

# Concomitance of Aids and cysticercosis in autopsies

## *Concomitância entre cisticercose e Aids em autópsias*

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### ABSTRACT

The objective of the present study was to report the concomitance of cysticercosis and acquired immunodeficiency syndrome (Aids) in autopsied patients at a school hospital in Minas Gerais State, Brazil. Cysticercosis can be seen in patients with Aids, who may or may not present symptoms according to their immunological state. Therefore, it is necessary that cysticercosis be included in the list of opportunistic infections, and that more studies be carried out for a better understanding of this coinfection.

**Key words:** autopsy; Aids; cysticercosis.

### RESUMO

*O objetivo do presente trabalho foi relatar a concomitância entre cisticercose e síndrome da imunodeficiência adquirida (Aids) em pacientes autopsiados em um hospital escola de Minas Gerais, Brasil. É possível associar cisticercose e pacientes com Aids, mas eles podem ou não apresentar os sintomas, dependendo do seu estado imunológico. Por isso, é necessário que a cisticercose entre no rol de infecções oportunistas e que mais estudos sejam feitos para melhor compreensão dessa coinfeção.*

*Unitermos:* autópsia; Aids; cisticercose.

### RESUMEN

*El objetivo del presente trabajo es reportar la concomitancia entre cisticercosis y el síndrome de inmunodeficiencia adquirida (Sida) en pacientes sometidos a autopsia en un hospital universitario de Minas Gerais, Brasil. Es posible asociar cisticercosis y pacientes con Sida, pero ellos pueden presentar síntomas o no, según su situación inmunitaria. Por eso, se recomienda incluir la cisticercosis en la lista de infecciones oportunistas y realizar más estudios para mejorar la comprensión de esa coinfección.*

*Palabras clave:* autopsia; Sida; cisticercosis.

## INTRODUCTION

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The acquired immunodeficiency syndrome (Aids) is caused by the human immunodeficiency virus (HIV), a human retrovirus belonging to the family *Retroviridae* and subfamily *Lentivirinae*. The disease was first described in the decade of 1980, in the United States, becoming, since then, a major global public health problem<sup>(1)</sup>. It characterizes by weakening the immune system of the infected individuals, especially affecting CD4+ T lymphocytes and causing severe immunodepression, making them susceptible to opportunistic diseases, such as pneumocystis pneumonia, cytomegalovirus infections, isosporiasis, cryptococcal disease, toxoplasmosis, among others<sup>(2)</sup>.

In view of the scenario of HIV infection and its resulting immunodepression, cysticercosis can be considered one of the most frequent opportunistic infections, being the commonest cause of brain lesions in HIV-positive patients<sup>(3)</sup>. The increased prevalence of retroviruses in endemic areas of cysticercosis leads to the most recurrent coinfection. However, few cysticercosis cases in patients with HIV have been reported, and the influence of the retrovirus infection upon the natural history of cysticercosis is not fully clarified<sup>(4,5)</sup>.

Human cysticercosis is a parasitic disease whose cycle begins with the ingestion of food or water contaminated with eggs of *Taenia solium*. Pigs act as intermediate hosts and human beings are the definitive hosts<sup>(6)</sup>. In men, cysticerci can reach any tissue; in spite of this, there is tropism toward the central nervous system (CNS), where they generally produce inflammatory reactions, provoking the most severe aspect of the disease: neurocysticercosis (NCC)<sup>(7-9)</sup>.

NCC is the commonest CNS parasitic infection; it is a serious public health problem, especially in developing countries, such as those in Latin America, Asia, and Africa. Poor sanitation conditions and the low socioeconomic and cultural level contribute to the persistence and dissemination of the disease, besides the heavy consumption of contaminated pork in those places<sup>(10)</sup>.

Besides, there are differences in the literature regarding prevalence of cardiac cysticercosis worldwide. In Latin American countries, such as Brazil, studies show the occurrence of cardiac cysticercosis in around 23% of the performed autopsies. But the cardiac location has been poorly studied, and information about patients' prognosis is scarce or inconsistent<sup>(11)</sup>.

Although NCC has been associated with 27% of CNS lesions in HIV-infected individuals<sup>(12)</sup>, cardiac cysticercosis keeps being, in

most cases, a finding at post-mortem examinations<sup>(13)</sup>. Up to the present, reports on the concomitance of cardiac cysticercosis and Aids have not been found in the literature.

This work is aimed at reporting a case of NCC and a case of cardiac cysticercosis in autopsied patients who presented concomitant HIV infection, in order to verify a possible association between those diseases and discuss the involved mechanisms.

## REPORT OF THE CASES

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By means of a retrospective study, 830 results of autopsies performed during the course of General Pathology, at Hospital de Clínicas da Universidade Federal do Triângulo Mineiro (HC/UFTM), Uberaba, Minas Gerais, Brazil, from 1990 to 2018, were reviewed. Among them, two cases were found with diagnoses of cysticercosis and Aids.

### Case 1

Autopsied male patient, 44 years old, Caucasian, from Uberaba, body mass index (BMI) 22.15 kg/m<sup>2</sup>, with medical history of untreated HIV infection, Aids-associated retinopathy, besides severe malaria, daily fever, headache, weight loss, oral candidiasis, and renal failure. He began treatment at HC/UFTM in July 1995 because of fever, diarrhea and enlarged abdomen. With blood count suggesting an infectious picture, a positive result was yielded in the search for *Plasmodium falciparum*. In the cardiologic exam, he presented diffuse alterations of ventricular repolarization. The patient underwent successive hospitalizations since then. In March 1999, the patient was again hospitalized with fever, weakness, oral candidiasis, and extrapulmonary tuberculosis reactivation, evolving to death.

Post-mortem examination revealed disseminated and generalized infection by *Cryptococcus* sp., characterized by the presence of yeast fungal cells with single budding and thick capsule. In brain analysis, partial detachment of the ependyma was found with visualization of a 0.8-cm-diameter *Cysticercus cellulosae* located in the wall of the right lateral ventricle (**Figure**). In the interface host-parasite, several general pathological processes with discrete intensity were revealed, including fibrosis, glycidic radical deposits, inflammatory infiltrate of mononuclear cells, gliosis and edema. Enzyme-linked immunosorbent assay (ELISA) was conducted in the cerebrospinal fluid, which was positive for cysticercosis.

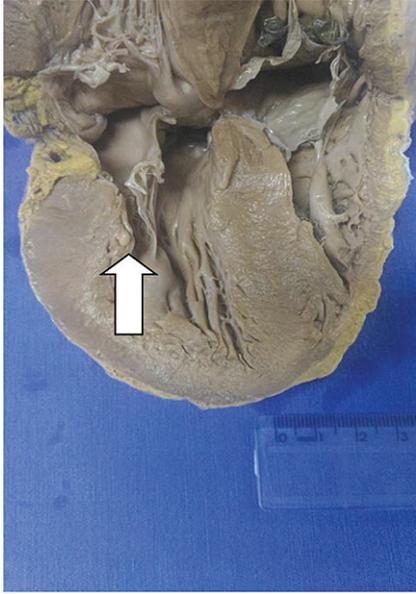


FIGURE – Macroscopic aspect of brain and heart obtained from autopsied patients with cysticercosis, from 1990 to 2018 (arrows)

## Case 2

Autopsied male patient, 34 years old, white, from Uberaba, BMI 21.79 kg/m<sup>2</sup>, with medical history of untreated HIV infection for 10 years, arterial hypertension, diabetes *mellitus*, tuberculosis, daily fever and weight loss. Last hospitalization was in 2007, when he was admitted at the Emergency Room of HC/UFTM mainly complaining about chest pain, associated with dry cough, fever not measured, and dependent on ventilation. Pneumonia was diagnosed and there was worsening of the general state. The patient died four days after hospitalization.

At post-mortem examination, disseminated tuberculosis was found affecting lungs with the formation of diffuse nodules bilaterally, adhesions between the pleurae and moderate

hydrothorax; intensely friable spleen with accentuated nodular dissemination; liver and kidneys with nodular dissemination. Also, a fibrocalcific subendocardial *Cysticercus cellulosae* was found in the lateral wall of the left ventricle, with dilated heart chambers and chronic productive pericarditis in atrioventricular surfaces.

## DISCUSSION

Since 1990, when the first case of Aids was autopsied in our sector, up to the present date, 800 autopsies have been performed. Among them, 117 (14.6%) were patients with the syndrome; and 10 (1.25%), patients with cysticercosis (one the cardiac form and nine NCC). Just two cases (0.25%) were patients with concomitant infection by Aids and cysticercosis (odds ratio = 1.33).

In both reported cases, patients' death was due to disseminated infections: cryptococcosis and tuberculosis. The systemic mycosis caused by *Cryptococcus neoformans* was also reported by White Jr. *et al.* (1995)<sup>(14)</sup> in a patient with Aids and cysticercosis; it was described as one of the main opportunistic diseases, besides an important cause of hospitalization in patients with Aids<sup>(15)</sup>. Tuberculosis, in its turn, differs in its clinical presentation in HIV-infected individuals from the general population because of the large range of extrapulmonary forms and dissemination<sup>(16)</sup>. As a result of its high pathogenicity, *Mycobacterium tuberculosis* is more easily activated than other infectious agents in the patient with Aids due to the decreased immune functions caused by the retrovirus<sup>(17)</sup>.

Despite the high prevalence of both diseases separately, few cases are reported in the literature about patients with Aids and NCC, even in areas where the prevalence of each is high individually<sup>(14, 18-20)</sup>. In the analyzed literature, reports of patients with Aids and cardiac cysticercosis were not found. Although the cardiac location of the cysticercus has been little discussed, it is worth mentioning that the region in which the present study was carried out is endemic for Chagas disease, what intensifies the direction of cardiac clinical and post-mortem studies.

With the increased frequency of HIV-positive patients in endemic areas of cysticercosis, coinfection has become more frequent; yet, there are no consistent studies proving that HIV-caused immunodepression would favor the occurrence of the parasitic infection, as well as cysticercosis progression<sup>(14, 21, 22)</sup>, or the opposite. In the study by Soto *et al.* (1996)<sup>(4)</sup>, most cases of NCC were observed to occur in late-stage HIV infection, reinforcing the possibility of an important link between both diseases<sup>(23, 24)</sup>. On the other hand, individuals with *Taenia solium* are known to present deficiencies in

the immune response, as the parasite is able to suppress mechanisms such as the complement system and activation of lymphocytes and their cytokines, facilitating the onset of a viral infection in non-contaminated individuals and accelerating the evolution of Aids in patients with the retrovirus infection<sup>(24)</sup>.

NCC symptoms depend on location, number and stage of development of cysticerci. The most common are: headache, seizures, intracranial hypertension, hydrocephalus, meningitis, and psychological disorders. Still, even degenerated or fibrocalcific cysts, when in contact with defense cells, are capable of drawing successive host inflammatory responses, once the parasite antigens are found in the calcified matrix<sup>(9)</sup>.

According to Del Brutto *et al.* (1998)<sup>(7)</sup>, the viable forms of cysticerci can induce an asymptomatic inflammatory reaction, including in immunocompetent patients, because they can evade and suppress the immune system, delaying the picture for many years. In the HIV/Aids scenario, the deficit of the immune response caused by viral infection permits an uncontrolled replication of the parasite, with the resulting recurrence of NCC<sup>(25)</sup>.

Thus, in immunodepressed patients, symptom manifestation is usually absent, what extends the asymptomatic period. Apart from that, patients with Aids in regular use of antiretroviral drugs and relatively high CD4+ T lymphocyte counts present an immune system able to trigger an inflammatory process against the cysticercus with generation of symptoms, providing the basis for the diagnosis of the parasitic disease<sup>(24)</sup>.

It is important to highlight that, according to information from the medical records in our cases, the patients did not present symptoms related to cysticercosis; cysticerci, therefore, were autopsy findings. Moreover, the fact that a cysticercus of one patient is located in the myocardium and is fibrocalcific, and the cysticercus of the other patient is located in the brain and is fibrosated can be an indicative sign that the parasitic infection must have occurred before the HIV infection, once immunodepressed patients could not develop a resolute inflammatory response to fight cysticerci.

Although the presence of giant cysts is an uncommon finding in immunocompetent subjects with cysticercosis, in patients with

Aids this finding has been reported, as in both analyzed cases. In accordance with the literature, atypical giant cysts, multiple or mixed parenchymal forms and racemose cysts can be found in patients with Aids and NCC<sup>(19, 25)</sup>.

Studying a similar population, Serpa *et al.* (2007)<sup>(12)</sup> diagnosed giant brain cysts in around 17% of coinfecting patients. Even so, solid bases were not found in the literature to justify the atypical presentation of cysticercus in HIV-infected patients. It is also premature to establish a relationship between those lesions with the immune system, such as CD4+ T lymphocyte count, given the scarcity of studies in this area<sup>(25)</sup>.

There is no consensus in the literature on if coinfection Aids-cysticercosis occurs simultaneously or if one would facilitate the onset of the other, because both diseases cause a state of deficiency of the immune system. However, early detection of cysticercosis in patients with HIV is important to formulate a treatment plan, because tuberculous meningitis and cerebral toxoplasmosis, which are common infections in this group, are similar to NCC<sup>(5)</sup>. Besides, although the finding of cardiac cysticercosis is rare, depending on its location, the parasite can alter the heart function, causing a series of complications and interfering in the quality of life of the individuals<sup>(5, 26)</sup>.

## CONCLUSION

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It was possible to report the concomitance of cysticercosis and Aids in two patients submitted to autopsy, with no symptoms, a fact that depends on patients' immune status. Therefore, it is necessary that cysticercosis become in the context of analysis of opportunistic diseases of patients with the retrovirus infection, so that its diagnosis is provided earlier to avoid inadequate treatment of those patients. Moreover, the scarcity of researches in this area confirms the deficit of knowledge about pathogenic mechanisms between HIV and cysticercus, displaying a bias between the infection moment (by the cysticercus or retrovirus) and the development of the pathologic processes since then, what can lead to inconclusive prognoses.

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