ORIGINAL RESEARCH PAPER
Volume-8 | Issue-9 | September - 2019 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CHALLENGES IN THE DIAGNOSIS OF NEUROCYSTICERCOSIS IN DEVELOPING COUNTRIES: A CASE REPORT FROM ZAMBIA AND A REVIEW ON THE ROLE FOR IMMUNODIAGNOSIS.

Medical Science

Victor Mwanakasale* Copperbelt University, Ndola, Zambia *Corresponding Author

Nataliya Yakovlyeva Ndola Teaching Hospital, Ndola, Zambia

Peter Songolo World Health Organisation, Country office, Lusaka, Zambia

ABSTRACT

Neurocysticercosis, a complication of Taeniasis solium, is a difficult condition to diagnose. In developing countries that are resource constrained Neurocysticercosis cases either go undetected or are diagnosed late in health facilities that have Computer Tomography scan. A case report on Neurocysticercosis in a female patient from Zambia is presented here. The role of immunodiagnosis in Neurocysticercosis is also reviewed briefly.

KEYWORDS

Neurocysticercosis, diagnose, developing countries, immunodiagnosis.

INTRODUCTION.

Neurocysticercosis (NCC) is a zoonotic Neglected Tropical Disease (NTD). It is a complication of *Taenia solium* infection in which man acquires the infection by accidentally ingestion the eggs of the tapeworm via auto infection [1]. In the intestines the egg hatches into a stage called the oncosphere. The oncosphere then develops into the mature larva called the larva taenia. The larva taenia is then carried by blood circulation to the brain and then lodges in the brain tissue leading to the condition of NCC. One of the clinical presentations of NCC is epilepsy. It has been reported that up to 30% of all epilepsy cases in developing countries is due to NCC [2, 3, 4]. The greatest challenge in the management of NCC in developing countries where the disease is endemic is making the correct diagnosis on time and correct intervention [5]. We present a case report of NCC to demonstrate the dilemma of diagnosis of NCC in resource constrained developing countries such Zambia and review the role of immunodiagnostics in the diagnosis of this condition.

The case report

A 50 years old female patient presented to Ndola Teaching Hospital, Ndola, Zambia, in June 2015 with a history of epileptic seizures of unknown duration. A Computer Tomography (CT) scan was requested on the patient. The scan was done at Ndola Teaching Hospital with and without contrast. The scan showed the following: There were scattered calcifications bilaterally, in the parenchyma and cortex, the largest lesion not exceeding 1.0 cm in diameter (Figures 1 and 2 below). There were no oedematic features around the lesions. The interhemispheric fissure was centered on the midline. The cerebrum and cerebellum showed prominent cortical sulcation indicating early atrophic changes. The cerebral ventricles were of normal size and symmetrically arranged. There were no signs of increased intracranial pressure. The brain stem and cerebellum also appeared normal. Sella and Pituitary were normal. Parasellar structures were unremarkable. There were no abnormalities in the cerebellopontine angle areas on both sides. The paranasal sinuses and mastoid air cells were normally developed were clear and pneumomatized.The orbital contents were unremarkable. There were no abnormalities in the calvarium. A provisional diagnosis of an inactive NCC in nodular calcified stage was made. Electro-Encephalogram and Magnetic Resonance Imaging (MRI) were recommended on this patient to confirm the diagnosis but both were unavailable at the hospital.

Implication for this finding was that chemotherapy at this stage would not reverse the damage done to the brain tissue as calcification had set in. The patient would continue to have epileptic seizures for the rest of her life. Antiepileptic drugs would be the only source of relief for her. Had CT scan or any other sensitive diagnostic test been done earlier chemotherapy with drugs such as praziquantel or albendazole or surgery might have reversed the pathology.

In developing countries such as Zambia, many cases of NCC either go undetected or are diagnosed late since this disease is prevalent in rural areas where diagnostic tests such as CT scan and MRI are unavailable. By the time the patient is referred to a hospital with diagnostic facilities it is usually late to reverse the pathology. There is therefore a need to explore potential diagnostic tests for the early detection of NCC. Potential role for immunodiagnosis of NCC is discussed below.

Figure 1. Brain CT scan image 1.

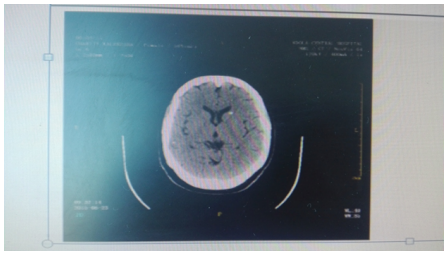

Figure 2. Brain CT scan image 2.

Role for Immunodiagnosis in NCC.

The role of immunodiagnostics for the early detection and diagnosis of NCC and thereby early intervention with either chemotherapy or surgery has been explored before. This is as far back as 1909 and later years in 1940s [6, 7[. Haemagglutination and RadioImmuno assay methods were used during these trials but were found to have low sensitivity and specificity [7]. However, the advent of Enzyme Linked Immuno Assay decades later saw improvement in the quality of results from immunodiagnostics for NCC [8, 9, 10, 11]. The performance of immunodiagnostics for NCC was further improved with the development and introduction of Enzyme Linked Immunoelectrotransfer blot using lentil lectin-bound glycoproteins (LLGP-EITB). All of the above mentioned assays are based on the detection of specific antibodies for NCC and do take advantage of the multiplier effect of the antibody production system in the host man. Detection of the parasite antigens by these methods was found to be poor [12, 13]. The gold standard immunodiagnostic method for antibody detection for NCC therefore is LLGP-EITB [7]. LLGP-EITB's diagnostic performance in serum samples has been demonstrated to be as high as 98% sensitivity and 100% specificity in patients with more than one viable brain cysticercosis [7]. As for patients with a single viable or degenerating cyst, performance of

LLGP-EITB is low with sensitivity at 60-70% [14]. In incidences of patients only with calcified lesions chances of detecting circulating antibodies by LLGP-EITB are extremely variable and likely to be influenced by the intensity of the original infection and the time since resolution.

Diagnosis of NCC by parasite antigen detection is restricted by the amount of circulating antigens that are produced or released from the parasite. This is unlike the antibody responses that are amplified by the host's immune system. Detection of circulating antigens demonstrates the presence of live cysticerci in man. For patients with only calcified NCC the antigen detection test should be negative while a positive test result in this condition might imply that the viable lesions were missed by radiological imaging. In patients with degenerating cyst or with one or a few viable parenchymal cysts antigen detection test results are frequently negative while they are consistently positive in patients with several viable parenchymal cysts [2]. In patients with subarachnoid NCC the levels of circulating antigens are very high.

As for the role of immunodiagnostics in NCC it should be appreciated that brain imaging remains key in investigating a patient with suspected NCC and is used to make the diagnosis, define the critical characteristics of the infection, and determine the medical or surgical treatment approaches [2]. The levels of antigens and antibodies vary greatly depending on the stage and number of the parasites present. In situations where brain imaging is unavailable utilization of immunodiagnostics to screen for NCC is limited. This is because immunodiagnosis using available tests does not change the clinical management for many infected persons with either asymptomatic or symptomatic NCC. Most physicians do not prescribe antiparasitic drugs in the absence of brain imaging due to the risks associated with the resulting inflammatory response that depend greatly on the number and location of viable cysts present. The role of immunodiagnosis might be in identifying a small proportion of persons with heavy NCC or early subarachnoid NCC with raised risk of disease progression or complication.

CONCLUSION.

In developing countries that usually lack diagnostic tests for NCC such as CT scan and MRI having a high index of suspicion for NCC in a patient presenting with epileptic seizures may be the only way to early diagnosis of NCC and institution of effective medical or surgical intervention. Role of immunodiagnostics for NCC in developing countries may need to be revisited.

Acknowledgement.

The authors are grateful to the Ndola Teaching Hospital, Radiology Department for the CT scan images.

REFERENCES.

1. Garcia HH, Nash TE, Dei Brutto OH. "Clinical symptoms, diagnosis, and treatment of neurocysticercosis". Clinical symptoms, diagnosis, and treatment of neurocysticercosis". Lancet Neurol. (2014): 43; 1202-1215.
2. Garcia Hector H, On'Neal Seath E, Hoh John, Handati Sukwan for the Cysticercosis working group in Peru. "Laboratory diagnosis of Neurocysticercosis (Tanie solium)". Journal of Clinical Microbiology. (2018): 56(9), e00424.
3. Newton CR, Garcia HH. "Epilepsy in poor regions of the world". Lancet. (2012): 380; 1193-1201.
4. Ndimubanzi PC, Carabin H, Budke CM, Nguyen H, Qian YJ, Rainwater E, Dickey M, Reynolds S, Stoner JA. "A systematic review of the frequency of neurocysticercosis with a focus on people with epilepsy". PLoS Neglected Trop Dis. (2010): 4; e870.doi:10.137/journal.
5. Dixon HB and Lipscomb FM. "Cysticercosis: an analysis and follow-up of 450 cases". Medical Research Council, London, United Kingdom. (1961), Vol 299.
6. Prabhakhar S and Singh G. "Taenia solium: a historical note"., in Singh G and Prabhakhar S (ed), Taenia solium cysticercosis; from basic to clinical science, CABI Publishing, oxon, United Kingdom (2002). 157-168.
7. Tsang VC, Brand JA, Boyer AE. "An Enzyme-Linked Immunelectrotransfer blot assay and glycoprotein antigens for diagnosing human cysticercosis (Taenia solium). J.Infect Dis (1989) 159: 50-59.
8. Arambulo PV, Wallis KW, Bullock S, Kagan IG. "Serodiagnosis of human cysticercosis by microplate enzyme-linked immunospecific assay (ELISA)". Acta Trop. (1978) 35:63-67.
9. Coker-Vann M, Brown P, Gajdusek DC. "Serodiagnosis of human cysticercosis using a chromatofocused antigenic preparation of Taenia solium cysticerci in an enzyme-linked immunosorbent assay (ELISA)". Trans R. Soc Trop. Med Hyg. (1984) 78: 492-498.
10. Diwan AR, Coker-Vann M, Brown P, Subianto DB, Yolken R, Desowitz R, Escobar A, Gibbs CJ Jr, Gajdusek DC. "Enzyme-linked Immunosorbent assay (ELISA) for the detection of antibody to cysticerci of Taenia solium". Am. J. Trop Med Hyg (1982) 31: 364-369.
11. Costa JM, Ferreira AW, Makino MM, Camango ME. "Spinal fluid Immunoenymatic assay (ELISA) for Neurocysticercosis". Rev. Inst Med Trop. Sao Paulo.(1982) 24: 337-341.
12. Tellez Giron E, Ramos MC, Dufour L, Montante M. "Use of the ELISA method in the diagnosis of cysticercosis". Bol Officina Sanit Panam (1984) 97: 8-13.
13. Correa D, Sandoval MA, Harrison LJ, Parkhouse RM, Plancarte A, Meza-Lucas A, Fisser A. "Human neurocysticercosis: comparison of enzyme immunoassay capture techniques based on monoclonal and polyclonal antibodies for the detection of parasite products in cerebralspinal fluid". Trans R. Soc Trop Hyg (1989) 83: 814-816.
14. Rodriguez S, Wilkins P, Domy P. "Immunological and molecular diagnosis of cysticercosis". Pathog Glob Health (2012) 106: 286-298.