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CASE REPORT

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Atypical tuberculous peritonitis presenting as a peritoneal pseudocyst in an immunocompetent adult: insights from a case and literature review

Jimmy Balibanga Minani[1,2*], Wani Bisimwa[2,3], Fabrice Cikomola Gulimwentuga[2,3,6], Aline Bedha[1,2], Ghislain Maheshe Balemba[2,4], Guy-Quesney Mateso Mbale[2,5], David Lupande Mwenebitu[2,6,9], Pierrot Mulumeoderhwa Kahasha[2,7], Marius Baguma[1,2,6], Pacifique Mwene-batu[2,8], Patrick DMC Katoto[2,6,10] and Tony Akilimali Shindano[1,2,6]

Abstract

Background Tuberculous peritonitis often presents with nonspecific symptoms that can lead to diagnostic challenges, particularly when manifesting as peritoneal pseudocysts. This study highlights the clinical complexity and diagnostic approach of tuberculous peritonitis presented as a pseudocyst in an immunocompetent adult, an atypical scenario that is rarely documented.

Case presentation We report a detailed case of a 41-year-old man presenting with abdominal distension, pain, and significant weight loss over four months. Abdominal CT showed a peritoneal pseudocyst, initially misdiagnosed due to its resemblance to more common abdominal pathologies. The diagnosis of tuberculous peritonitis was confirmed through histopathological analysis. Additionally, a systematic literature review was conducted to identify and analyse similar cases, focusing on clinical presentations, diagnostic methods, and patient outcomes. Our patient exhibited classic symptoms of abdominal TB but was unique due to the absence of prior ventriculoperitoneal shunting, a common factor in similar cases. Our literature review found that such presentations typically result in diagnostic delays averaging five months, complicating patient management and outcomes. This review also underscores the importance of considering tuberculosis in the differential diagnosis of peritoneal pseudocysts, particularly in TB-endemic regions.

Conclusion This case and review emphasize the need for high clinical suspicion and prompt investigation of tuberculosis in patients presenting with atypical abdominal symptoms and pseudocysts. Improved diagnostic strategies, including early use of imaging and pathological evaluations, are essential for timely diagnosis and management, thereby improving patient outcomes in suspected cases of extrapulmonary tuberculosis.

Keywords Pseudocysts, Tuberculous peritonitis, Extrapulmonary Tuberculosis, Diagnosis challenge, Ventriculoperitoneal shunt, Democratic Republic of the Congo

*Correspondence:
Jimmy Balibanga Minani
jimmyminj@gmail.com

Full list of author information is available at the end of the article

Background

Tuberculosis (TB) remains a significant public health challenge, especially in developing regions [1] such as the Southeast Asia, the Western Pacific, and the Sub-Saharan Africa [2]. While the most cases of TB are pulmonary, abdominal TB, including tuberculous peritonitis, represent a critical area of rising incidence. It ranks as the sixth most prevalent form of extrapulmonary TB [2, 3]. Peritoneal TB, which constitutes approximately 25–50% of abdominal TB cases [2] and 5 to 16.6% of extrapulmonary TB cases [1, 4], is often a result of reactivation of latent infections. The bacilli typically spread hematogenously to the mesenteric lymph nodes from active pulmonary infection or ingested with subsequent passage through Peyer's patches [1–3]. Rarely, the bacilli enter the peritoneal cavity transmurally from sites such as genitourinary tract [1, 2, 5]. People with immunocompromised states, chronic kidney disease requiring continuous ambulatory peritoneal dialysis, cirrhosis or liver disease, living in endemic TB areas, prior TB infection and prior TB exposure are more likely to develop tuberculous peritonitis [2, 6].

Despite its prevalence, this condition poses significant diagnostic challenges, particularly due to its insidious and non-specific symptoms like abdominal pain, weight loss, fever, and ascites [1, 2, 5]. This diagnosis challenge is even more pronounced in atypical presentations of tuberculous peritonitis, notably pseudotumoral forms, which can mimic other serious conditions, often leading to misdiagnoses and, consequently, delayed management. Among these, tuberculous peritonitis manifesting as a peritoneal pseudocyst is exceptionally rare and predominantly documented post ventriculoperitoneal shunt (VPS) operations, thus adding to the complexity of clinical evaluation and diagnosis [6–8].

In this context, our study presents a unique case of tuberculous peritonitis manifesting as a peritoneal pseudocyst in an immunocompetent adult with no history of ventriculoperitoneal shunting. This case highlights the diagnostic dilemma associated with such rare presentations. Alongside the case report, we conducted a comprehensive review of the literature through Medline, covering publications up to March 2024, to gather additional insights into similar cases. Our analysis focused on the clinical presentations, demographic characteristics, diagnostic strategies, and progression of the disease, aiming to enhance understanding and improve the diagnostic accuracy for such atypical presentations of tuberculous peritonitis, to reduce the time to initiation of treatment and, consequently, reduce the overall morbidity and mortality of tuberculosis worldwide.

Methods

Case report description

Our study begins with a detailed case report of tuberculous peritonitis manifesting as a peritoneal pseudocyst. We provide an in-depth look at the clinical manifestations, diagnostic processes, therapeutic interventions, and outcomes for this patient. Informed consent was secured prior to the study's initiation, ensuring ethical compliance. Subsequently, we extend our analysis to encompass sociodemographic factors, diagnostic methodologies, and disease trajectories of comparable cases documented in the literature.

Literature review and search strategy

To identify additional cases of tuberculous peritonitis presenting as peritoneal pseudocysts, we conducted a literature search using Medline. This search utilized both keywords and predefined MeSH terms: "peritoneal tuberculosis OR abdominal tuberculosis OR 'Peritonitis, Tuberculous'[Mesh]" AND "pseudocyst OR 'Mesenteric Cyst'[Mesh]". The review spanned from the inception of the database until March 2024, and included articles published in both English and French.

Inclusion criteria and data analysis

The inclusion criteria were strict, focusing on studies where tuberculous peritonitis was definitively confirmed via histopathological analysis following surgical resection or through culture of aspirated pseudocyst fluid. Of the initial 20 articles identified, 14 were excluded due to non-tuberculous diagnoses, 2 due to pseudocyst localization outside the peritoneal cavity, and 1 for lack of accessible abstracts and full texts limiting access to its data and therefore to its analysis. The remaining three case reports were examined thoroughly (Fig. 1). Data extracted included age at diagnosis, sex, nationality, clinical symptoms, presence of a ventriculoperitoneal shunt, time to diagnosis, findings from CT scans and other imaging techniques, surgical and pathological results, and patient outcomes. The time to diagnosis was specifically noted from the onset of symptoms to confirmed diagnosis. Descriptive statistics were employed to synthesize the data, using Epi Info version 7.2 for data encoding and analysis. Categorical variables were presented as proportions, while continuous variables were depicted as means.

Results

Case report

Patient presentation

A 41-year-old man was seen as an outpatient for severe abdominal distension, abdominal pain, and significant weight loss (62 to 47Kg) over four months. He had no history of smoking, immunocompromising disease, or familial history of neoplasia. Initially treated for suspected

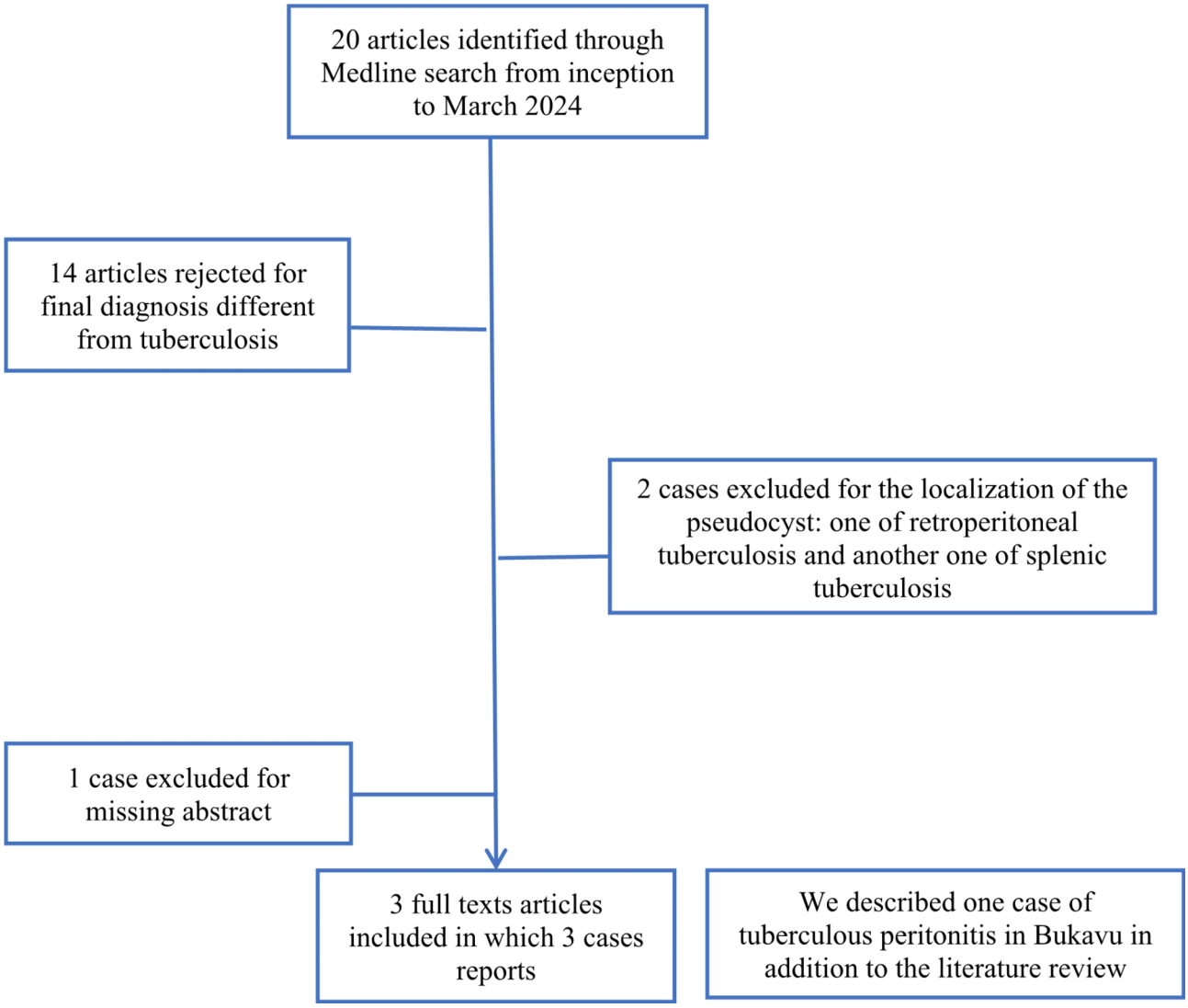

Fig. 1 Flow chart diagram of the literature search for cases of tuberculous peritonitis revealed as a peritoneal pseudocyst through Medline from inception to March 2024

Table 1 Summary of biological tests and imaging results

Biological blood tests	Imaging results
- C-Reactive Protein: 82 mg/L - Sedimentation rate: 70 mm/h - Albuminemia: 2.6 g/dl - Total serum protein: 7.8 g/dL - Gamma-GT: 266 IU/L - Phosphatase alkaline: 268UI/L - HIV, hepatitis B and hepatitis C serologies: negatives	Abdominal CT: peritoneal pseudocyst associated with multiple adenopathies and bilateral pleural effusion, predominantly on the right.

poisoning with traditional methods, he showed no symptom improvement. Medical examination revealed generalized abdominal distension, diffuse abdominal tenderness and bilateral oedema of the lower limbs. There was no adenopathy or organomegaly, and the chest examination was normal. Blood tests showed a normal white blood cell count, an inflammatory syndrome, hypoalbuminemia, a normal total serum protein, a biological cholestasis syndrome. HIV, hepatitis B and hepatitis C serologies were all negative (Table 1). Imaging studies including ultrasonography and a CT scan suggested a peritoneal pseudocyst associated with multiple adenopathies and bilateral pleural effusion, predominantly on the right, raising initial differential diagnoses of lymphoma or dysembryoma (Fig. 2). Laparotomy was indicated to

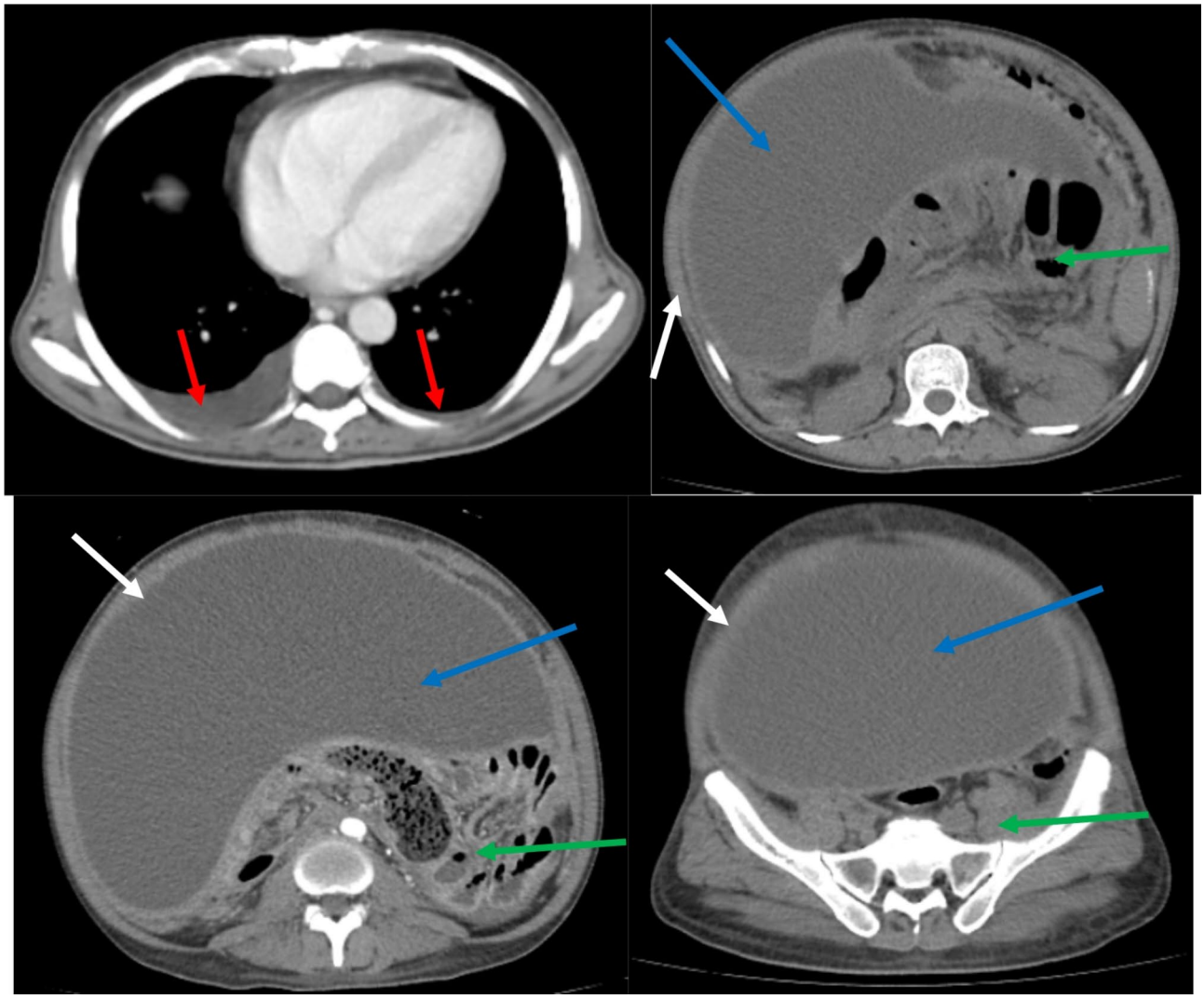

Fig. 2 Abdominal CT scan showing a large peritoneal pseudocyst (blue arrows), 3 mm-thick (white arrows), roughly oval, extending from the right hypochondrium to the pelvis, measuring 203 × 266 × 248 mm, and pushing back the bowel and abdominal viscera (green arrows) associated with multiple adenopathies and bilateral pleural effusion, predominantly on the right (red arrows)

explore and remove the peritoneal pseudocyst to relieve the compression of the abdominal viscera.

Surgical procedure

A xyphopubic laparotomy exposed a thickened parietal peritoneum and intestinal membranes encased in a fibrous matrix, containing a yellow-citrine liquid (Fig. 3). Approximately 6.5 litters of fluid were removed, followed by thorough cleansing of the peritoneal cavity. Analysis of the peritoneal fluid showed normal cytology, normal direct examination, and negative bacteriological tests. Histological examination of the peritoneal biopsy revealed fibro- collagenized tissue with granulomatous formations and caseous necrosis, confirming tuberculous peritonitis. Postoperative care involved intensive monitoring and initiation of a six-month course of antituberculosis therapy (Fig. 4).

Patient evolution

Post-surgery, the patient experienced initial weight loss (47 to 38 Kg) but showed significant clinical improvement under antituberculosis treatment, including the resolution of abdominal symptoms and oedema. He was discharged after a week and continued to recover, regaining weight (57 Kg), and showing no treatment-related side effects.

Review of literature cases

Our literature search yielded three additional cases of tuberculous peritonitis presenting as pseudocysts, providing valuable insights into the demographic characteristics, clinical manifestations, diagnostic approaches, and therapeutic outcomes of these rare instances (Table 2). All reported cases involved male patients, with a mean age of 15.6 years, indicating a possible demographic

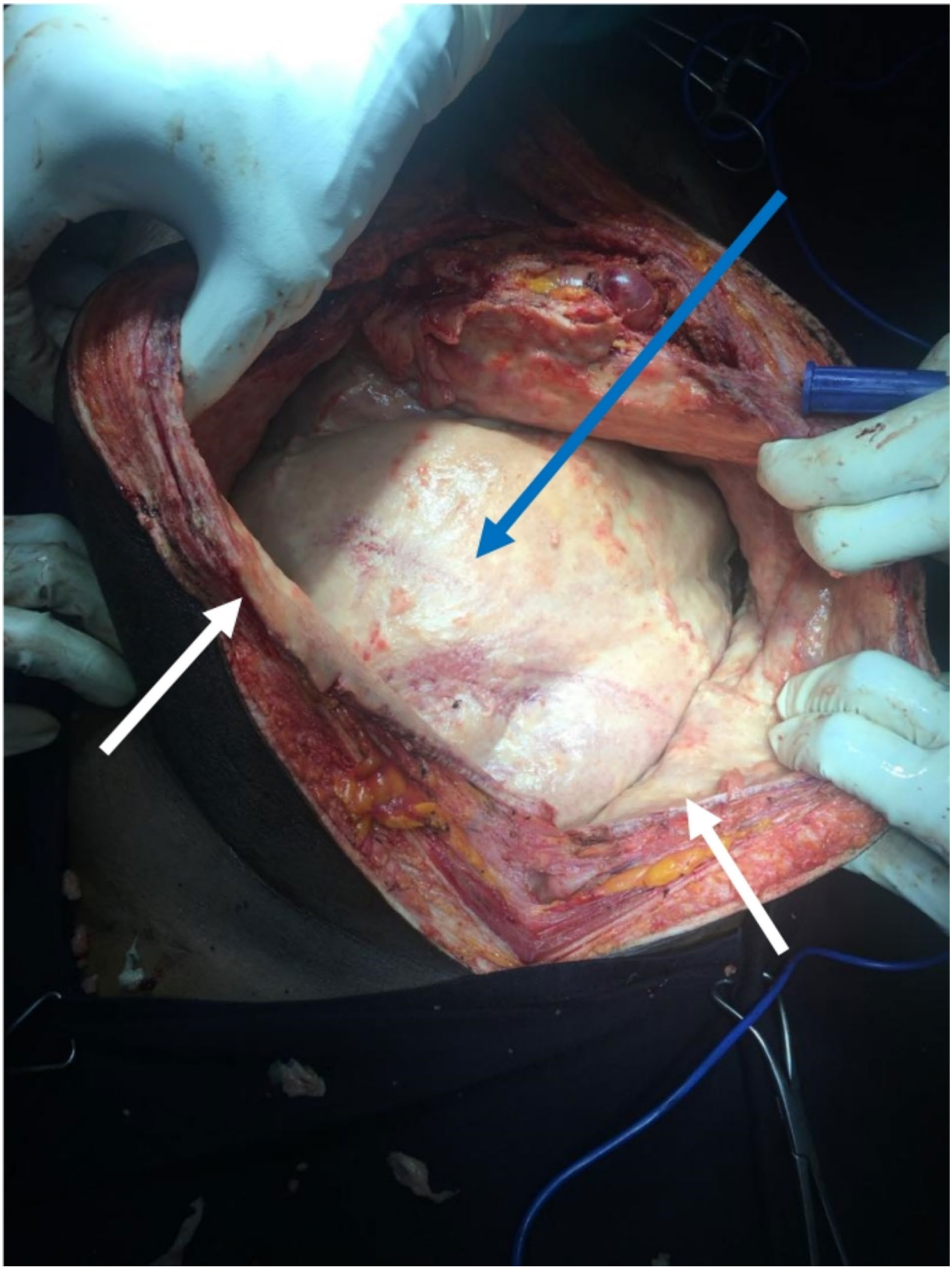

Fig. 3 Intraoperative photograph showing thickening of the parietal peritoneum (white arrow) and the surface of the intestinal ansae covered by a thick membrane (blue arrow), forming a magma, and delimiting a cavity containing 6.5 L of citrine-yellow liquid

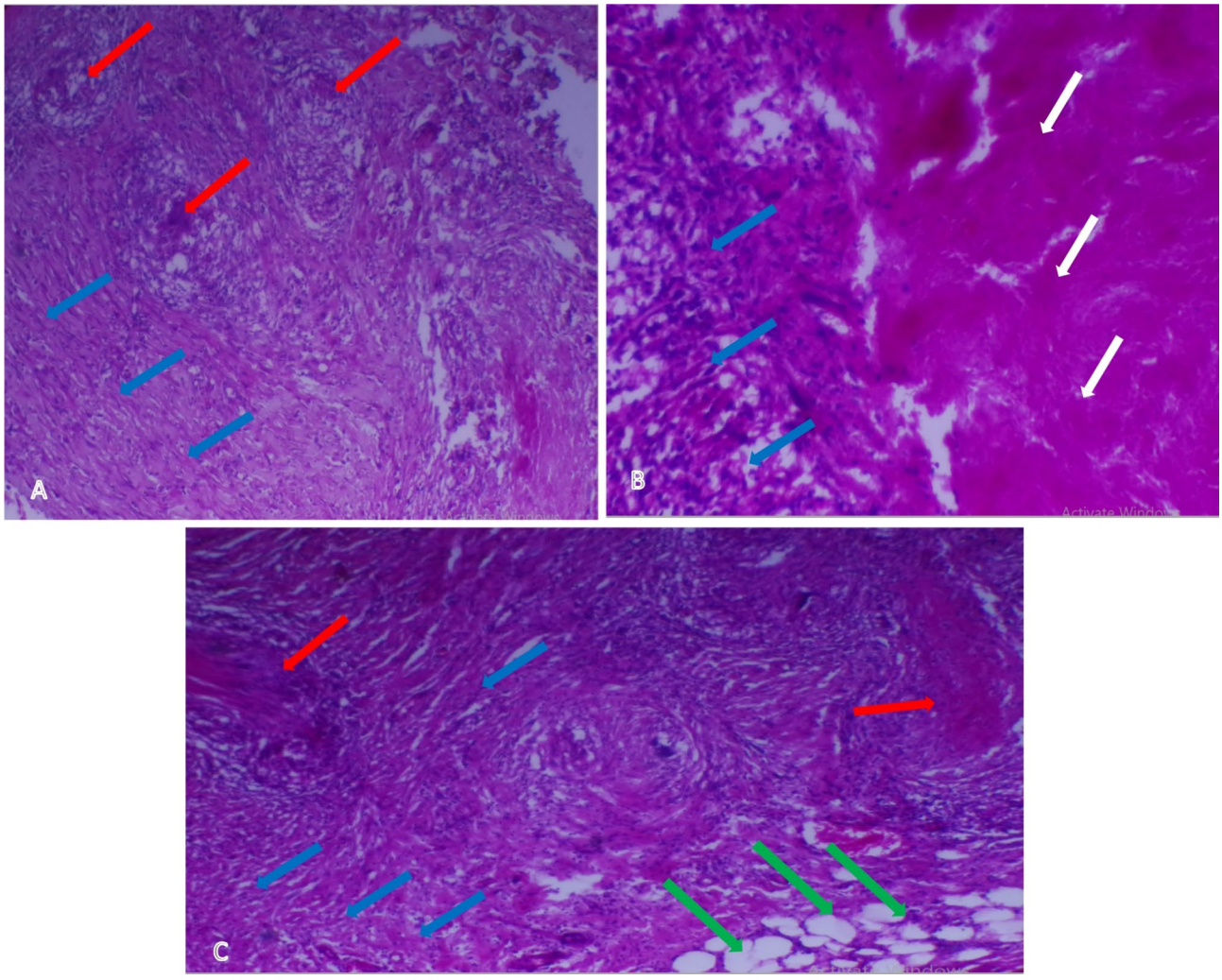

Fig. 4 Peritoneal biopsy showing: (A) fibrofatty tissue (blue arrow) predominating in the lower left quadrant containing epithelial-giganto-cellular granulomatous structures with foci of caseous necrosis (red arrows); (B) Image focused on the area of homogenizing caseous necrosis on the right (white arrows) with fibrous tissue on the left; and (C) peritoneal serosa adipose tissue (green arrows) with elsewhere fibrous tissue (blue arrows) containing granulomas (red arrows)

trend in the occurrence of this atypical presentation. The geographical distribution included two cases from high-income countries and one from a low-income country, suggesting that the incidence is not confined to regions traditionally associated with high TB prevalence.

Clinical presentations and diagnosis

The clinical presentations were consistently marked by abdominal pain and distension, accompanied by significant weight loss. These symptoms align with typical manifestations of tuberculous peritonitis but are complicated by the presence of pseudocysts, which can mimic other abdominal pathologies, thereby complicating the clinical diagnosis. The average time from symptom onset to diagnosis was approximately five months, reflecting the challenges in recognizing this atypical form of TB. Imaging studies played a crucial role in these cases, with CT scans frequently revealing cystic masses associated with VPS catheters, a common feature in these patients. This specific finding guided the diagnostic process towards considering tuberculous aetiology alongside other differential diagnoses.

Histopathological confirmation and treatment

Definitive diagnosis was established through histopathological analysis in most cases, where tissue samples exhibited characteristic epithelioid granulomas with caseous necrosis. In one instance, *Mycobacterium tuberculosis* was isolated from the aspirate of a pseudocyst, providing direct microbiological confirmation of the infection. Treatment regimens typically followed standard anti-tuberculosis protocols, but the presence of VPS introduced additional complexities. One patient experienced a relapse of symptoms two years post-treatment,

Table 2 Comprehensive overview of reported cases of tuberculous peritonitis revealed by a peritoneal pseudocyst

Reference and Year	Age	Sex	Country	Clinical Presentation	Prior Ventriculo-Peritoneal Shunts (VPS)	Abdomen CT-Scan Findings	Time to Diagnosis	Diagnostic method used to confirm TB (Microbiological and Pathology Findings)	Findings During Surgery	Patient Evolution
Narasimharao KL et al., 1984	8 years	M	India	Abdominal pain, enlarging mass, fever	Yes, indicated for hydrocephalus following tubercular meningitis	NS	8 months	Epithelioid granuloma composed of epithelioid cells, Langhan's giant cells, and lymphocytes characteristic of tuberculosis	Pseudocyst formation in the supracolic compartment, extensive tubercles noted all over the omentum, peritoneum, and bowel wall with blood-stained ascites	NS
Hajime Takase et al., 2014	21 years	M	Japan	Fever, sporadic nausea, abdominal pain and distention, worsening headache and consciousness disturbance	Yes, indicated for hydrocephalus due to a suprasellar arachnoid cyst	Enormous peritoneal cyst surrounding the distal end of the peritoneal tube, and fluid in the sheath surrounding the peritoneal tube. No chest CT abnormalities	4 months	Cultures of xanthochromic fluid aspirated from the pseudocyst were negative but Mycobacterium tuberculosis isolated in the xanthochromic fluid from the left knee	No membrane surrounding the abdominal cyst, no malignancy within the omentum, no ascites within the abdominal cavity	Relapse of peritoneal inflammation after 2 years, treated with antituberculosis agents. Symptoms improved after removal of the CP shunt by thoracoscopic surgery.
Manzoor Ahmed et al., 2019	18 years	M	United Arab Emirates	Enlargement of the abdomen, VPS dysfunction	Yes, indicated for hydrocephalus due to tuberculous meningitidis	CT: cystic mass to the tip of the VPS catheter	6 months	Mycobacterium tuberculosis isolated in culture from the cyst aspirates and a CSF shunt tap	Large pseudocyst with local inflammatory changes	Slow clinical improvement, stable appearance with no new disease signs.
Our case, current study	41 years	M	Democratic Republic of Congo	Abdominal distension, abdominal pain, and weight loss	No	Large, 3 mm-thick oval intraperitoneal cystic mass from right hypochondrium to pelvis, displacing bowel and bladder. Notable for multiple adenopathies and bilateral pleural effusion, predominantly right.	4 months	Epithelio-gigantocellular granulomatous formations with large patches of caseous necrosis	Thickening of the parietal peritoneum, surface of the intestinal ansae covered by a thick membrane, forming a magma	Significant weight gain and improved general condition post-treatment. Disappearance of abdominal pain and distention.

CSF: cerebrospinal fluid, CP: Cysto-peritoneal, CT: Computed Tomography, NS: not specified., VPS: Ventriculoperitoneal shunt

necessitating the removal of the shunt via thoracoscopic surgery and a renewed course of anti-tuberculosis medication.

Outcomes and prognosis

Outcomes varied among the cases, with most patients showing clinical improvement and stabilization of symptoms following the initiation of treatment. However, the case with relapse highlights the potential for long-term complications and the need for ongoing surveillance in patients with tuberculous peritonitis, especially those with complicating factors such as VPS.

Discussion

Our study has shown the challenges of diagnosing and managing tuberculous peritonitis, particularly when it presents as a peritoneal pseudocyst. We described a unique case of an immunocompetent adult with this condition, who had no prior history of ventriculoperitoneal shunting, contrasting with other cases in the literature where such a history was prevalent. The patient presented with significant abdominal symptoms, which were initially mistaken for other abdominal pathologies. This highlights the critical need for heightened awareness and clinical suspicion, especially in regions where tuberculosis is endemic.

The literature reveals that tuberculous peritonitis presenting as a pseudocyst is an infrequent but clinically significant manifestation, particularly because it mimics more common abdominal disorders, leading to diagnostic complexities [9, 10]. This is evident in the cases reviewed, where pseudocysts were initially mistaken for neoplastic such as carcinomatosis, lymphangioma and mesothelioma or other inflammatory abdominal conditions. Such misdiagnoses underscore the subtlety of tuberculous peritonitis's symptoms and the necessity for differential diagnosis in abdominal pathology. An ambispective study including 44 cases of tuberculous peritonitis and 45 cases of peritoneal carcinomatosis showed that fever, past history of tuberculosis, and weight loss were significantly associated with tuberculous peritonitis ($p \leq 0.001$, $p = 0.038$ and $p = 0.001$) whereas pain in the abdomen and history of malignancy were significantly associated with peritoneal carcinomatosis ($p = 0.038$ and $p \leq 0.001$) [10]. Based on this study, our patient's clinical picture showed an overlapping of symptoms consistent with tuberculous peritonitis, including weight loss, whereas the abdominal pain and discomfort associated with the peritoneal pseudocyst would be consistent with peritoneal carcinomatosis. This situation of intersecting and nonspecific symptoms is also observed in cases reported in the literature. Additionally, the reviewed literature highlights a consistent pattern of delayed diagnosis, averaging five months, primarily due to the insidious onset, the atypical presentation of the disease, the low suspicion of TB and the differential diagnosis evoked [11, 12]. This delay is problematic, as it can lead to worsening of the condition and highlights the need for improved diagnostic protocols that incorporate the possibility of tuberculosis more readily, particularly in endemic countries.

Factors predisposing patients to pseudocyst formation include chronic inflammation, increased protein content in the peritoneal fluid, peritoneal adhesions, malabsorption of the peritoneal fluid due to subclinical peritonitis, intraperitoneal catheter infections and ventriculoperitoneal shunts [8, 9, 13]. Chronic inflammation, increased protein content, and malabsorption of peritoneal fluid due to tuberculous peritonitis would be the factors associated with pseudocyst formation in our patient, and VPS should be the major predisposing factor in the three reviewed cases. Indeed, it is well known that VPS is associated with increased risk complication such as peritoneal pseudocyst formation [7]; and in patients who have undergone it for hydrocephalus resulting from tuberculous meningitis, the most advanced hypothesis is the passage of tuberculous mycobacteria into the peritoneal cavity through the VPS, a passage which itself favours pseudocyst formation through chronic inflammation and the increase in proteins in the peritoneal fluid [6, 8]. This would be the situation for the case reported by Manzoor Ahmed et al. [6], whereas this hypothesis is not supported by the case of Narasimharao et al. [8] in which the patient had no neurological symptoms and the bacteriological test for tuberculous mycobacteria was negative in the CSF. Similarly, in the case reported by Hajime Takase et al., VPS was indicated for hydrocephalus due to suprasellar arachnoid cyst [7]. Associated factors such as immunodepression in these contexts could favours the reactivation of latent foci of tuberculosis.

Although the diagnostic approach of peritoneal pseudocyst is very challenging, USG, CT and MRI are among the imaging tests used to establish differential diagnoses [12, 14]. The imaging stigmata of tuberculous peritonitis include enlarged mesenteric lymph nodes with central necrosis and calcification, high-density ascites, diffusely thickened peritoneum, soft-tissue omental changes, and omental or mesenteric masses [15–17]. A systematic review comparing the yield of CT findings in discriminating tuberculous peritonitis from peritoneal carcinomatosis showed the highest diagnostic accuracy for tuberculous peritonitis achieved by smooth peritoneal thickening with good specificity (84%) but limited sensitivity (59%). The location and presence of ascites showed poor diagnostic accuracy with poor sensitivity (59%) and specificity (58%). Lymph node and necrosis and calcification showed an impressive specificity (95% and 100% respectively) but poor sensitivity (10 and

12% respectively) [18]. Even though the peritoneum was thickened in our patient, the multiple lymphadenopathies did not show central low density which could also lead to TB suspicion. Nevertheless, the central low density of lymphadenopathy can occasionally be found in metastatic malignancies, lymphomas, pyogenic infections, and Whipple's disease. This shows the diagnostic complexities and limitations of imaging in the diagnosis of tuberculous peritonitis, especially in atypical and infrequent situations such as a peritoneal pseudocyst.

In the cases reviewed, TB was confirmed by histopathological examination of tissue biopsy samples and microbiological examination of the fluid aspirated from the pseudocyst. In our case, microbiological testing for TB diagnosis was not initially performed, given the misleading clinical picture, and the unavailability of mycobacterial culture media. Nevertheless, microbiological diagnosis of tuberculous peritonitis is also very challenging because the peritoneal fluid yields lower bacterial counts [7, 18]. It is well known that the sensitivity of the Ziehl-Neelsen stain for diagnosing acid-fast bacilli is low, ranging from 0 to 35% only, and the yield of positive cultures for Mycobacterium tuberculosis is much lower, ranging from 16 to 58%, due to the paucibacillary nature of tuberculous peritonitis and the dilutional effect of ascites [3, 9]. Biomolecular diagnostic methods such as Xpert MTB/RIF of ascitic fluid are highly specific but also lack sensitivity, ranging from 8 to 50% [3]. The concentration of adenosine deaminase in the peritoneal fluid, which can also be useful for diagnosis, has been determined in several studies, with a cut-off adenosine deaminase level higher than 30IU/L highly suggestive, yielding a sensitivity close to 100% and a specificity greater than 95% for peritoneal TB as shown in a systematic review [19].

The cases from the literature emphasize the variability in clinical presentations and outcomes associated with tuberculous peritonitis presenting as a pseudocyst [6–8]. These presentations stress the importance of considering a comprehensive diagnostic approach, including the use of advanced imaging techniques and definitive microbiological and histopathological examinations, to differentiate tuberculous peritonitis from other similar clinical conditions [3, 9]. The need for such detailed diagnostic strategies becomes even more critical in areas with high tuberculosis prevalence, suggesting that healthcare systems in these regions should prioritize access to and training in the use of these diagnostic technologies.

The challenges highlighted by these cases have important implications for both public health policy and clinical practice. Given the potential for diagnostic delays and their associated morbidity, there is a clear need for policy makers to strengthen diagnostic capabilities in endemic regions, possibly through better access to advanced imaging, microbiological testing (Xpert/MTB/Rif, mycobacterial culture) and biomarkers like adenosine deaminase which should be systematically carried out in suspected case. Clinically, the findings advocate for the development of guidelines that prompt earlier consideration of tuberculosis in patients presenting with nonspecific abdominal symptoms and pseudocysts, irrespective of their immune status or history of prior tuberculosis exposure. This approach can facilitate earlier intervention, potentially improving patient outcomes and decreasing the spread of tuberculosis within communities.

This study's strength lies in its detailed case description and comprehensive review of similar cases, which provide a deep insight into a rare presentation of a common global health issue. However, the study is limited by the small number of similar cases available for review, which might not fully represent the spectrum of presentations of tuberculous peritonitis as a pseudocyst. Additionally, the retrospective nature of the case reviews limits the ability to draw causal inferences from the data collected. The impact of different treatment regimens could also not be robustly assessed due to the variability in clinical management across the cases.

Conclusion

Our study highlights the diagnostic and therapeutic challenges of tuberculous peritonitis manifesting as a peritoneal pseudocyst. It calls for a critical evaluation of both clinical and policy approaches to managing tuberculosis, particularly in its less common forms. If diagnostic is improved and system delay is reduced in treatment, healthcare providers can significantly improve outcomes for patients suffering from this severe form of extrapulmonary tuberculosis. The insights gained from this study and similar cases in the literature should inform future strategies in both local and global tuberculosis management efforts.

Abbreviations

CT	Computed Tomography
CSF	Cerebrospinal fluid
CP	Cysto-peritoneal
MRI	Magnetic Resonance Imaging
NS	Not specified
TB	Tuberculosis
USG	Ultrasonography
VPS	Ventriculo-Peritoneal Shunts

Author contributions

JMB: drafted the manuscript, reviewed the literature, followed up the patient and edited the final manuscript. WB and FGC followed-up the patient and revised the manuscript. AB, GMB, GQM, DLM, PMK, MB, PM, PDMK and TAS edited and revised the manuscript. All the authors approved the final version of the manuscript.

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Data availability
Materials and data provided in this case study and literature review are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
The publication of the case was approved by the Ethics committee of the Catholic University of Bukavu, DRC. Informed consent to participate was obtained from all study participants.

Consent for publication
Consent for publication of the clinical details and/or laboratory results was obtained from the patient.

Competing interests
The authors declare no competing interests.

Author details
[1]Department of Internal Medicine, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[2]Faculty of Medicine, Université Catholique de Bukavu (UCB), Bukavu, South Kivu, Democratic Republic of the Congo
[3]Department of Surgery, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[4]Department of Radiology, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[5]Department of Intensive Care Medicine, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[6]Centre for Tropical Diseases and Global Health, Department of Medicine, Université Catholique de Bukavu (UCB), Bukavu, South Kivu, Democratic Republic of the Congo
[7]Department of Pathology, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[8]École Régionale de Santé Publique (ERSP), Université Catholique de Bukavu (UCB), Bukavu, South Kivu, Democratic Republic of the Congo
[9]Department of Laboratory, Hôpital Provincial Général de Référence de Bukavu (HPGRB), Bukavu, South Kivu, Democratic Republic of the Congo
[10]Centre for Evidence Based Medicine, Department of Global Health, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

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