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Original Article

Progression of Vascular Pythiosis and Management of Intra-Abdominal Arterial Involvement

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Abstract Intra-abdominal vascular pythiosis is a rare, life- and limb-threatening infection caused by Pythium insidiosum. A 36-year-old Thai male with thalassemia presented with a chronic left leg ulcer that progressed despite debridement, leading to a below-knee amputation (BKA). Post-BKA, chronic osteomyelitis necessitated an above-knee amputation (AKA). The stump failed to heal, and intra-abdominal vascular pythiosis was diagnosed using PCR and computed tomography angiography (CTA), which revealed extensive arterial occlusion. Management included antifungal and antibacterial therapy, high AKA, and arterial resection. Over 36 months, the patient showed clinical improvement with stable inflammatory markers. Timely diagnosis of vascular pythiosis is essential for optimizing treatment outcomes, and radical surgical resection continues to serve as the cornerstone of effective therapy.

Keywords: Intra-abdominal vascular pythiosis, Antifungal agent, Antibacterial agent

Introduction

Vascular pythiosis is a rare disease but serious life- and limb-threatening infection caused by Pythium insidiosum, a fungus-like organism endemic in Thailand. The clinical conditions are classified into four groups: cutaneous/subcutaneous, vascular, ocular, and disseminated.[1] In 1989, vascular pythiosis was reported.[2] Factors predisposing to the arteritis caused by P. insidiosum are not entirely identified, but arteritis occurs most often in patients with hemoglobinopathies, particularly thalassemia, which are relatively common in Thailand.[3] The current effective management is the combination of surgery and medication. Particularly, the surgical management must be a radical amputation above the area of the arterial lesion.[4] Vascular pythiosis is typically located in the infrainguinal area. In contrast, intra-abdominal extension of the disease can influence the outcome and result in a higher mortality rate.[5] This case report demonstrates the progression of vascular pythiosis in the lower extremity and the management of intra-abdominal vascular pythiosis.

Case Report

The patient is a 36-year-old Thai male with a history of thalassemia (HbH disease with HbCS). He was pierced by a stick on the medial side of his left lower leg while working in the field. One week after the accident,

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he noticed a small ulcer, pain, swelling, redness, and tenderness. He was diagnosed with cellulitis and treated with oral antibiotics at the community hospital.

One month later, the medial aspect of his left leg developed a larger wound with black edges, and the wound also extended to the lateral aspect of his left leg. He was referred to a tertiary hospital and admitted to the surgical ward. According to the physical examinations, he had a thalassemic facial appearance, a fever, and a wound on his left leg. His pulses were normal in all extremities except for the left posterior tibial artery, where the pulse was absent, though a biphasic Doppler signal was detected. He underwent debridement of the left leg (Tissue culture revealed Staphylococcus aureus). During his five-day hospital stay, he was treated with a combination of a third-generation cephalosporin and clindamycin. After discharge, he was prescribed oral antibiotics to continue at home for ten days.

Two months after debridement, the wound on the left leg showed progressive necrotic tissue with pus oozing from both the medial and lateral aspects. (Figure 1A) The surgeon decided to perform a below-knee amputation (BKA) due to an infection deep within the muscle. After the surgical intervention, the wound had completely healed.

One year after the BKA, he noticed swelling, redness, and a limited range of motion in his left knee. He went to a community hospital, where he was diagnosed with chronic osteomyelitis and septic arthritis of the left knee. He underwent a left knee arthrotomy. After two arthrotomies, his condition improved.

Seven months after arthrotomy, the left knee arthrotomy wound had pus with necrotic tissue again. (Figures 1B and 1C) He was again diagnosed with chronic osteomyelitis and septic arthritis in his left knee. The surgeon decided to perform an above-knee amputation (AKA) due to chronic osteomyelitis.

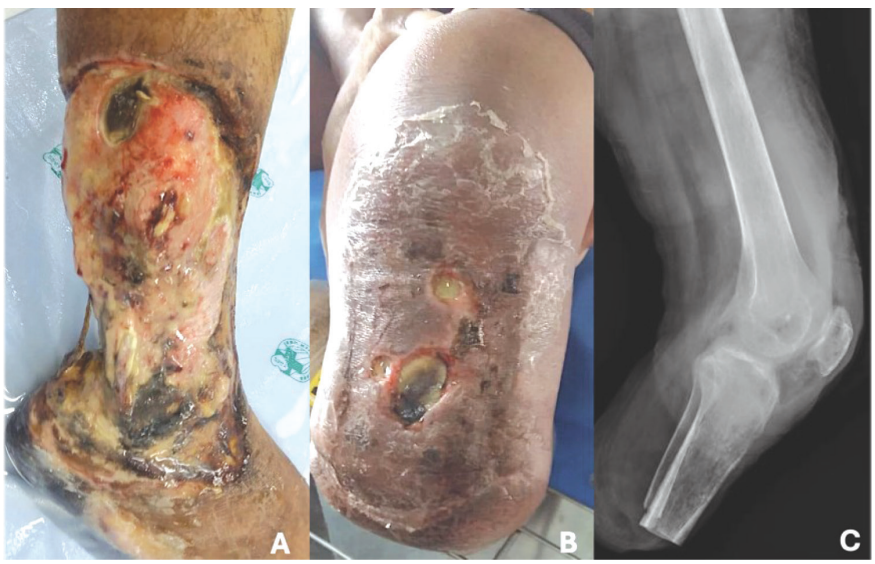

Figure 1 Wound on the left leg after debridement (A), Seven months after arthrotomy, the left knee arthrotomy wound had pus with necrotic tissue. (B), and the X-ray shows osteomyelitis with air around the left knee joint (C).

One month after the AKA, the wound remained unhealed, and the AKA stump was infected. During the examination, the physical exam revealed an impalpable common femoral artery (CFA) pulse, prompting a consultation with a vascular surgeon. The vascular surgeon ordered a computed tomography angiography (CTA), which demonstrated total occlusion of the left common iliac artery (CIA), internal iliac artery (IIA), external iliac artery (EIA), down to the proximal superficial femoral artery (SFA). The affected segments showed characteristic features of vascular pythiosis, including concentric mural thickening, perivascular soft-tissue infiltration, and the absence of arterial calcification (Figure 2A). After obtaining the CTA, a Pythium infection was suspected, so a polymerase chain reaction (PCR) test for Pythium insidiosum was ordered, and the result confirmed to be positive. The inflammatory markers showed a very high Erythrocyte sedimentation rate (ESR) of 120 ml/hr and C-reactive protein (CRP) of 111.4 mg/L.

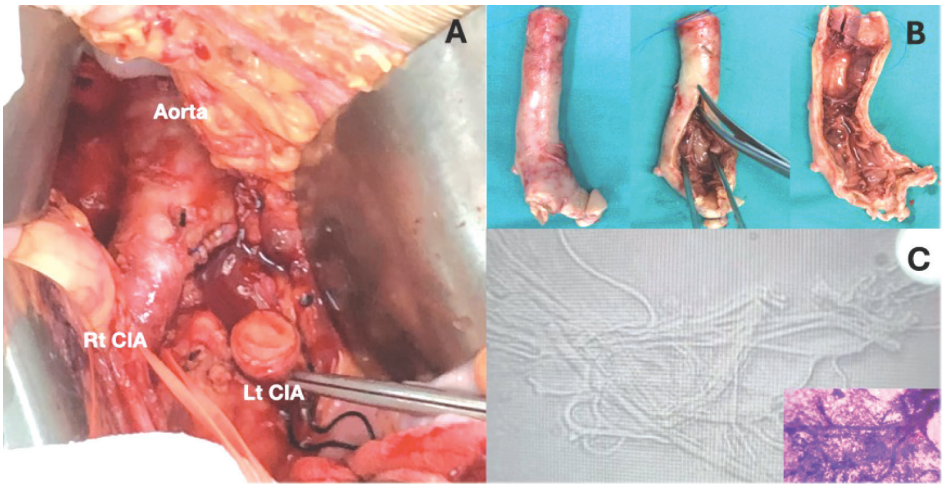

Figure 2 Aneurysmal changes and inflammation of the CIA and EIA (A). Gross pathology after CIA excision showed pus and inflammation (B). CIA pus: 10% Potassium Hydroxide (KOH) and Gram stain (C).

The patient's management included the prompt initiation of antifungal therapy with itraconazole (200 mg twice daily) and antibacterial treatment with doxycycline (100 mg twice daily) and azithromycin (250 mg twice daily), along with surgical eradication of infected tissue. Using a retroperitoneal approach, findings revealed aneurysmal changes and inflammation of CIA and EIA. Prompt removal of CIA and EIA, ligation of IIA, and a high above-knee amputation (AKA) were performed (Figure 3A).

The pathological report showed no completely free margin of Pythium infection in CIA. Despite being advised to undergo reoperation, the patient declined.

Following surgical eradication, the patient's wound healed well. Due to the surgical non-free margin for Pythium infection, lifelong treatment with itraconazole (antifungal), doxycycline, and azithromycin (antibacterials) was prescribed.[6,7]

After follow-up, the patient continued medical treatment. The inflammation markers, ESR and CRP, showed improvement. But CTA after 6 months showed dilatation of the abdominal aorta with suspected progression of vascular pythiosis (Figure 3B). We offered reoperation again, but he declined.

After 36 months of follow-up with lifelong medical treatment, CTA showed no progression of abdominal aortic aneurysm (Figure 3C), and both ESR and CRP were normal. The patient was still in good well-being.

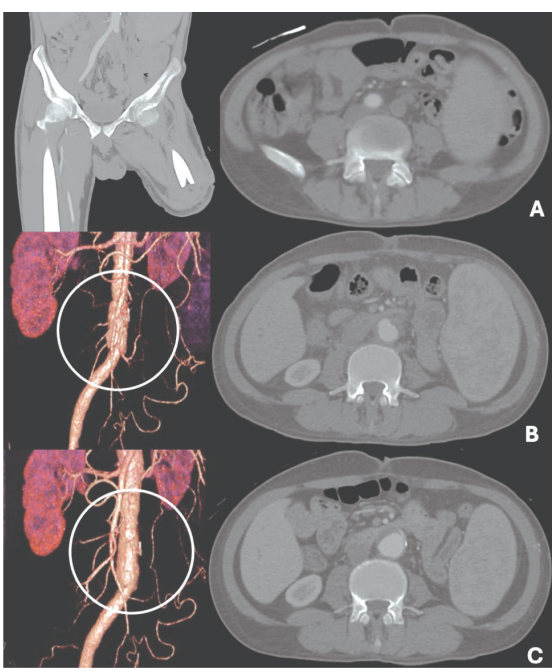

Figure 3 Preoperative CTA showed total occlusion of the left CIA, IIA, and EIA down to the proximal SFA (A). Postoperative CTA after 6 months showed dilatation of the abdominal aorta (B). Postoperative CTA after 36 months showed no progression of the abdominal aorta (C). Lifelong follow-up appointments, including clinical examinations and inflammatory marker tests such as ESR and CRP, were scheduled every 3 months, with a CTA scan at 3 months postoperatively and then every 6 months thereafter.

Discussion

In this case, although the presentation was typical of vascular pythiosis, early diagnosis was challenging because it resembled other soft-tissue infections, leading to a delayed diagnosis. This condition requires a high index of suspicion and is often recognized by vascular surgeons or clinicians familiar with this infection. For early diagnosis of vascular pythiosis, patients often present with a history of an underlying hematologic disease and a progressively worsening chronic wound with black edges, typically affecting the foot and ankle. In late-stage cases, pulses in the lower extremities may become impalpable. As a result, diagnosing this patient took up to 24 months from the initial medical consultation. Another helpful tool for diagnosis is CTA, which often reveals the crusty thrombosed arterial sign. This sign is characterized by diffuse thickening and irregular enhancement of the arterial wall along with long arterial thrombosis, without any skip lesions.[8]

In cases of suprainguinal pythiosis involvement, survival beyond 12 weeks post-diagnosis is rare. According to a literature review, effective management of suprainguinal pythiosis includes a combination of medical treatment and adequate surgical margins, which is associated with the highest likelihood of survival.[6]

In the operative technique, the non-infected common iliac artery was ligated proximally, and a short segment just distal to the arterial stump was sent for microscopic examination to confirm its freedom from pathogens. The arterial stump was then covered with noninfected adjacent tissue to protect it from potential contamination by pathogens.[4] This is similar to the surgery performed in this case. However, we did not send samples for intraoperative microscopic examination to confirm the margins. The surgical results for this case revealed that the pathological report indicated non-free margins of the proximal CIA. Inadequate assessment of the surgical-free margin at the time of surgery can lead to the progression of residual disease involving the proximal artery, such as the aorta, which may result in a poor prognosis.[6] Patients with CIA or aortic involvement who underwent aneurysmectomy with anatomical bypass grafting survived only a few months.[9] In our case, bypass grafting was not performed. Patients with disease involving the iliac vessels or the femoral artery may relapse, despite the negative surgical margin, given that the vessels are in the proximity of the aorta.[7] We recommended extra-anatomical bypass. Nevertheless, the patients in this report remained clinically stable at 36 months post-diagnosis, likely due to the combination of antibacterial and antifungal agents they received. Given its effectiveness, this approach could serve as a promising strategy to combat this life-threatening disease and warrants further study.[7,10]

Diagnosis of vascular pythiosis relies on a combination of clinical suspicion, imaging findings, and confirmatory laboratory tests, as there are no universal guidelines due to its rarity. The disease should be suspected in patients with thalassemia or other hemoglobinopathies who present with chronic nonhealing ulcers or arterial occlusions unresponsive to standard therapy, particularly in endemic areas with water exposure. CTA typically demonstrates long-segment arterial occlusion with concentric mural thickening, perivascular soft tissue infiltration, and absence of calcification. Definitive diagnosis is achieved through histopathologic identification of broad, sparsely septate hyphae using GMS or PAS stains, culture or PCR detection of Pythium insidiosum, and supportive serologic testing such as immunodiffusion or ELISA. Surgical intervention to achieve organism-free margins of affected tissue, in combination with antibacterial and antifungal therapy, immunotherapy, remains the recommended treatment approach.[1,5,8-10]

Due to the lack of established follow-up guidelines, cases of vascular pythiosis at our center involve clinical and laboratory assessments, including monitoring inflammatory markers such as ESR and CRP every 3 months. Additionally, imaging with CTA is performed every 6 months to assess disease progression.

Conclusion

In conclusion, the management of intra-abdominal vascular pythiosis requires a comprehensive approach. This includes optimized medical treatment, which is a combination of antibacterial and antifungal agents and immunotherapy with cytokine injections, as well as aggressive surgical removal of the infected artery. Additionally, continuous patient follow-up using inflammatory markers and imaging, such as CTA, is essential for improving survival outcomes.

Timely diagnosis of vascular pythiosis is essential for optimizing treatment outcomes, and radical surgical resection continues to serve as the cornerstone of effective therapy.

Conflicts of Interest

All authors have no conflicts of interest.

Additional note

Patient consent for publication was obtained.

Author Contributions

Study conception: all authors
Data collection: all authors
Writing: all authors
Critical review and revision: all authors
Final approval of the article: all authors
Accountability for all aspects of the work: all authors

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