Case Report

Septic Gangrene and Thrombophlebitis Following Leech Therapy in a Patient with Undiagnosed Arterial Occlusive Disease: A Case Report

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Abstract

Different side effects have been reported for leech therapy, such as local itching, skin reactions, infection, bleeding disorders, and anemia. The present study described a rare and lethal adverse event following leech therapy.

A 63-year-old man was referred to Nemazee Teaching Hospital (Shiraz, Iran) in December 2020 with a two-week history of progressive right lower extremity swelling, erythema, and ecchymosis. One week before symptom onset, he had undergone leech therapy on the lateral calf and upper thigh of the right lower extremity, administered by a traditional healer. Physical examination revealed gangrene of the right leg and absence of all pulses. Color Doppler sonography of the leg and computed tomography angiography (CTA) of the thoracic aorta to the lower extremities revealed complete thrombosis of all right lower extremity arteries, extending to the right iliac artery and abdominal aorta. With a diagnosis of arterial occlusive disease and septic thrombophlebitis, the patient received intravenous antibiotics and anticoagulant therapy. Due to the inadequacy of medical treatments, a right lower extremity amputation was performed. The patient expired 5 days postoperatively due to septic shock and multiorgan failure.

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Keywords ● Leeching ● Thrombophlebitis ● Infections ● Long term adverse effects ● Mortality

What's Known

- Leech therapy is widely used to treat different diseases, including wounds, hypertension, varicose veins, hemorrhoids, and dermatological diseases.
- Different side effects were reported for leech therapy, such as local itching, skin reactions, infection, bleeding disorders, and anemia.

What's New

- In contrast to general belief, leech therapy might trigger or aggravate coagulation disorders and should be avoided in patients with potential coagulation pathologies.
- Leech therapy should be performed under medical supervision, with monitoring of distal pulses and oxygen saturation, particularly in high-risk patients.

Introduction

The use of complementary and alternative medicine (CAM) has become increasingly prevalent worldwide in recent decades. One of the most popular types of CAM is manual interventions, including acupuncture, venesection, cupping, and leech therapy. Leeches are commonly used to treat various conditions such as wounds, hypertension, varicose veins, hemorrhoids, and dermatologic diseases.[1] Some studies demonstrated promising results for leech therapy in clinical applications, particularly for osteoarthritis.

Leech therapy is primarily recognized for its anticoagulant properties, attributed to bioactive compounds present in leech saliva.[2] This characteristic makes it an effective adjunct treatment in reconstructive microsurgery for managing venous congestion. Institutional studies, including a study by Cornejo and colleagues, reported the clinical efficacy of leech therapy in 87 patients with venous congestion.[3] Additionally, Bhatt and

others documented its successful application in a case of systemic sclerosis complicated by compartment syndrome, underscoring its broader therapeutic value.[4]

Despite its therapeutic benefits, leech therapy has been associated with complications ranging from localized itching, skin reactions, and infections to more significant hematologic manifestations, such as prolonged bleeding, and anemia.[5] However, serious and potentially life-threatening complications remain inadequately documented in the literature. This case report presented a rare case of septic gangrene and thrombophlebitis following leech therapy in a patient with previously undiagnosed arterial occlusive disease, a presentation that challenges the widely accepted anticoagulant properties of leeches. Although the therapeutic efficacy of leech therapy is well-established, discrepancies in reported outcomes and the paucity of literature addressing severe vascular complications highlighted the necessity for further investigation. This case report aimed to contribute to the existing knowledge by describing a novel, life-threatening complication that demanded heightened clinical vigilance.

Case Presentation

A 63-year-old man presented to Nemazee Teaching Hospital (Shiraz, Iran), in December 2020 with a two-week history of right leg and foot swelling, erythema, and ecchymosis. Three weeks before admission, the patient had undergone leech therapy on the lateral side of his right upper thigh due to painful sensations in his right lower extremity. The procedure was performed at home by a traditional healer without administering prophylaxis antibiotics. While the patient could not provide specific details about the leeches used, he reported significant hygiene violations during the procedure, including the potential reuse of leeches for multiple patients. Besides, the type of leeches used (medicinal versus non-medicinal) was not confirmed. Three days after the procedure, the patient developed progressive erythema, pain, swelling, and warmth in the right lower extremity. After 9 days, the swelling was intensified, accompanied by new-onset coldness, numbness, and gangrenous changes in the right foot.

The patient was a heavy smoker (80 pack-year) with concurrent opioid and methadone dependence.

Figure 1: Clinical images show the right lower extremity at initial evaluation. a) Supine view demonstrates the lower extremities b) Lateral view shows the right thigh and the buttock c) Dorsal view shows both feet d) Plantar surfaces are shown. Notable findings included marked erythema, edema, multiple dark erosions, lacerations, abrasions, fixed cutaneous mottling, and cyanosis affecting the right lower extremity.

His medical history included ischemic heart disease, for which he underwent percutaneous coronary intervention with stenting 4 years before admission. No other significant past medical history, medications, family history, or identifiable risk factors for coagulation disorders were reported.

The patient was hemodynamically stable with normal vital signs. The physical examination of the right lower extremity showed marked erythema, edema, and coldness, with multiple dark erosions, lacerations, abrasions, fixed mottling, and cyanosis (figure 1). All peripheral pulses (femoral, popliteal, posterior tibial, and dorsalis pedis) were absent. Complete sensory loss was noted throughout the affected extremity.

The patient underwent evaluation by both an internist and a general surgeon, resulting in hospital admission with a diagnosis of foot gangrene. Diagnostic imaging included color Doppler sonography (CDS) of the arterial and venous systems in both lower extremities along with dedicated soft tissue sonography of the right leg. The CDS revealed complete occlusion of the right femoral artery extending to the popliteal artery by an echogenic material consistent with a thrombus. Distal arterial spectral waveforms were absent due to proximal occlusion. Notably, the contralateral left femoral and popliteal arteries showed abnormal staccato waveforms, with similarly compromised flow observed in both the dorsalis pedis and posterior tibial arteries.

Soft tissue sonography demonstrated evidence of fat inflammation and subcutaneous edema. To evaluate the possibility of thromboembolism, high-resolution computed tomography of the chest was performed, which revealed only chronic findings including mediastinal calcified lymph nodes and evidence of old rib fractures with callus formation. Pelvic and right lower extremity radiographs showed normal osseous structures. Following vascular surgery consultation, computed tomography angiography (CTA) was performed from the aorta through the lower extremities, including pulmonary artery evaluation (figure 2). The CTA revealed extensive thromboembolic disease, with filling defects in both main pulmonary arteries and their distal branches consistent with bilateral pulmonary thromboembolism (PTE). The abdominal aorta showed complete thrombosis extending from the level of the celiac axis and superior mesenteric artery to its distal segment. Additional findings included thrombosis of the distal right renal artery with associated decreased enhancement of the lower pole, suggestive of renal infarction. The right iliac and distal arteries showed no contrast

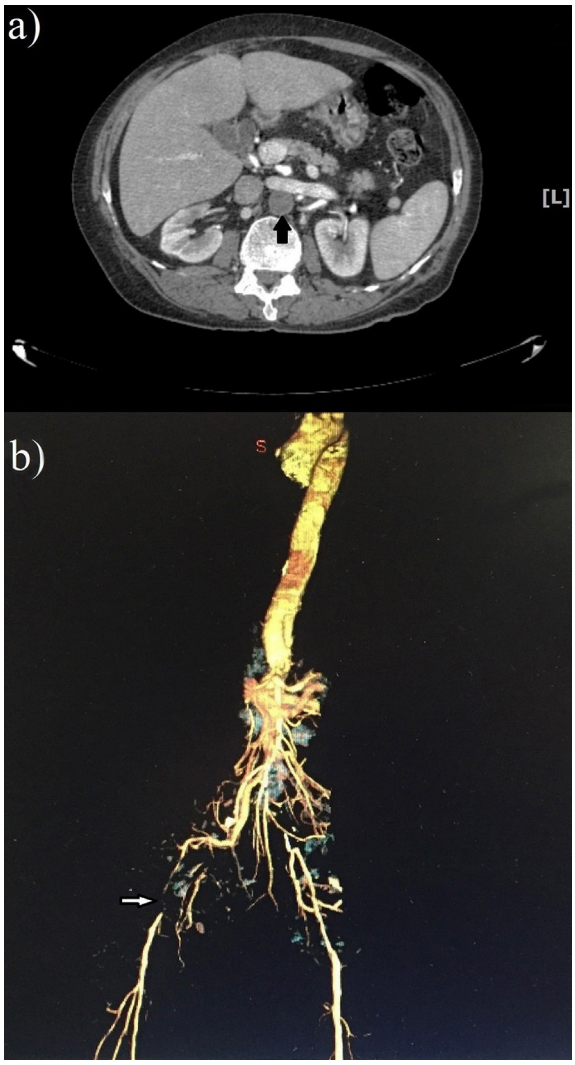

Figure 2: Computed tomography angiography (CTA) demonstrates the aorta through the lower extremities. a) Axial image demonstrates the complete thrombosis of the abdominal aorta (arrow). b) Three-dimensional reconstruction reveals right iliac artery occlusion (arrow).

opacification, with the absence of significant collateral circulation. Several enlarged para-aortic and para-iliac lymph nodes were noted, the largest measuring 11×7 mm.

Initial laboratory evaluation revealed leukocytosis with neutrophilia, elevated creatine phosphokinase (CPK), lactate dehydrogenase (LDH) levels, and decreased hemoglobin consistent with anemia. Additionally, the patient demonstrated elevated blood urea nitrogen (BUN) and creatinine, indicating acute kidney injury. These findings were present on admission.

The patient was initiated on intravenous (IV) antibiotic therapy with ciprofloxacin (Shahid Ghazi Co., Iran) and clindamycin (Alborz Darou Co., Iran), which was subsequently escalated to imipenem (Exir Co., Iran), vancomycin (Exir Co., Iran), and levofloxacin (Shahid Ghazi Co., Iran) during hospitalization. Therapeutic

anticoagulation was administered via continuous IV heparin infusion (1000 units/hour; Alborz Darou Co., Iran). Wound cultures from the right lower extremity demonstrated heavy growth of *Escherichia Coli* with sensitivity to colistin, prompting its addition to the antimicrobial regimen. Following vascular surgery consultation, a right lower extremity amputation was performed on the 14th day of hospitalization. Despite these interventions, the patient died 5 days postoperatively due to septic shock and multiorgan failure.

This case report received approval from the Medical Ethics Committee of Shiraz University of Medical Sciences (code: IR.SUMS.REC.1403.403). In accordance with ethical guidelines, written informed consent was obtained from the patient's son prior to submission of this case report, as the patient was deceased.

Discussion

Hirudotherapy (leech therapy) has been practiced since at least 1500 B.C. and remains a popular complementary and alternative treatment for various medical conditions. Multiple studies demonstrated its therapeutic potential in various diseases, such as inflammatory disorders, cardiovascular diseases, osteoarthritis, and postoperative care, particularly in plastic and reconstructive surgery.[1] While generally safe, common adverse effects include localized itching and skin reactions, likely mediated by allergic responses to leech-derived substances.[6] Less frequent complications comprise infection, bleeding disorders, anemia, and cutaneous pseudolymphoma.[6]

This case report described a rare and life-threatening complication of leech therapy. In the present case, the patient developed septic gangrene and thrombophlebitis 3 days after leech therapy, presenting with symptoms of arterial occlusive disease. This represents a rare condition, as leech therapy is commonly employed for thrombosis treatment due to the thrombin-inhibiting properties of leech saliva, which acts on both cellular and plasma coagulation factors.[7] Hirudin, the primary active compound in leech saliva, exerts potent anticoagulant effects by directly inhibiting thrombin activity. While leech therapy is commonly used for venous congestion, existing literature identified arterial insufficiency as a contraindication. Notably, this case involved a heavy smoker with probable underlying arterial compromise, potentially explaining the treatment's adverse outcome.[8] Leech therapy exacerbated the existing arterial insufficiency in distal organs. The lack of sufficient collateral circulation subsequently resulted in gangrene, and cyanosis, and ultimately necessitated amputation of the right lower extremity. This case suggested that the concurrent presence of arterial insufficiency and infection, both established risk factors for thrombophlebitis, likely contributed to the primary pathogenic mechanism.

While leech saliva has demonstrated therapeutic benefits for thrombophlebitis (including cases affecting the greater saphenous vein) through its anti-inflammatory, bacteriostatic, and anticoagulant properties,[7, 8] the present case represented an unexpected paradoxical complication. The primary causes of thrombophlebitis and venous thromboembolism include infection, arterial insufficiency, vein manipulation or injury, prolonged immobility, and blood-clotting disorders.[8, 9] In this case, septic thrombophlebitis was likely attributable to three factors, including potential use of non-medicinal leech species, repeated use of leeches across multiple patients, and inadequate adherence to procedural or patient hygiene protocols. These factors might have overcome the inherent therapeutic benefits of leech saliva, ultimately leading to the observed complications.

One of the limitations of this report was the inability to culture the leech for contamination analysis, which precluded a definitive establishment of causality between leech therapy and the observed adverse event.

Infection represents a serious and frequently reported complication of leech therapy, with incidence rates ranging from 2.4 to 20%.[10] These findings provided important caution for both practitioners and patients regarding potentially life-threatening complications. Another limitation was the absence of comparable studies to compare the findings of the present study within the existing literature. Therefore, further studies are required to elucidate the precise pathogenesis of post-leech therapy thrombophlebitis.

Conclusion

In this case, a 63-year-old heavy smoker presented to a traditional healer with lower extremity pain and intermittent claudication, symptoms suggestive of arterial occlusive disease. He developed gangrene in the right lower extremity and septic thrombophlebitis 3 days after leech therapy, ultimately requiring right leg amputation and resulting in his death. Notably, contrary to common belief, leech therapy might

initiate or exacerbate coagulation disorders and should be avoided in patients with coagulopathy. Consequently, leech therapy should only be performed under medical supervision following comprehensive history-taking and careful physical examination, including pulse assessment and distal oxygen saturation measurement. This is particularly crucial for high-risk individuals, such as active smokers, and those with diabetes mellitus, hypertension, and hyperlipidemia, all of whom face elevated risks for arterial occlusive diseases or insufficiency.

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Authors' Contribution

M.O: Conceptualism and drafting; A.H: Conceptualism, data gathering, interpretation, and reviewing the manuscript critically; M.H: Conceptualism and drafting; M.M: Data gathering and drafting; M.Sh: Conceptualism, data gathering, interpretation, and reviewing the manuscript critically; All authors have read and approved the final manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Conflict of Interest: None declared.

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