

# The contribution of ultrasonography and computed tomography in the evaluation of abdominal involvement in paracoccidioidomycosis

## *Contribuição da ultrassonografia e da tomografia computadorizada na avaliação do acometimento abdominal na paracoccidioidomicose*

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### ABSTRACT

**Introduction:** paracoccidioidomycosis (PCM) is a polymorphic systemic granulomatous inflammatory disease determined by *Paracoccidioides brasiliensis*, one of the 10 leading causes of morbidity and mortality among the parasitic diseases endemic in Brazil. **Objective:** To identify the following aspects of PCM by ultrasound (US) and computed tomography (CT): abdominal changes, intensity and characteristics of the observed images, frequency of changes depending on clinical presentation, differences from other nosological entities. **Patients and methods:** This was a retrospective, observational, cross-sectional study carried out with 35 patients with PCM treated at the Hospital das Clínicas (HC) at the Universidade Federal de Minas Gerais (UFMG). Patients with tuberculosis, bronchial asthma, generalized chronic obstructive pulmonary disease, or in contact with silica or mines, as well as those with granulomatous diseases at any point in their current or past clinical history and detected through serology, anatomopathology or microbiological exams were excluded. Collected data were transcribed into SPSS for Windows<sup>®</sup> for statistical analysis. The study was approved by the UFMG Ethics Committee (082/00). **Results and conclusion:** CT and U.S. showed involvement of abdominal organs in all forms of PCM, including lymphadenopathy (40%), hepatomegaly (37%), splenomegaly (37%) and adrenal involvement (17%). Gallbladder and retroperitoneal musculature involvement were also observed, along with ascites and pleural effusion. Lymph node calcification, adrenal involvement and ascites constituted evidence of high probability of PCM even though these findings are not enough to differentiate PCM from tuberculosis. Chronic and sequelae forms, abdominal involvement is more frequent than indicated by the clinical manifestations.

**Key words:** Paracoccidioidomycosis; Mycosis; Ultrasonography; Tomography, X-Ray Computed.

### RESUMO

**Introdução:** a paracoccidioidomicose (PCM) é doença inflamatória granulomatosa sistêmica, polimórfica, determinada pelo *Paracoccidioides brasiliensis*, uma das 10 causas de morbimortalidade entre as doenças endêmicas parasitárias no Brasil. **Objetivo:** identificar pela ultrassonografia (US) e tomografia computadorizada (TC) em relação à PCM: alterações abdominais; intensidade e características das imagens observadas; frequência das alterações em função da sua forma clínica; diferença em relação às outras entidades nosológicas. **Pacientes e métodos:** este é um estudo retrospectivo, observacional, transversal, realizado em 35 pacientes com PCM atendidos no Hospital das Clínicas (HC) da Universidade Federal de Minas Gerais (UFMG). Foram excluídos pacientes com tuberculose, asma brônquica, doença pulmonar obstrutiva crônica generalizada, contato com sílica ou minas, doenças granulomatosas em algum momento de sua história clínica atual ou progressa e por intermédio da avaliação sorológica, anatomopatológica

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*e microbiológica. Os dados coletados foram transcritos em SPSS para Windows® e submetidos à análise estatística. Foi aprovado pelo Comitê de Ética (082/00) da UFMG. Resultados e conclusão: a TC e a US evidenciaram acometimento dos órgãos abdominais em todas as formas da PCM, como: linfonodomegalia (40%), hepatomegalia (37%), esplenomegalia (37%) e acometimento adrenal (17%). Observados ainda comprometimento da vesícula biliar e da musculatura retroperitoneal, ascite e derrame pleural. Calcificação linfonodal, acometimento adrenal e ascite constituíram evidência de grande probabilidade de PCM, entretanto, não são capazes de a diferenciar da tuberculose. Nas formas crônicas e sequelares, o comprometimento abdominal é mais frequente do que indicam as manifestações clínicas.*

**Palavras-chave:** Paracoccidioidomicose; Paracoccidioidomicose/diagnóstico; Micose; Ultrassonografia; Tomografia Computadorizada por Raios-X.

## INTRODUCTION

Paracoccidioidomycosis (PCM) is a systemic granulomatous inflammatory disease, polymorphic, endemic in Latin America from Mexico to Argentina, with high prevalence in Brazil, Venezuela, and Colombia, determined by *Paracoccidioides brasiliensis*, a dimorphic fungus, which develops especially in temperate or hot, humid, with rainy summers and dry winters.<sup>1,2</sup> This disease was described by Lutz in 1908, and initially named pseudo-coccidioidal hyphoblastomycosis to be differentiated from coccidioidomycosis.<sup>1</sup> The PCM transmission between people or epidemic outbreaks is not known and its occurrence within a family is rare.<sup>3-5</sup>

It is classified as an infection or illness with acute or subacute forms (juvenile type), moderate or severe or chronic (adult type), uni or multifocal, and light to moderate or severe.<sup>6,7</sup>

The disease is usually acquired in the childhood or youth, expressing itself in immunocompetent people as an infection through the inhalation of spores of *P. brasiliensis*, which reach the pulmonary alveoli forming an inflammatory focus and hence reaching the peribronchial lymph nodes and establishing the primary pulmonary complex.<sup>2, 5, 8, 9</sup> The primary complex does not calcify or is rare in people from endemic zones infected with *P. brasiliensis*, however, without PCM.<sup>10,11</sup> The initial infection may be followed by a hematogenous spread of the fungus to other organs.<sup>12</sup> After the development of cellular immunity and hypersensitivity, primary foci suffer necrosis, in general without calcification, and can contain viable and quiescent fungi. Primary lesions may evolve and establish serious lesions, acute bronchopneumonia

or extra-pulmonary, due to primary hematogenous spread, with variable clinical spectrum that depends on the patient's age<sup>5</sup> and immunocompetence. The most common form of inflammatory reaction to *P. brasiliensis* is the epithelioid granuloma; it can present recurrences and clinical diversity in reliance of previous episodes as to intensity, extent, and dissemination related to the fungus pathogenicity and variations of the patient's immune response.<sup>10-12</sup>

PCM is characterized, especially in children, by febrile systemic clinical manifestations and hepatosplenic lymphadenomegalies, and in adults by oropharyngeal, pulmonary, and lymph-nodal lesions. The respiratory symptoms are usually unspecific and well-tolerated, generally in an insidious form, characterized by unproductive, discreet, and irritating cough<sup>11-14</sup> or rarely with mucous expectoration. Dyspnea, chest pain, loss of appetite,<sup>2,15-17</sup> adynamia, odynophagia, and weight loss might be present (15 kg on average). Its evolution can progress in general for months to years and is unpredictable.<sup>2,3</sup>

The confirmed diagnosis is determined by the detection of the fungus in the collected material, in general from punctures or aspirations of affected tissues, and presumptive when based on serological evidence.<sup>8,9,18-21</sup> Imaging methods help to define alterations in organs and systems, however, there are no typical patterns of PCM.

In studies of the abdomen, various methods are used to determine changes that might be associated with PCM such as simple x-rays, which reveals calcifications; barium examination, which helps defining the mucosal surface and indirect signals; and several other tests that help defining abnormalities without determining specificity, such as cholangiography, lymphography, ultrasonography, (US), computed tomography (CT), scintigraphy, MRI, and CT by positron emissions. Another method used for the study of the abdomen is laparotomy on the suspicion of acute abdomen or fungal aneurysm. The necroscopic study helps defining the diagnosis before serious and fatal manifestations.<sup>8,10,15,16,22,23</sup>

The aim of this study was to describe the contribution from US and CT in the evaluation of abdominal involvement in PCM; identify the structures involved; determine the intensity of the involved organs; determine the frequency of involvement of abdominal structures; describe the imaginological characteristics of alterations; and assess the possible alterations that differentiate this disease from other nosological entities and the prevalence of abdominal alterations depending on the clinical form.

## PATIENTS AND METHODS

This is a retrospective, observational, cross-sectional study, characterized by an analysis of data from PCM patients' charts and exams, including children and adults, attended at the Clinical Hospital (HC) at the Federal University of Minas Gerais (UFMG).

An initial clinical evaluation was carried out in 52 PCM patients between 1988 and 2003, through a protocol designed for this purpose and transcribed for a specific computer software (SPSS for Windows®).

Patients were divided into two groups according to the acute and chronic clinical forms of the disease. The acute form was defined by the clinical history of recent onset, between one and two months, and symptoms compatible with reticuloendothelial involvement such as generalized lymphomegaly and hepatosplenomegaly. The chronic form was characterized by evolution for more than six months, with pulmonary and cutaneous-mucosal involvement.<sup>6</sup> Smoking was present in 56.4% of the studied patients who were not excluded from the analysis.

### Ethical aspect

All patients included in the study received information about the type of service provided based on an informed consent provided in their first consultation. The identity of patients or any information that would identify them was preserved; their initials or record numbers were used when necessary, in presentations of results or reports. The study was approved by the Ethics Committee of the UFMG (ETIC 082/00).

### Inclusion criteria

Clinical and imaginological aspects were evaluated in 35 patients, characterized by time of symptoms' onset, main complaint, and most frequent signs and symptoms. The PCM diagnosis was confirmed by the identification of the fungus in the sputum examination or in biopsies of cutaneous-mucosal lesions.

### Exclusion criteria

A total of 17 out of the 52 initially evaluated patients were excluded from the analysis being: nine,

three, two, two, and one patients, due to previous or current history of tuberculosis (14.6%), bronchial asthma (5.7%), chronic obstructive pulmonary disease (3.8%), or work in mines (3.8%) or with silica (1.9%), respectively. The exclusion was determined after serological, anatomopathological, and microbiological evaluation.

The exclusion of other granulomatous diseases such as sarcoidosis, lymphoma, infectious mononucleosis, and toxoplasmosis was determined after anatomopathological, serological, and immunopathological exams.

Patients who performed abdomen US in other services and those who had only conventional radiological exams for abdominal evaluation, such as intestinal transit and barium enema, were also excluded.

### Review of the literature

A review of the literature was based on the Medline and LILACS databases using the terms: paracoccidioidomycosis, South American blastomycosis, abdomen, US, and CT.

### Analysis of radiological exams

A total of 58 imaging exams were performed, distributed as US; US and CT; and CT in 27, 7 and 1 patients, respectively.

The US was performed through the SonolineSL-2 Siemens, Sonoline Prima Siemens and ATL 3500 Philips apparatuses. The CT was performed in the Somatom DR.G Siemens, Somatom Siemens AR.T, or Auklet Toshiba equipments from the Radiology Service in the HC at the UFMG.

Normal aspects in each organ and the characteristics of alterations found were described in the CT exams such as size, contours, density, shape, relationship with adjacent structures and enhancement after the administration of iodine contrast medium. The US exams described the normal aspects of organs such as size, contours, texture, shape, echogenicity, relationships with adjacent structures, and characteristics of alterations. In both methods, the liver was considered of normal dimensions when presenting up to 11 mm longitudinal diameter in the left lobe, and 15 cm in the right lobe. The spleen was considered of normal dimensions when presenting

up to 12 cm longitudinal diameter. Both organs exhibited homogeneous texture without lumps when normal. Lymph nodes with more than 1 cm in their smallest diameter were considered involved.<sup>24</sup>

The exams were analyzed independently and single blinded by two radiologists; divergent opinions were resolved by a third radiologist.

## STATISTICAL ANALYSIS OF THE DATA

Data analysis was performed using the Epi-Info 6.04 and SPSS for Windows V10. A p value > 0.05 was considered significant.

The data were subjected to statistical analysis with the development of frequency tables and Chi-square test analyzed using the Epi-info 6.04 and SPSS for Windows programs.

## RESULTS

The patients were distributed according to genders in 21 men (60%) and 14 women (40%), with an average age of 32.9 ± 15.5 years (four were 62 years old).

The acute and chronic form or sequel were diagnosed in 13 (8 women) and 22 (6 women) patients, respectively. The acute and chronic phase patients had an average age of 19.8 ± 9.4 and 40.5 ± 12.9 years, respectively.

A total of 58 exams were conducted, 24% (14) were normal or had findings unrelated to PCM, such as renal cortical cysts or aerobilia due to prior digestive surgery. The 44 remaining exams (76%) revealed some alteration related to PCM (Tables 1 and 2). In the acute form, alterations were observed in 92% of patients (12), with 95% of exams detecting some alteration. In the chronic form, alterations were observed in 50% (11) of patients. The exam was normal in only one patient (Tables 1 and 2).

**Table 1** - Ratios between normal and altered exams and clinical forms of paracoccidioidomycosis in patients treated at the Clinical Hospital at UFMG between 1988 and 2003

Form	Exam		Total
	Normal	Altered	
Acute	1	22	23
Chronic	13	22	35
Total	14	44	58

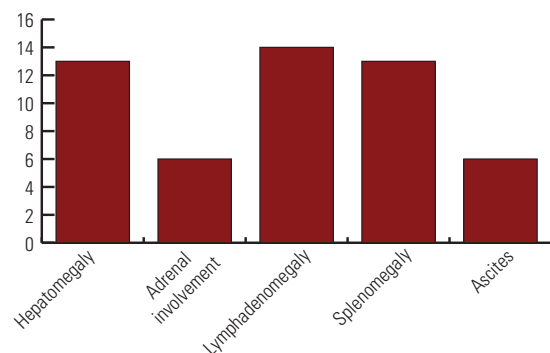
X<sup>2</sup> test with Yates correction: 6.46; Value of p: 0,01.

**Table 2** - Ratios between the number of patients with normal and altered exams and clinical forms of paracoccidioidomycosis in patients treated at the Clinical Hospital at UFMG between 1988 and 2003

Form	Exam		Total
	Normal	Altered	
Acute	1	12	13
Chronic	11	11	22
Total	12	23	35

Fisher's exact test. Value of p: 0.04.

The imaging exams showed that the most affected organs in both phases of the disease (Figure 1 and Table 3) were the liver (37 percent), abdominal lymph nodes (40 percent), spleen (37%), and adrenals (17 percent).



**Figure 1** - Most affected organs by paracoccidioidomycosis

Total patients: N = 35, Acute form: n = 13, Chronic form: N = 22, Value of p.

**Table 3** - Main detected alterations according to abdominal MRI and ultrasonography in 35 patients with PCM, in absolute and percentage values, and according to the clinical forms; patients followed up for 5 years at the HC at UFMG

Alterations	Form (%)		p value
	Acute	Chronic	
Lymphadenomegaly *	9 (69%)	5 (23%)	0,01
Hepatomegaly**	8 (61%)	5 (23%)	0,03
Splenomegaly	6 (46%)	7 (24%)	0,49
Ascites**	6 (46%)	–	0,01
Renal cortical echogenicity alteration**	4 (31%)	5 (23%)	0,69
Pleural effusion**	3 (23%)	1 (4%)	0,11
Adrenal involvement**	2 (15%)	4 (18%)	1,0
Total patients	13 (100%)	22 (100%)	–

X<sup>2</sup> test with Yates correction; \*\*Fisher's exact test.

Hepatomegaly was discrete (16 cm), mainly in the right lobe, without concomitance of hepatic nodules, with periportal thickening in two, and bile duct dilation in four patients, respectively. This dilation was associated, in two patients, with a periportal or mesenteric lymph node mass; in one of them, located in the left lobe without lymphomegaly and in the other two concurrent with parietal alteration of the gallbladder, one of them in acute form, with ascites and diffuse parietal thickening and the other with the chronic form presenting nodular parietal thickening (Figure 2). Portal thrombosis was identified in one patient with the chronic form concomitant with previous thrombosis of the portal vein with collateral periportal veins and splenomegaly (Figure 3).

The pancreas was normal in all patients.

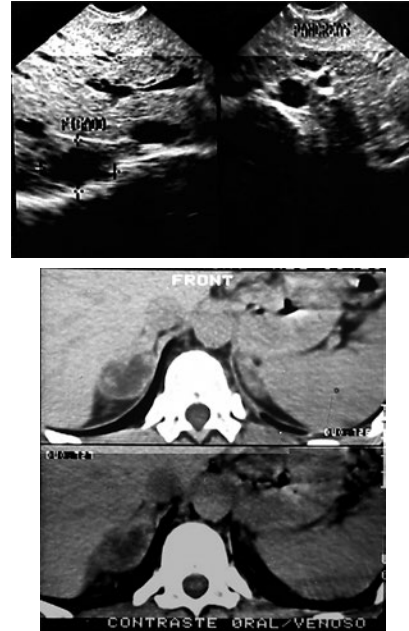


**Figure 2** - Dilatation of intra-hepatic biliary pathways. Patient with lymphadenomegaly in the hepatic hilum.



**Figure 3** - Patient in the chronic phase of the disease showing old thrombosis in the porta vein with periportal collateral veins and splenomegaly.

The adrenals were involved, bilaterally, in six patients (17%); the US revealed a hypoechoic lump, and the CT revealed central necrosis. Calcification was found in one patient (Figure 4).



**Figure 4** - Involvement of the adrenal, hypoechoic nodule, central necrosis, and calcification.

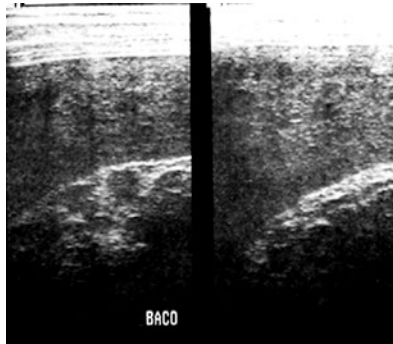
The kidneys showed increased parenchyma echogenicity (Figure 5) in six patients (17%).



**Figure 5** - Kidneys with increased echogenicity in the parenchyma.

The splenomegaly was observed in 13 (37%) patients, even moderate (16 cm), with a homogeneous texture and focal lesions in three patients (Figure 6).

Lymphomegaly was present in 14 (40%) patients and involved the peripancreatic (67 percent), retroperitoneal (59%), and (52%) mesenteric chains besides the lymphonodal conglomerates. The appearance of lymph nodes was rounded and hypoechoic, in both forms of PCM (Figure 7).



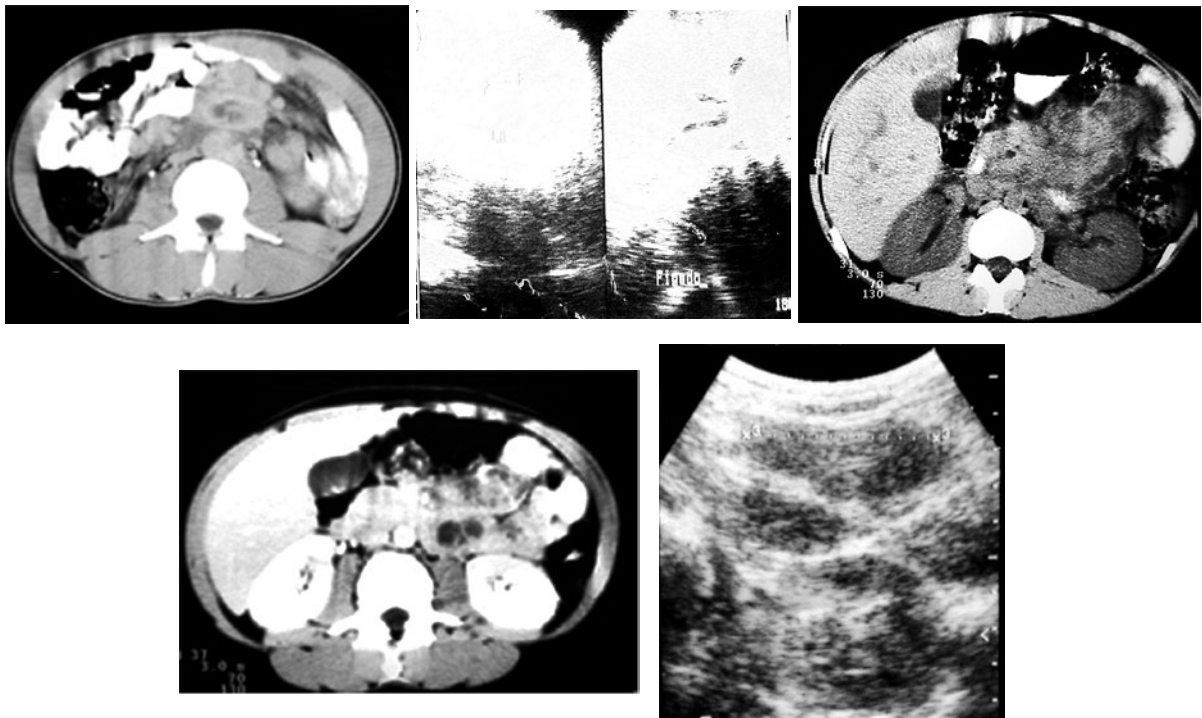
**Figure 6** - Spleen with focal lesions.

Ascites and bilateral pleural effusion were identified in six (Figure 8) and four (11%) patients (Figure 9), respectively.



**Figure 8** - Ascites.

Two muscular abscesses were identified in two patients (Figure 10) and mesenteric cystic formations in two other patients, who were no longer present in subsequent examinations (Figure 11).



**Figure 7** - Lymphadenomegaly in mesenteric chains, peripancreatic, and retroperitoneal, linfonodaal conglomerates with rounded aspect and hipoeisogenico.

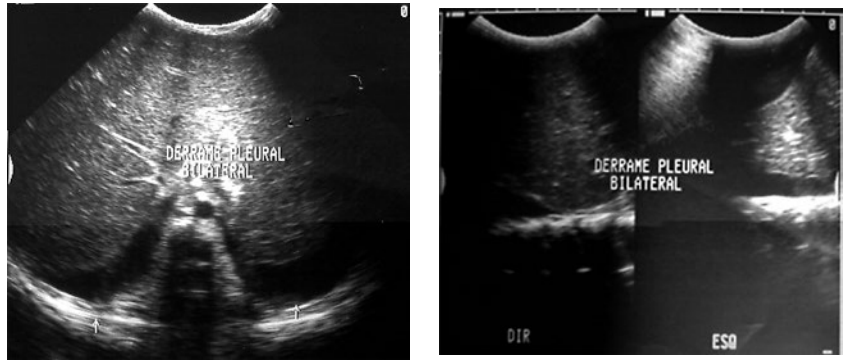


Figure 9 - Identification of pleural effusion.

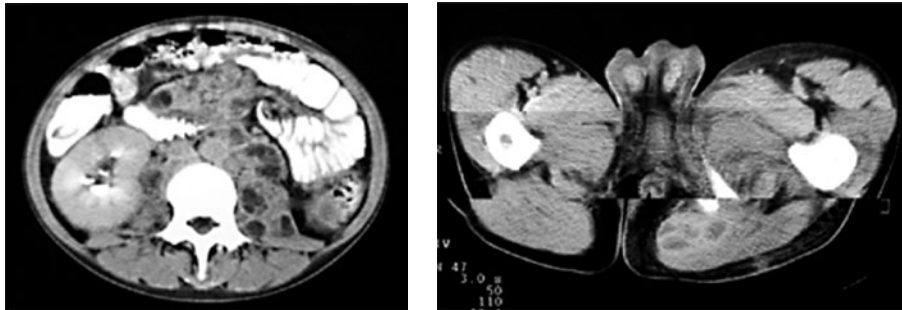


Figure 10 - Muscular abscesses.

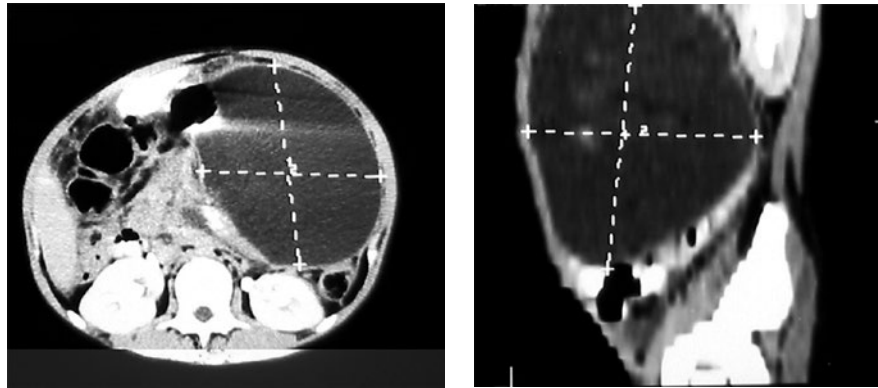


Figure 11 - Mesenteric cystic formations followed up during five years in the HC/UFG.

The hepatomegaly and lymph node involvement were more frequent in patients with the acute than the chronic form; ascites was only found in the acute form of PCM. An association between lymph node involvement and hepatomegaly or splenomegaly was observed (Tables 4 and 5).

## DISCUSSION

PCM mostly affects individuals in the age range between 10 and 52 years old; the acute and chron-

ic forms are prevalent in the second and third, and fourth and fifth decades of life, respectively. The involvement of men and women was in the ratio of 1.5:1 and 1:2.33 in the acute and chronic forms, respectively. The acute form is seen in children and adolescents with equal distribution between boys and girls, whereas the chronic form predominates in young adults, with higher prevalence in men than women. These data are in agreement with most studies of PCM and confirm the greater intensity and severity associated with the acute form that predominantly affects children and adolescents.<sup>8,10-12,15-18</sup>

**Table 4** - Description of the main hepatic alterations observed in 22 out of the 35 patients with paracoccidioidomycosis according to abdominal MRI and ultrasonography, in absolute and percentage values, and according to the clinical forms; patients followed up for 5 years at the HC at UFMG

Alterations	Total (%)	Form (%)		p value
		Acute	Chronic	
Hepatomegaly**	13 (37%)	8 (61%)	5 (23%)	0,03
Periportal thickening**	3 (8%)	–	3 (14%)	0,53
Intra/biliary extra – hepatic dilatation**	4 (11%)	2 (15%)	2 (9%)	0,61
Portal thrombosis**	2 (6%)	1 (8%)	1 (5%)	1,0

\*\* Fisher’s exact test. Value of p: 0.04.

**Table 5** - Relative frequencies of involvement of intra-abdominal organs, observed in paracoccidioidomycosis, according to MRI and ultrasonography in patients with paracoccidioidomycosis followed up for 5 years at the HC at UFMG

Relations	OR	CI	p value
Hepatomegaly-splenomegaly*	5,6	1,4 a 23,6	0,007
Hepatomegaly- Lymphadenomegaly*	0,14	0,03 a 0,56	0,002
Splenomegaly- Lymphadenomegaly*	0,55	0,16 a 1,88	0,41
Ascites- Lymphadenomegaly**	2,01	0,30 a 10,7	0,46

\*Chi-square Yates test; \*\*Fisher’s exact test.

The alterations observed in abdominal images occurred in 92 and in 50% of patients with an acute and chronic form, respectively. Because of its systematization, the acute form affects several organs and systems including abdominal structures; whereas the chronic form is more localized, affecting mucous membranes and skin, and lymph nodes in soft tissues, which naturally determines more intensity and PCM generalization in childhood and adolescence. The acute form is considered a result of the failure of the host’s defenses against the fungi, mainly from cellular immunity, being almost always serious and contrasting the adult form, which is generally located and less aggressive.<sup>8,10-12,16,18,22,24</sup>

The intra-abdominal organs most commonly involved, in descending order, were lymph nodes, liver, adrenal, and spleen.<sup>16,23-29</sup>

The discreet hepatomegaly was characterized by periportal thickening and bile ducts dilation associated with periportal or mesenteric lymph node mass and the concomitant with gallbladder parietal thickening, diffuse or nodular. Portal thrombosis was also identified, concomitant to previous thrombosis in the portal vein with collateral periportal veins and splenomegaly. Hepatic alterations are present in 36 to 59% of multiple

series of patients with PCM, being all symptomatic with homogeneous aspect based on the CT exams,<sup>29</sup> presenting or not nodules with parasites inside them.<sup>29-33</sup> The most commonly observed histological alterations were of normal parenchyma with chronic inflammatory infiltrate in the region of port spaces, focal areas of parenchymal necrosis, granulomas and periportal chronic inflammatory infiltrate, periportal fibrosis, and alterations due to cholestasis. Periportal fibrosis with port hypertension has been reported in previous studies, however, without the exclusion of schistosomiasis mansoni. Patients in this study presented portal hypertension without associated periportal fibrosis but previous portal vein thrombosis.<sup>34,35</sup>

The gallbladder is rarely involved; however, acute cholecystitis with granulomatous inflammatory infiltrate and fungi on the vesicular wall and thickening and diffuse parietal associated with ascites, hepatitis, hypoalbuminemia, and cholecystitis have already been described.<sup>34,35</sup>

The adrenals were involved, bilaterally, with hypoechoic nodule and central necrosis with variable characteristics observed through the imaging methods and indistinct from other granulomatous disorders. These affected up to 48% of patients submitted to the necroscopic study, and adrenal insufficiency may be identified in 48.7% of paracoccidioidomycosis patients.<sup>36-41</sup> The adrenal hypo function is not always possible to be diagnosed. The adrenals are increased in size in the acute form, with hypo dense center, and lesions may calcify with chronicity.<sup>36-42</sup>

The kidneys were increased in echogenicity suggesting glomerular or tubular damage, which is associated to the use of amphotericin B.<sup>5,9,11,16,17</sup>

The splenomegaly was observed in approximately one third of patients, even moderate (16 cm), with homogeneous texture, which may contain focal lesions. The frequency of splenomegaly was similar to that of other series, in which it ranged from 23 to 42%. Focal lesions presented aspect similar to that determined by the lymphoma. The CT could describe abscess and calcifications.<sup>33,43</sup>

The lymphomegaly was recorded in peripancreatic, mesenteric, and retroperitoneal chains in addition to forming lymphonodal conglomerates with rounded and hypoechoic aspect, in both forms of PCM, which are characteristics similar to those described in the literature. The lymphomegaly is the most common finding on abdominal PCM, identified in 48% of patients undergoing CT.<sup>44-50</sup> The involved lymph nodes



tend to be rounded and with a necrotic center, similar to tuberculosis. Lymph node involvement can be identified at up to 10 years after the initial contact with the fungus. The lymphonodal conglomerates can cause bile ducts obstruction and trigger lymphoedema due to fibrotic alterations determined on the lymphatic system after treatment.<sup>44-50</sup>

Ascites and pleural effusion are associated to severe clinical manifestations and can have chylous content. Pleuritis and fibrinous peritonitis have been reported with a large amount of parasites. Mesenteric cystic formations that disappeared after treatment have a high probability of lymphatic origin.

Muscular abscesses were observed, similar to those in other descriptions,<sup>25</sup> with regression after specific treatment.

The pancreas showed no alterations, which is also reported in other studies.<sup>8,16,17,28</sup>

Hepatomegaly and lymph node involvement were more frequent in the acute than in the chronic form; ascites was only found in the acute form of PCM, noting the association between lymph node involvement and hepatomegaly or splenomegaly. Hepatomegaly, adrenal involvement, and lymphomegaly can be found in the chronic form of PCM even without clinical symptoms as reported in other studies.<sup>32-34,43</sup> Greater abdominal involvement has been reported in the acute form of PCM than suspected in clinical examination. Therefore, imaging methods are important to the overall diagnosis of PCM involvement and evaluation of its evolution for early diagnoses of recurrences.<sup>19,21,32,36,39,40,44,51-55</sup>

The differential diagnosis of PCM mainly consists of tuberculosis and lymphoma and other deep mycoses. Lymphomegaly in tuberculosis and PCM may have central necrosis and calcification. In the lymphoma, lymph nodes are more homogeneous and may calcify after treatment. PCM has the tendency to affect the adrenals more than tuberculosis, which it does in about 5% of cases. Adrenal calcifications are more frequent in TB than in PCM. Non-Hodgkin's lymphoma can also affect adrenals.<sup>56-60</sup>

The limitations of this study are represented by the fact that some of the intra-abdominal lesions were not biopsied for the confirmation of a PCM diagnosis. However, the exclusion of other diseases was determined by the anatomical, pathological study of materials from another location or serology, by the evolutionary evaluation for up to five years followup, and therapeutic response to antifungal treatment.

## CONCLUSIONS

The CT and US exams allowed demonstrating the involvement of abdominal organs in all forms of PCM. The most involved organs were lymph nodes, liver, spleen, and adrenals.

Gallbladder, retroperitoneal musculature, ascites, and pleural effusion showed alterations. Lymph node calcification, adrenal involvement, and ascites constitute evidences of high probability of PCM; however, they do not allow differentiation from tuberculosis.

In the chronic forms and with sequels, abdominal involvement is more frequent than what clinical forms indicate such as in patients without abdominal symptoms with hepatomegaly, lymphomegaly, and adrenal involvement.

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