

CEREBRAL CYSTICERCOSIS IN CAMPINA GRANDE, PARAÍBA - NORTHERN BRAZIL

COMPUTERIZED TOMOGRAPHY DIAGNOSIS IMPORTANCE

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ABSTRACT - Neurocysticercosis is the infection of the central nervous system by the larval form of *Taenia solium*, the *Cysticercus cellulosae*. We studied 4011 computerized tomographies performed in TomoHPI Radioimaging Service, Hospital Pedro I, Campina Grande PB, Northern Brazil, since its installation on August 1993 to July 1995. 41 patients were diagnosed as having *Cysticercus* cerebral infestation, corresponding to an incidence of 1.02 %. No cases were related in Campina Grande PB during 1991 according to hospitalizations under prospective payment rates. After this radioimaging service installation, we observed 1.86 cases per month. We conclude that Campina Grande has to be included as an endemic area of neurocysticercosis, needing health service measures to cease the cycle *Taenia-Cysticercus*, the only way to get rid of such a serious problem.

KEY WORDS: cysticercosis, neurocysticercosis, central nervous system infection, computed tomography, epidemiology, radiology.

Cisticercose cerebral em Campina Grande, Paraíba - Nordeste do Brasil: importância diagnóstica da tomografia computadorizada

RESUMO - Neurocisticercose é a infecção do sistema nervoso central pela larva da *Taenia solium*, o *Cysticercus cellulosae*. Estudamos 4011 tomografias computadorizadas feitas no Serviço de Radioimagem do Hospital Pedro I, Campina Grande PB, desde sua instalação em setembro de 1993 a junho de 1995. 41 pacientes foram diagnosticados como apresentando infestação cerebral por *Cysticercus*, correspondendo a 1,02 % . Nenhum caso de neurocisticercose foi diagnosticado em Campina Grande no ano de 1991, ao se analisar as causas das internações na Rede Hospitalar de Campina Grande conveniada ao SUS durante tal ano. Após a instalação deste serviço de radioimagem, observamos, em média, 1,86 casos por mês. Concluímos ser Campina Grande área endêmica para neurocisticercose, necessitando de medidas de saúde pública no intuito de cessar o ciclo *Taenia-Cysticercus*, a única maneira de erradicar tal afecção.

PALAVRAS-CHAVE: cisticercose, neurocisticercose, infecção do sistema nervoso central, tomografia computadorizada, epidemiologia, radiologia.

Neurocysticercosis is an infection of the central nervous system (CNS) by the larval form of *Taenia solium*, the *Cysticercus cellulosae*, and represents the most frequent parasitosis of the CNS^{1-3,6,8,10}. It is related to feeding and hygiene habits¹. It is rare in Europe, United States and Canada but it is endemic in Latin America, Africa and Asia^{1,8,10}. In Brazil, it is common in São Paulo, Rio de Janeiro and Minas Gerais².

The diagnosis of neurocysticercosis is difficult, specially in regions lacking specialized laboratory facilities^{1,7,10}. Lange, quoted by Takayanagui and Jardim¹⁴, related 13 cases of

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neurocysticercosis among 4200 patients analysed between 1925 and 1940. According to Coêlho⁵, no cases of neurocysticercosis were diagnosed in Campina Grande during 1991 taking account of hospitalizations under prospective payments. The diagnosis of neurocysticercosis has been favoured in the last decade by the current use of computerized tomography scan (CT)⁹, though its use is limited in developing countries because of its high cost and limited availability.

In this paper the incidence of neurocysticercosis in Campina Grande PB, Northern Brazil, is reported after the installation of a radioimaging service, corroborating the role played by the CT scan in the diagnosis of this affection of the CNS.

MATERIAL AND METHODS

Data from 4011 CT scans performed in TomoHPI Radioimaging Service, Hospital Pedro I, Campina Grande PB since its installation on August 1993 to July 1995 were retrospectively analyzed.

CT scans were obtained in all patients on admission, following standardized procedures, using a GE Sytec 2000i CT Scanner, before and after intravenous contrast injection.

Findings were classified according to Kramer et al⁸ and Machado et al⁹. The results were compared and evaluated in relation to treatment efficacy.

All patients were indicated to return at thirty day intervals during two months. Only 29.6% of them returned to this radioimaging service.

RESULTS

Forty-one CT diagnosis of neurocysticercosis were made from the total of 4011 CTs analyzed (1.02% - 1.86 cases/month). The first neurocysticercosis diagnosis was reported on September 29th, 1993. The last neurocysticercosis diagnosis included was reported on June 2nd, 1995. 55 CTs were performed: 41 on admittance and 14 subsequently. 29 patients were submitted to one CT procedure (70.73%), 10 were submitted to two CT scans (24.39%). Two patients were submitted to three or more CT procedures (4.88%). In 58.54% of CTs performed on admittance 3 or less lesions could be seen. In 41.46% inumerous lesions could be seen.

Classification of findings according to Kramer et al⁸ and Machado et al⁹ is summarized in Tables 1 and 2, respectively. Its efficacy according to treatment will be commented later.

The intracranial location of lesions is on Table 3.

Table 1. Classification of cases according to Kramer et al. classification⁸.

	1 (%)	Acute 2 (%)	3 (%)	4 (%)	Chronic 5 (%)	6 (%)	Total
1st CT	8 (14.81)	10 (18.52)	9 (16.67)	17 (31.48)	—	10 (18.52)	54
2nd CT	—	—	1 (7.14)	5 (35.71)	—	8 (57.14)	14
3rd CT	—	—	—	1 (25.00)	1 (25.00)	2 (50.00)	4
Total	8	10	10	23	1	20	74

Table 2. Classification of cases according to Machado et al. classification⁹.

	I	II	III	IV	Total
1st CT	—	8	36	10	54
2nd CT	—	—	6	8	14
3rd CT	1	—	—	3	4
Total	1	8	42	21	72

Table 3. CT scan location of lesions.

Parenchymal	35
Meningeal	—
Ventricular-Cisternal	6

DISCUSSION

Neurocysticercosis is a complex disease associated with precarious socioeconomic conditions. Its diagnosis is difficult, specially in non-endemic regions or regions lacking specialized laboratory facilities¹. As quoted by Arruda et al.², neurocysticercosis is relatively rare in Brazilian States of North and Northeast.

In our series, 1.02% of patients submitted to CT evaluation in this radioimaging service were diagnosed as having cysticercosis infestation of the CNS. This incidence is in accordance with Spina-França et al¹³, that found an incidence of 1.13% using immunodiagnosis methods. Chequer and Vieira⁴ diagnosed 45 cases of neurocysticercosis between January 1987 and January 1989 in the Hospital Universitário Cassiano Antônio Moraes Neurology Service, considering this pathology as endemic in their region (Espírito Santo State). Shibata et al¹² diagnosed 22 cases of neurocysticercosis in a 20 months period.

Neurocysticercosis classification was according to Kramer et al⁸ and Machado et al⁹. Only 14.81% of neurocysticercosis cases were diagnosed in the first acute phase, in Kramer's classification corresponding to small, non-enhancing edematous lesions. This phase corresponds to Type II CT images in Machado's classification. As symptoms appear only after tissue response, which corresponds to the second acute stage, characterized by small enhancing areas, 85.18% of patients were diagnosed at or after this stage, in the first CT procedure. This corresponds to Type III CT images in Machado's classification. Machado et al⁹ affirm that Type III CT images lesions are characterized by "parenchymal cysts associated to inflammatory signs, and/or presence of cysts with signs of degeneration: loss of sharpness, annular enhancement, nodular enhancement or localized edema". It corresponds to Acute Phase 2 and Chronic Phases 3 and 4 of Kramer's classification. These Type III lesions were responsible for 66.67% of the CT images in the first CT procedure.

Calcified images were responsible for 18.52% of CT images detected in the first CT procedure. In Colli et al⁶, calcification was responsible for 33.3% of the images, active cysts in 24.3% of lesions and degenerating cysts were responsible for 3.6 % of the images.

In the second CT procedure, calcifications were found in 57.14% of CT scans.

In the third CT procedure, there was a predominance of calcified lesions. It was found a patient without apparent parenchymal lesion that may correspond to later reappearance as calcified nodules.

As Carbajal et al.³ affirmed, the presence of calcifications does not rule out the concomitant presence of living larvae. In our series, a great number of patients had concomitant calcified images and images of cysts in degeneration. It indicates either multiple exposures or variable degrees of larval viability secondary to varying local nutritional availability⁸.

Location of cysticercus cysts was predominantly in cerebral parenchyma (85.36%) without predilection to any region of the brain. Six cases corresponded to mixed form (parenchymal-ventricular-cisternal).

In the United States, neurocysticercosis was a medical curiosity until the mid-70's and has been increasingly diagnosed since then because of the improved images of the brain offered by computerized tomography and magnetic resonance image scans and the increasing number of immigrants from areas where this affection is endemic^{7,8,11}.

In 1985, no local reports were available on the public health importance of taeniasis-cysticercosis in Honduras⁷. Also, diagnosis of human cysticercosis at the University Hospital increased from 22 cases (1980-1984) to 109 cases (1985-1988) with the introduction of computerized tomography and an enzyme-linked immunosorbent assay. In this same report, de Kaninsky concludes that "cysticercosis caused by *T. solium* may become a serious health problem if no specific measures are taken to counteract it".

Coêlho⁵ did not report any case of neurocysticercosis in hospitalizations under prospective payments in Campina Grande during 1991. After the installation of S.U.S. - Government Health System - Computed Tomography Scanner (TomoHPI Radioimaging Service), in September 1993, 41 cases were detected in a period of 22 months.

In view of the exposed above, we can conclude that:

- Incidence of neurocysticercosis in Campina Grande matches those of other endemic areas.
- Machado et al. CT findings classification, though simpler than that of Kramer et al., is more adequate for treatment: Type II CT images can be treated with cysticidal drugs; type III and IV CT images are treated with symptomatic therapy.
- The presence of a great amount of calcified lesions may indicate old prevalence of neurocysticercosis. Concomitant lesions may indicate that Taeniasis-Cysticercosis cycle is a long time installed one.
- CT scan is an important diagnosis method for neurocysticercosis.
- Campina Grande is included as an endemic area of neurocysticercosis, needing health service measures to cease the cycle Taeniasis-Cysticercosis, the only way to get rid of a serious health problem such as this.

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