

# Peritoneal Tuberculosis in Adults in Brazzaville: Epidemiological, Diagnostic, and Progressive Aspects

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## Abstract

Peritoneal tuberculosis is the most common digestive location of tuberculosis. Its diagnosis is often based on a combination of clinical and biological arguments, and confirmed by bacteriology which is rarely available. In Congo there is little published data on this entity. **Objectives:** To describe the epidemiological, diagnostic, and progression characteristics of peritoneal tuberculosis at the university hospital center in Brazzaville. **Patients and Methods:** This study is a descriptive and retrospective analysis conducted from January 1, 2015, to December 31, 2021, in the Gastroenterology and Internal Medicine department of the CHU of Brazzaville. It included all patients hospitalized during this period with a confirmed diagnosis of peritoneal tuberculosis, encompassing 54 records that met the inclusion criteria. **Results:** Out of the study period, 54 records that fulfilled the inclusion criteria were analyzed. The annual incidence of peritoneal tuberculosis was 7.7 patients, with a prevalence of 1.4%, showing a male predominance of 61% and an average age of  $39.93 \pm 14.62$  years. The primary symptoms were abdominal bloating and abdominal pain, present in 100% and 74% of cases, respectively. The clinical presentation was primarily characterized by febrile ascites observed in all patients. HIV co-infection was noted in 29.6% of cases. Anemia was present in 79.6% of patients, and an elevated sedimentation rate was observed in 74% of cases. The tuberculin skin test returned positive in 50% of cases. The ascitic fluid was exudative, rich in proteins and white blood cells (exceeding 1000/mm<sup>3</sup>, predominantly lymphocytes) in the majority of cases (100%, 83.3%, 83.3%, respectively). The diagnosis was deemed highly probable based on the clinical

and paraclinical signs and the favorable response to treatment in 79.6% of cases. There were instances of pleural involvement (33.3%) and lymph node involvement (pulmonary 22.2% and lymph node 16.6%). Treatment outcomes were favorable in 37% of cases, with a mortality rate of 9%. **Conclusion:** Peritoneal tuberculosis is prevalent in Brazzaville, predominantly affecting young males. The diagnosis relies chiefly on a combination of clinical, paraclinical, and progression indicators.

### Keywords

Peritoneal Tuberculosis, Epidemiological Study, Diagnostic Methods, Brazzaville

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## 1. Introduction

Tuberculosis is an infectious and contagious disease, characterized by its endemic-epidemic nature, primarily transmitted between humans and caused by *Mycobacterium tuberculosis* (also known as Koch's bacillus or BK) [1]. It presents a significant public health challenge globally, especially in developing countries in Asia and Africa, primarily due to inadequate living conditions and the concurrent HIV epidemic. Pulmonary tuberculosis is the most prevalent form, accounting for 80 to 90% of cases [2]. Among the various extrapulmonary manifestations, digestive tuberculosis is notably significant due to its multiple sites. Peritoneal tuberculosis, the most common digestive form, comprises 3.7% of extrapulmonary tuberculosis cases, ranking sixth after lymph node, genitourinary, osteoarticular, miliary, and bone forms [3]-[5]. Diagnosing peritoneal tuberculosis is challenging due to the non-specific nature of clinical symptoms, as well as the limitations of biological and radiological tests, compounded by the difficulty in isolating *Mycobacterium tuberculosis* from ascitic fluid. Advanced diagnostic techniques like Polymerase Chain Reaction (PCR) are expensive and often unavailable in resource-constrained settings [5]. Invasive procedures such as laparoscopy, and preferably coeloscopy with peritoneal biopsies, remain the diagnostic gold standard for confirming tuberculous peritoneal involvement. However, access to these procedures is limited in many regions where tuberculosis is endemic [6]. Consequently, the diagnosis of peritoneal tuberculosis is typically based on a combination of suggestive clinical and paraclinical indicators, with favorable outcomes observed under specific treatment [6].

According to the literature, several factors are associated with an increased risk of peritoneal tuberculosis, including advanced age, socioeconomic deprivation, substance abuse, alcoholism, diabetes, prolonged corticosteroid use, cirrhosis, malnutrition, peritoneal dialysis in patients with renal failure, and HIV-related immunosuppression [6] [7]. Tuberculosis generally shows a favorable progression in most cases, with mortality rates ranging from 1.4% to 10%, predominantly occurring post-operatively or in cases of disseminated tuberculosis [8]. In the

Republic of Congo, tuberculosis remains a significant public health issue, with an incidence of 375 per 100,000 residents annually as of 2018 [9]. Notably, there has been no research conducted on adult peritoneal tuberculosis at the University Hospital Center of Brazzaville. This gap underscores the need for this study, which aims to elucidate the epidemiological, diagnostic, and clinical progression characteristics of peritoneal tuberculosis within the Gastroenterology and Internal Medicine department at the CHU of Brazzaville.

## 2. Patients and Methods

A descriptive study with retrospective data collection was conducted, spanning from January 1, 2015, to December 31, 2021. This study took place in the Gastroenterology and Internal Medicine Department at the Brazzaville University Hospital Center, focusing on hospitalized patients.

The study sample included patients who were hospitalized and diagnosed with peritoneal tuberculosis or multifocal tuberculosis with peritoneal involvement. Patients with incomplete records were excluded from the study. We considered that the diagnosis of tuberculosis was certain if there was isolation of Koch's bacillus in tissues collected laparoscopically or the presence of Koester's granuloma. The diagnosis was considered probable, when there were clinical and biological arguments in favor (notably febrile ascites, tuberculin impregnation syndrome, and analysis of ascites fluid showing a fluid rich in proteins and lymphocyte cells) and a favorable outcome under anti-tuberculosis treatment.

Data collection was performed using a pre-established survey form, drawing from hospitalization registers and patient records. The study examined epidemiological and clinical aspects, diagnostic criteria, and progression modalities.

## 3. Results

Between January 1, 2015, and December 31, 2021, a total of 3,788 patients were admitted to the hospital. Among these, 97 cases were diagnosed with peritoneal tuberculosis, corresponding to a prevalence of 2.6%. For the purposes of our study, 54 cases that fully met the inclusion criteria were selected, accounting for 1.4% of all hospital admissions. This cohort consisted of 33 males and 21 females, yielding a sex ratio of 1.6. The mean age was  $39.9 \pm 14.6$  years, with a range from 18 to 81 years.

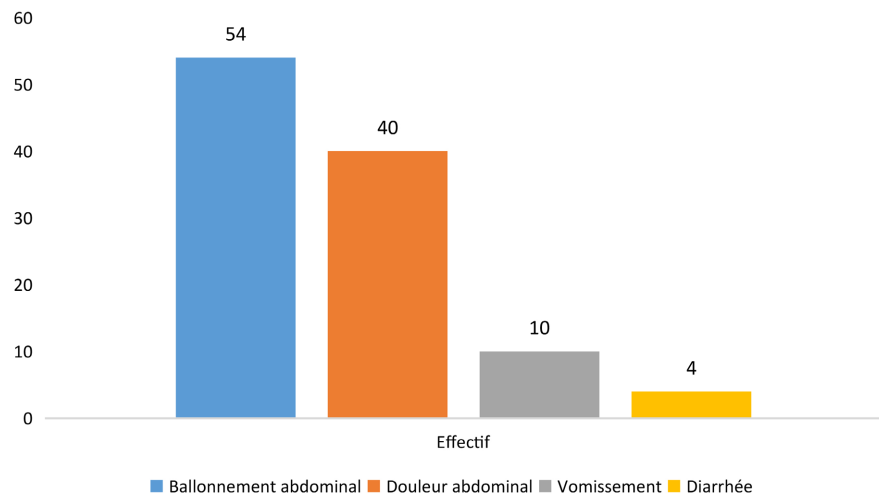
Considering the monthly family income and the occupational status of the patients, 93% of our study cohort ( $n = 50$ ) were of low socio-economic status. A history of pulmonary tuberculosis was present in five patients (9.3%). Evidence of tuberculosis exposure within their environment was reported by 10 patients (7.3%).

Peritoneal tuberculosis was diagnosed in patients with HIV in 16 instances (29.6%). HIV serology returned negative results in 21 patients (38.9%), while it was not specified in 17 patients (31.5%).

Additional comorbidities identified included cirrhosis in three cases (5.6%),

diabetes mellitus in two patients (3.7%), and hypertension in one patient.

Clinically, the primary symptoms reported were abdominal bloating in all 54 cases (100%) and abdominal pain in 40 cases (74%), as illustrated in **Figure 1**.



**Figure 1.** Distribution of patients by presenting symptoms.

Fever was a consistent symptom among all patients, with 49 patients (90.7%) exhibiting signs of tuberculin impregnation syndrome. This syndrome was marked by evening and nocturnal fever, fatigue, loss of appetite, and profuse night sweats, observed in all patients. Weight loss was variable and likely obscured by third-space fluid accumulation. The primary and consistent clinical sign was ascites, noted in all patients. Additional digestive and extra-digestive clinical signs are detailed in **Table 1**.

**Table 1.** Distribution of patients by clinical symptoms.

Clinical Symptom	Number	Percentage
Fever	54	100
Weight Loss	53	98.1
Tuberculin Impregnation Syndrome	49	90.7
Ascites	54	100
Abdominal Mass	10	18.5
Peripheral Lymphadenopathy	8	14.8

The observed extra-digestive symptoms included cough in 15 patients (33.3%), chest pain in 11 patients (24.4%), dyspnea in 7 patients (15.5%), lymphadenopathy in 8 patients (17.7%), and edema of the lower limbs in 3 patients (6.6%).

#### Paraclinical Investigations

From a biological perspective, anemia was detected in 43 patients, leukocytosis

with a predominance of lymphocytes in 23 patients, and an elevated sedimentation rate in 40 patients. The ascitic fluid was typically citrine, with a high concentration of cells and proteins. The findings from the paraclinical investigations are detailed in **Table 2**.

**Table 2.** Distribution of patients according to biological test results.

	Number	Percentage
<b>Biology</b>		
Citrine LA appearance	46	85.2
White blood cell count exceeding 1000/mm <sup>3</sup>	45	83.3
Lymphocyte predominance	45	83.3
Protein concentration above 25 g/l	54	100
Isolated organism(s)	-	-
Elevated erythrocyte sedimentation rate (ESR)	40	74
Anemia	43	79.2
Hyperleukocytosis with leukocyte formula inversion	23	42.6
Positive tuberculin skin test (IDR)	27	59

Abdominal ultrasound confirmed the presence of ascites in all patients; however, it did not yield further insights regarding the peritoneum. In our study, abdominal CT scans were not conducted. Paraclinical assessments determined that peritoneal involvement was associated with pleural involvement in 18 cases (33.3%), pulmonary involvement in 12 cases (22.2%), and lymph node involvement in 9 cases (16.7%).

#### Evolution

Recovery was reported in 20 out of 54 patients, representing 37% of the cases. Conversely, in 17 instances, recovery was not reported due to loss to follow-up (31.5%). For these patients, who were not monitored until complete recovery, the clinical course was considered favorable prior to their loss to follow-up, characterized by symptom improvement or reduction, absence of fever in all patients, weight gain, and a satisfactory overall condition. The mortality rate was 9.3%, with five deaths occurring during the course of treatment (**Table 3**).

**Table 3.** Distribution of cases according to progression modalities.

Outcome Categories	Number	Percentage
Recovery	20	37
Lost to follow-up	17	31.5
Persistent ascites	12	22.2
Death	5	9.3
Total	54	100

### Foundations of Diagnosis

Based on clinical, paraclinical, and developmental indicators, the diagnosis of peritoneal tuberculosis was deemed highly probable in 43 patients, representing 76.63%, compared to 20.37% ( $n = 11$ ) of cases that were considered probable peritoneal tuberculosis among all cases documented in our study. There were no cases of definitive diagnosis, as no patient had access to laparoscopy with biopsy or adenosine deaminase measurement, tests that are not conducted in our country.

## 4. Discussion

### 4.1. Methodology Analysis

Our research is a retrospective study, similar to many studies documented in the literature, and it faces certain limitations concerning data quantity and quality. These limitations account for the small size of our study population, primarily due to the lack of certain digitalization in medical records. Despite our sample size being smaller than the extensive series conducted by Redah, Hamdani, and Benani, which included 108, 207, and 300 patients respectively [10]-[12], it still provides valuable insights into the clinical characteristics of Congolese adults with peritoneal tuberculosis. This serves as a preliminary overview while we work towards establishing a larger cohort. Similar insights have been gleaned from other African studies with small sample sizes, such as those by El Ajim and Tolo [13] [14].

When feasible, laparoscopy should be routinely conducted (unless contraindicated) as it constitutes the cornerstone for the definitive diagnosis of peritoneal tuberculosis. Nevertheless, the absence of laparoscopy should not preclude the consideration of the diagnosis. Accordingly, we categorized our patients into three groups based on the degree of diagnostic certainty: definite, highly probable, and probable. This classification was determined by the presence of histological or biological evidence, or by a combination of clinical, paraclinical, and progressive arguments, or merely clinical and progressive arguments. Cissé *et al.* employed similar terminology, referring to a formal diagnosis when histological evidence was present, or when the diagnosis was based on a combination of clinical, biological, and progressive evidence [15].

### 4.2. Epidemiological, Clinical, Paraclinical, and Therapeutic Variables

#### Frequency

The study encompassed 54 patients over a span of seven years, yielding an average annual frequency of approximately 7 patients. This frequency aligns with the findings of Redah [10]. However, it is lower than the Maghreb series such as Hamdani's, which reported 21 patients annually, and the Malagasy series by Peghini, which reported 13 patients annually. It is, however, comparable to a Senegalese series documented by Ndiaye [7] [11] [16].

The hospital frequency of peritoneal tuberculosis was 1.4% (n = 54), similar to the frequency reported by Bennani's team, and higher than that noted by Sankale *et al.* (0.4%) [3] [17]. There are no prior studies documenting the frequency of peritoneal tuberculosis in adults in Congo; however, in pediatric cases, Pemba *et al.* noted a frequency of 0.65% (n = 35) over a six-year period [18].

### **Sex and Age**

Our study demonstrated a predominance of male participants, with a sex ratio of 1.6. This finding aligns with the results of Darré *et al.* in Togo [19], as well as with studies from Europe and the United States, such as those by Khoury *et al.* [20] and Thoreau *et al.* in France [21]. These studies suggest that the male predominance in these regions may be attributed to the significant number of male immigrant workers from countries with high tuberculosis endemicity, who are part of communities where tuberculosis is prevalent [22]. Nonetheless, it is traditionally observed that there is a female predominance in populations affected by peritoneal tuberculosis, as indicated by the research of Sanai, Hanson, and Dembélé in Morocco, Türkiye, and Senegal, respectively [21]-[23]. Furthermore, in pediatric cases in Congo, Pemba *et al.* also noted a male predominance [18].

In our study cohort, the mean age was  $39.93 \pm 14.62$  years, with a notable predominance in the age group ranging from 20 to over 59 years. Peritoneal tuberculosis is predominantly a condition affecting younger individuals, particularly manifesting between the third and fourth decades of life, as corroborated by various studies [19] [21] [22] [24]-[26].

### **Socio-Economic Status**

In our study, 93% of the patients were of low socio-economic status. Numerous studies on this topic have indicated that peritoneal tuberculosis, similar to its manifestations in other locations, is prevalent among disadvantaged social classes [11] [12] [27]. Nonetheless, this pattern is not universally applicable. Peritoneal tuberculosis can also affect individuals from higher socio-economic backgrounds, although inadequate hygiene and living conditions are contributing factors that increase the risk of infection and the development of severe cases.

### **Comorbidities**

Low socio-economic status is significantly associated with HIV infection. Over the past three decades, HIV infection has contributed to the re-emergence of tuberculosis cases, primarily affecting the lungs, but also manifesting in other forms. This underscores the importance of routinely screening for HIV-tuberculosis co-infection when diagnosing tuberculosis in patients. In our study population, approximately 30% of the patients tested positive for HIV. The prevalence of this co-infection varies by region and study. Variations in prevalence may be attributed to differences in patient recruitment methods across healthcare facilities. For instance, Darré *et al.* in Lomé and Sawadogo *et al.* in Burkina reported much higher seroprevalence rates of 63.9% and 79%, respectively [28]. Conversely, Dembélé *et al.* in Bamako reported no cases of HIV infection, Fall *et al.* in Dakar found a 4.5% prevalence among 61 cases studied, and Thoreau *et al.* in Paris reported an HIV

seroprevalence of 14.8% [23] [25] [29].

### History of Tuberculosis

The concept of tuberculosis exposure holds substantial diagnostic value, though it is often inconsistent [29] [30]. In our study, 19% of patients reported such exposure [30] [31]. Elmghari *et al* noted a frequency of 21%, while Thoreau *et al* observed a lower frequency of 11% [24] [29].

It is essential to systematically investigate the history of tuberculosis, even though it is infrequently identified. Peritoneal tuberculosis is invariably a secondary manifestation. The primary site of infection, potentially dating back a long time, might not be detectable. Nonetheless, this aspect should be routinely examined, particularly in endemic regions. Belmani *et al* documented a frequency of 5%, which is considerably lower than the 9% observed in our population [32].

### Clinical Observations

In our study, the most frequently observed symptoms were abdominal bloating and abdominal pain. This observation is consistent with findings in various other studies. Nevertheless, some research, such as that by Peghini, Redah, and Sawadogo, reports lower incidences of abdominal pain, at 28%, 31%, and 36% of cases, respectively [7] [10] [28]. In contrast, other studies highlight notable instances of pseudo-surgical abdominal pain, which led to the diagnosis of peritoneal tuberculosis during surgery, as documented by Cissé *et al.*, who reported 23 cases over a six-year period [15]. The tuberculin impregnation syndrome, when fully manifest, provides valuable diagnostic guidance. However, in most instances within our study, fever was the consistent symptom. The clinical presentation in all cases involved febrile ascites, which is classically described as indicative of peritoneal tuberculosis, as noted by Bennani *et al.*, Fall *et al.*, and Gendron *et al.* [12] [25] [33].

### Paraclinical Findings

In terms of paraclinical findings, the hemogram revealed anemia in 80% of our patients. These figures are consistent with those reported by Aubry *et al.*, as well as Gendron and Thoreau [29] [33] [34]. However, other authors, such as Etienne, have reported lower incidences of around 35% of cases [35].

The erythrocyte sedimentation rate was elevated in 74% of the cases. Such high prevalence rates are commonly documented in the literature, with some studies reporting rates as high as 100% [10] [33]. Despite its frequent mention in the literature, an elevated sedimentation rate remains a non-specific indicator of peritoneal tuberculosis.

In a cohort of patients (n = 38), the intradermal reaction (IDR) showed a positive result in 50% of the cases. This finding aligns with the studies by Peghini *et al*, Fall *et al*, and El Ajmi *et al*, where the majority of IDRs were predominantly positive, with rates of 70%, 60%, and 56.4%, respectively [7] [13] [25]. Conversely, other researchers have reported that the IDR is positive in only 50% of instances [12] [33]. It is, however, widely recognized that various factors can affect the outcome of the tuberculin intradermal test, and that a low positivity or negative result holds limited diagnostic value for peritoneal tuberculosis.

In our study, the analysis of ascitic fluid revealed a citrine appearance in 85% of the cases, a finding consistent with observations from other studies by El Ajmi and Hamdani [11] [13]. Typically, this fluid was characterized by high protein content and a cellular composition exceeding 1000 white blood cells, predominantly lymphocytes, which is indicative of peritoneal fluid in tuberculosis cases. Sawadogo identified over 1000 white blood cells in 82% of ascitic fluid samples [28], while Peghini and Bennani reported similar findings in 100% and 73% of the cases, respectively [3] [7]. The protein richness was noted by Fall and Peghini in all cases studied [7] [25]. The detection of the Koch bacillus in ascitic fluid is infrequently positive. Similar to our findings, Peghini and Fall did not detect BK in the ascitic fluid [7] [25]. Thoreau and Nafeh reported positive results in 35% and 76% of cases through direct examination and culture, respectively, and Singh achieved an 83% positivity rate in cultures from centrifuged sediment of one liter of ascitic fluid [29] [36] [37].

In our study, no patient benefited from certainty examinations, laparoscopy or ADA. Indeed, this is the case for various studies in sub-Saharan Africa where the diagnosis is often probable and the result of the treatment contributes to the confirmation of the diagnosis (18). Darré in Togo however, reported a series of 44 histologically confirmed cases over 20 years (19). But this was work carried out in the laboratory, and not patients followed in a department. In addition, 44 cases described in 20 years confirm the rarity of diagnostic confirmation because this corresponds to two confirmed cases per year.

In cases of peritoneal tuberculosis, associated localizations are frequently observed since this condition is invariably secondary. Pulmonary localizations are commonly the most prevalent. In our series, pleural and lymph node localizations were the primary ones identified. We specifically attributed the adenopathies detected via ultrasound to a tuberculous origin. Similar associations have been described by Tolo and Pemba [14] [18].

### 4.3. Evolution

The initial progress was favorable in over 60% of cases; however, it remained favorable until the conclusion of treatment in only 37% of cases, primarily because some patients were not monitored through to the end of their treatment. This issue is particularly prevalent in developing countries, where medical practice has become increasingly passive. The absence of community-based healthcare, which previously allowed for closer patient engagement, contributes to the high incidence of patients lost to follow-up. Mortality during well-managed treatment is generally attributed to late diagnosis and comorbid conditions, especially with HIV [3] [15].

## 5. Conclusion

Peritoneal tuberculosis represents a relatively common manifestation of tuberculosis, predominantly affecting younger individuals, with an average age of 39 years, and

primarily males. The clinical presentation is chiefly characterized by febrile ascites, occasionally accompanied by a decline in general health status. Diagnosis relies on a combination of clinical and paraclinical evidence. When adhered to properly, treatment typically leads to a favorable outcome in most cases and corroborates the diagnostic process.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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