations	MRI findings	Scolex	Management
Vadher A et al., [12] (2021)	20 male	C7-T2	Magnetic resonance imaging	Thick walled hyperintense cystic lesion on T2WI with rim enhancement on post contrast images.	-	Surgery with postoperative albendazole and steroid
Barrie U et al., [17] (2020)	44 Female	C5-C6	Magnetic resonance imaging	Intramedullary ring enhancing lesion with surrounding edema.	-	Surgery with postoperative albendazole and steroid
Jobanputra K et al., [1] (2020)	44 Female	C5-C7	Magnetic resonance imaging	Partially cystic lobulated lesion with hyperintense superior component and surrounding edema on T2WI with rim enhancement on post contrast images.	-	Surgery
Yadav K et al., [14] (2017)	8 male	C5-C6	Magnetic resonance imaging	Hyperintense lesion with perilesional edema with ring like contrast enhancement.	-	Albendazole+steroids
Ranjan R et al., [10] (2017)	6 male	C4-C6	Magnetic resonance imaging, Enzyme-linked immunosorbent assay	Hyperintense cystic lesion with intracystic hypointense target like scolex.	+	Albendazole+steroids
Salazar Noguera EM et al., [4 (2015)	43 male	C7-T1	Magnetic resonance imaging	Contrast enhancing intramedullary mass.	-	Surgery with postoperative albendazole and steroid
Jain N et al., [11] (2012)	20 male	C2	Magnetic resonance imaging, Immunoglobulin G	Hyperintense cystic lesion with hypointense central dot like scolex.	+	Albendazole+steroids
Sheehan JP et al., [16] (2002)	16 Female	C1-C2	Magnetic resonance imaging	Intramedullary cystic lesion with irregular peripheral enhancement.	+	Surgery with postoperative praziquantel
Present case (2022)	19 Male	C2-C3	Magnetic resonance imaging	Hyperintense cystic lesion with hypointense eccentric nodule like scolex	+	Albendazole+steroids

[Table/Fig-4]: Review of similar cases published [1,4,11,12,14-17].

Neurocysticercosis is classified into four pathological stages by Escobar. These include the vesicular stage, which consists of a small cyst containing clear fluid and a small eccentric nodule (the scolex). At this stage, the parasite is still viable, and its membrane remains intact, so there is no host reaction. In the colloid vesicular stage, the cyst fluid becomes turbid and the membrane becomes leaky with edema surrounding the cyst. This stage is the most symptomatic. The granular nodular stage is marked by the regression of cysts, which become small granulomatous nodular lesions. Surrounding edema also decreases at this stage. The final stage is a nodular calcified stage, which is an end-stage quiescent calcified cyst remnant with no edema [6].

One of the most essential diagnostic methods for detecting cysticercosis is Magnetic Resonance Imaging (MRI). The appearance of the disease on MR imaging varies depending on the stage of the disease. In the vesicular stage, an MRI scan of the spinal cord reveals a cystic lesion that appears hypointense on T1W imaging with a hyperintense scolex found eccentrically inside the cyst cavity and hyperintense on T2W images with a faint hypointense rim. A thicker capsule can be detected in the colloid stage, which is hyperintense on T1W imaging and hypointense on T2W images. Peripheral rim enhancement can be detected on post-gadalonium imaging. A calcified cyst appears hypointense both on T1WI and T2W1 [7,8]. The diagnosis of the majority of cases reported in the literature was confirmed after histopathology, however, if the MRI reveals a strong suspicion of a diagnosis, treatment may be initiated. Other differential diagnoses such as astrocytoma, ependymoma, cavernous malformations, and cystic entities (like an arachnoid cyst, and neurenteric cyst) should be ruled out. Identification of scolex on MRI can assist in diagnosis [9].

The majority of the cases of cervical spinal cord cysticercosis reported in the literature described MRI findings of the vesicular stage, however, only a few cases reported visualised scolex in them [Table/Fig-4]. The present case revealed a T2W hyperintense cyst with an eccentric hypointense scolex in it consistent with the vesicular stage. Ranjan R et al., [10] and Jain N et al., [11] also reported similar findings with an eccentric hypointense scolex in the cystic lesion, which is consistent with the present case.

Medical and surgical interventions are the two mainstays of management of cysticercosis. The location of the parasite and the disease's activity are crucial guiding factors in the management of spinal cysticercosis. Surgical intervention may be needed in cases of doubtful diagnosis, acute presentation, or worsening neurological status. Surgery not only helps in decompression but also provides tissue for histological testing, which assists in the diagnosis [12]. Patients with stable neurological conditions can be considered for medical treatment. Albendazole is typically given as a preoperative adjunctive treatment before surgery or as a postoperative treatment for four to six weeks at a dose of 15 mg/kg/day. In addition, dexamethasone should be administered as it may increase blood levels of albendazole and decrease treatment-induced inflammation [13]. Yadav K et al., [14] reported a case in 8-year-old male who was successfully treated with albendazole and steroids. Additionally, albendazole may also be used individually as conservative treatment in suspected patients with a stable clinical course. Medical therapy alone could be advantageous in terms of avoiding surgery and treating surgically inaccessible cysticercosis [14]. There are only a handful of similar cases reported in the literature which makes this a rare presentation [1,4,11,12,14-17].

CONCLUSION(S)

Isolated involvement of intramedullary cysticercosis in the cervical spinal cord is an unusual manifestation. The diagnosis of intramedullary cysticercosis is challenging, and neurocysticercosis needs to be strongly considered as well. The MRI is one of the most essential diagnostic methods for detecting cysticercosis. In selected cases where patients are neurologically stable, medical treatment can be considered. Early diagnosis allows the patient to be treated medically with albendazole and corticosteroids.

REFERENCES

[1] Jobanputra K, Raj K, Yu F, Agarwal A. Intramedullary neurocysticercosis mimicking cord tumor. J Clin Imaging Sci. 2020;10(7):7. Available from: http://dx.doi.org/10.25259/JCIS_165_2019.
[2] Qi B, Ge P, Yang H, Bi C, Li Y. Spinal intramedullary cysticercosis: A case report and literature review. Int J Med Sci. 2011;8(5):420-23. Available from: http://dx.doi.org/10.7150/ijms.8.420.

[3] Dhar A, Dua S, Singh H. Isolated intramedullary lumbar spine neurocysticercosis: A rare occurrence and review of the literature. Surg J. 2021;7(4):e327-36. Available from: http://dx.doi.org/10.1055/s-0041-1739118.
[4] Salazar Noguera EM, Pineda Sic R, Escoto Solis F. Intramedullary spinal cord neurocysticercosis presenting as Brown-Séquard syndrome. BMC Neurol. 2015;15(1):1. Available from: http://dx.doi.org/10.1186/s12883-014-0245-5.
[5] Del Brutto OH, Garcia HH. Intramedullary cysticercosis of the spinal cord: A review of patients evaluated with MRI. J Neurol Sci. 2013;331(1-2):114-17. Available from: http://dx.doi.org/10.1016/j.jns.2013.05.025.
[6] Zhao JL, Lerner A, Shu Z, Gao XJ, Zee CS. Imaging spectrum of neurocysticercosis. Radiol Infect Dis. 2015;1(2):94-102. Available from: https://www.sciencedirect.com/science/article/pii/S235262111500003.
[7] Meena D, Gupta M, Jain VK, Arya RK. Isolated intramuscular cysticercosis: Clinicopathological features, diagnosis, and management- A review. J Clin Orthop Trauma. 2016;7(Suppl 2):243-49. Available from: http://dx.doi.org/10.1016/j.jcot.2016.06.016.
[8] Kimura-Hayama ET, Higuera JA, Corona-Cedillo R, Chávez-Macías L, Perochena A, Quiroz-Rojas LY, et al. Neurocysticercosis: Radiologic-pathologic correlation. Radiographics. 2010;30(6):1705-19. Available from: http://dx.doi.org/10.1148/rg.306105522.
[9] Pant I, Chaturvedi S, Singh G, Gupta S, Kumari R. Spinal cysticercosis: A report of two cases with review of the literature. J Craniovertebr Junction Spine. 2016;7(4):285-88. Available from: http://dx.doi.org/10.4103/0974-8237.193261.
[10] Ranjan R, Tulika, Chand S, Agnihotri A. Solitary intramedullary cervical cysticercosis without neurological deficit: A rare case report. J Pediatr Neurosci. 2017;12(1):99-101. http://dx.doi.org/10.4103/jpn.JPN_162_16.
[11] Jain N, Gutch M, Agrawal A, Khanna A. Quadriparalytic disseminated neurocysticercosis. BMJ Case Rep. 2012;2012:bcr0820114613. Available from: http://dx.doi.org/10.1136/bcr.08.2011.4613.
[12] Vadher A, Raval MR, Shah SD, Patel KG, Sharma K. A rare case of isolated intramedullary spinal cord cysticercosis. Cureus. 2021;13(5):e14864. Available from: http://dx.doi.org/10.7759/cureus.14864.
[13] Chhiber SS, Singh B, Bansal P, Pandita KK, Razdan S, Singh J. Intramedullary spinal cysticercosis cured with medical therapy: Case report and review of literature. Surg Neurol. 2009;72(6):765-68. Available from: http://dx.doi.org/10.1016/j.surneu.2009.06.011.
[14] Yadav K, Garg D, Kaushik JS, Vaswani ND, Dubey R, Agarwal S. Intramedullary neurocysticercosis successfully treated with medical therapy. Indian J Pediatrics. 2017;84(9):725-26. Available from: https://pubmed.ncbi.nlm.nih.gov/28466406/.
[15] Maste PS, Lokanath YK, Mahantshetti SS, Soumya S. Isolated intramedullary spinal cysticercosis: A case report with review of literature of a rare presentation. Asian J Neurosurg. 2018;13(1):154-56. Available from: http://dx.doi.org/10.4103/1793-5482.180894.
[16] Sheehan JP, Sheehan JM, Lopes MB, Jane JA. Intramedullary cervical spine cysticercosis. Acta Neurochir (Wien). 2002;144(10):1061-63. Available from: http://dx.doi.org/10.1007/s00701-002-0985-7.
[17] Barrie U, Badejo O, Aoun SG, Adeyemo E, Moler N, Christian ZK, et al. Systematic review and meta-analysis of management strategies and outcomes in adult spinal neurocysticercosis. World Neurosurg. 2020;138:504-511e8. Available from: http://dx.doi.org/10.1016/j.wneu.2020.03.093.

PARTICULARS OF CONTRIBUTORS:
1. Postgraduate Resident, Department of Radiodiagnosis, M.M. Institute of Medical Sciences and Research, Ambala, Haryana, India.
2. Postgraduate Resident, Department of Radiodiagnosis, M.M. Institute of Medical Sciences and Research, Ambala, Haryana, India.
3. Postgraduate Resident, Department of Radiodiagnosis, M.M. Institute of Medical Sciences and Research, Ambala, Haryana, India.
4. Postgraduate Resident, Department of Radiodiagnosis, M.M. Institute of Medical Sciences and Research, Ambala, Haryana, India.
5. Postgraduate Resident, Department of Radiodiagnosis, M.M. Institute of Medical Sciences and Research, Ambala, Haryana, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Venkata Raviteja Reddy Gayam,
Room 277, I-Block, M.M. Institute of Medical Sciences and Research, MMDU Campus, Mullana, Ambala, Haryana, India.
E-mail: gayam.tejareddy@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Feb 03, 2022
- Manual Googling: Feb 16, 2022
- iThenticate Software: Apr 18, 2022 (11%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jan 29, 2022**
Date of Peer Review: **Feb 25, 2022**
Date of Acceptance: **Apr 19, 2022**
Date of Publishing: **May 01, 2022**