American Journal of Infectious Diseases

Case Report

# A Case Report of Severe Malaria Due to *Plasmodium falciparum* Malaria Complicated by Symmetrical Peripheral Gangrene (SPG) at the Matlaboul Fawzaini National Hospital Center, Touba, Senegal

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*Article history*
Received: 24-06-2025
Revised: 08-12-2025
Accepted: 16-12-2025

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**Abstract:** Malaria remains a major public health problem worldwide, particularly in Africa. Symmetrical Peripheral Gangrene (SPG) is a distal ischemic lesion affecting at least two extremities in the absence of proximal arterial obstruction and vasculitis. It is a rare and severe clinical entity. Its association with malaria is rare, with approximately 27 cases reported worldwide, mostly in Asia. A 15-year-old male student with no known medical history was admitted to the Department of Medicine and Medical Specialties at Matlaboul Fawzaini National Hospital Center in Touba, presenting with a seven-day history of fever, generalized pain, vomiting, and jaundice. The initial clinical examination showed flu-like symptoms, prostration, systemic inflammatory response, hepatomegaly with a soft, regular lower border, non-cholestatic jaundice, anemia, and bilateral acrocyanosis with necrosis of the right foot's last three toes and the left foot's last four toes. Paraclinical investigations showed microcytic anemia at 6.9 mg/dL, a positive thick blood smear with a parasite density of 81,818 p/µL, negative blood cultures, and negative HIV, HBV serologies, and ANCA tests. The diagnosis of severe malaria due to *Plasmodium falciparum* associated with symmetrical peripheral gangrene was confirmed. The patient showed good clinical improvement under injectable artesunate followed by Artemether + Lumefantrine and symptomatic treatment for seven days. Symmetrical Peripheral Gangrene (SPG) is a very rare and severe clinical entity in the context of severe *P. falciparum* malaria. In malaria-endemic areas, it is poorly recognized and often attributed to other more common causes. Prompt management, including correction of tissue hypoperfusion and effective etiological treatment, can improve prognosis.

**Keywords:** Severe Malaria, Gangrene, Peripheral, Symmetrical, Touba, Senegal

## Introduction

Malaria remains a major public health problem worldwide, particularly in Africa. In 2024, the WHO estimated 263 million malaria cases and 597,000 deaths across 83 countries. In 2023, 94% of malaria cases (246 million) and 95% of malaria-related deaths (560,000) were recorded in Africa (United Nations Development Program, 2024).

Severe malaria is defined by the presence of *Plasmodium falciparum, vivax,* or *knowlesi* trophozoites in the blood, associated with at least one clinical and/or

biological severity criterion from the WHO 2015 classification, indicating organ or system failure (Malaria, 2014). Symmetrical Peripheral Gangrene (SPG) is a distal ischemic lesion affecting at least two extremities in the absence of proximal arterial obstruction and vasculitis. It is a very rare and severe clinical entity in the context of severe P. falciparum malaria. In malaria-endemic areas, it is poorly recognized and often attributed to other more common causes (Smaoui *et al.,* 2018; SPILF-Infectiologie, 2025). This syndrome has been associated with bacterial infections, Disseminated Intravascular Coagulation (DIC), shock states, and administration of certain medications such as vasopressin and norepinephrine (Nze Obiang, 2023). Its association with malaria is rare, with approximately 27 cases reported worldwide, mostly in Asia (Diop *et al*., 2023). To our knowledge, only six cases have been reported in Africa, including one in Gabon in a 3-year-old girl and two in Senegal in a 25-year-old woman and a 29-year-old man (Nze Obiang, 2023; Diop *et al*., 2023) We report a fifth-grade student, who did not use a Long-Lasting Insecticide-Treated Mosquito Net (LLIN), with no known medical history or underlying condition.

## *Case Report*

The patient was a 15-year-old male, fifth-grade student, who did not use a long-lasting insecticide-treated mosquito net (LLIN), with no known medical history or underlying conditions. He was admitted to the Internal Medicine and Medical Specialties Department at the Matlaboul Fawzaini National Hospital Center in Touba for fever, prostration, vomiting, and jaundice.

The illness began approximately seven days earlier, presenting with progressively worsening generalized pain, associated with nonspecific abdominal pain and postprandial vomiting, without diarrhea or constipation. Three days later, non-cholestatic jaundice appeared, for which he did not receive any treatment. The condition evolved in a context of fever without chills or sweating, anorexia, and severe asthenia, leading the patient to seek emergency care two days before his transfer.

The initial clinical examination revealed flu-like symptoms, prostration, Systemic Inflammatory Response Syndrome (SIRS) with a qSOFA score of 2, painful hepatomegaly with a soft lower border, clinical anemia, non-cholestatic jaundice, and a WHO grade 3 general condition deterioration. Local and regional examination of the limbs showed bilateral acrocyanosis of both feet, with necrosis of the right foot's last three toes and the left foot's last four toes (Figures 1 and 2), while the pedal pulse remained palpable.

Paraclinical investigations revealed microcytic anemia (hemoglobin 6.9 g/dL, MCV 75.8 fL, MCH 26.5%), leukocytosis (26,600/ mm3; neutrophils 19,800), thrombocytopenia (33,000/ mm3), elevated urea (0.36 g/L) and creatinine (19 mg/L), high CRP (192 mg/L), increased AST (371 IU/L) and ALT (151 IU/L), low total protein (55 g/L) and albumin (21 g/L), 24-hour proteinuria at 660.8 mg, and fasting blood glucose of 0.73 g/L. Blood cultures were negative, while the thick blood smear was positive for P. falciparum with a parasite density of 81,818 p/µL. Negative HIV, HBV serologies, and ANCA tests.

Imaging studies included a normal chest X-ray, an abdominal ultrasound revealing homogeneous hepatomegaly without signs of portal hypertension but with gastric stasis, and a Doppler ultrasound of the lower limbs showing patent arteries with normal flow and no plaques or stenosis.

The diagnosis of severe P. falciparum malaria in its icteric, anemic, and neurological forms, associated with Symmetrical Peripheral Gangrene (SPG), was confirmed. The patient was treated with injectable artesunate (2, 4 mg/kg [108 mg] at H0, H12, H24, H48, and H72), followed by Artemether + Lumefantrine 60/360 mg (1 tablet two times per day for 3 days), transfusion of two blood units (same group and Rh-compatible), perindopril 5 mg (½ tablet daily) on the nephrologist's advice given the elevated creatinine level and empirical antibiotic therapy with amoxicillin-clavulanic acid (1 g IV, three times per day for 7 days) before results of blood cultures.

By the fourth day of treatment, the patient showed marked clinical improvement, with resolution of fever, cessation of vomiting, disappearance of generalized pain, improvement in asthenia, and stabilization of the gangrenous lesions (Figure normalization of the complete blood count and liver transaminases, a decrease in CRP to 16 mg/L, and a negative thick blood smear. The patient was discharged after 12 days of hospitalization 3). By day five, laboratory follow-up showed.

Sources: Archives of the Matlaboul Fawzaini National Hospital Center of Touba

**Fig 1:** Distal gangrene of the right foot's last 3 toes on day 1 of hospitalization

Sources: Archives of the Matlaboul Fawzaini National Hospital Center of Touba

**Fig. 2:** Distal gangrene of the left foot's last 4 toes on day 1 of hospitalization

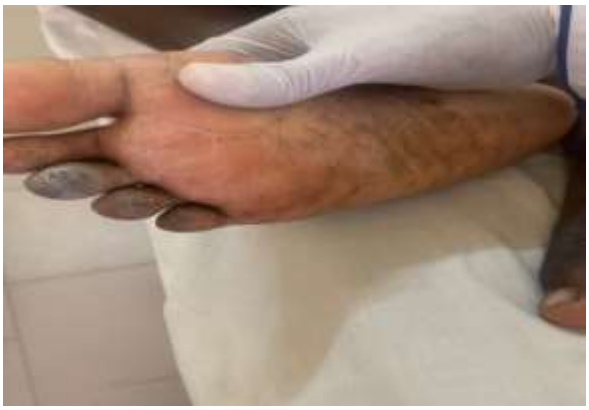

**Fig. 3:** Evolution of distal gangrene of the right foot's last 3 toes after antimalarial treatment on day 8 of hospitalization

## Discussion

Malaria is an endemic infectious disease in about 86 tropical countries worldwide, including 42 African nations (Nze Obiang, 2023; Maiga *et al*., 2016) with Senegal being no exception. Symmetrical peripheral gangrene is a rare but well-documented clinical syndrome, first described by Hutchison in 1891. It is characterized by symmetrical distal ischemic lesions leading to gangrene in two or more sites, in the absence of large vessel obstruction or vasculitis (SPILF-Infectiologie, 2025; Diop *et al*., 2023; Ghosh and Bandyopadhyay, 2011).

A wide range of infectious and non-infectious etiological factors, including sepsis caused by Gram-positive cocci and Gram-negative bacilli, rickettsial infections, Disseminated Intravascular Coagulation (DIC), and low cardiac output states, have been associated with SPG. However, its occurrence as a complication of malaria is rare (Nze Obiang, 2023; Ghosh and Bandyopadhyay, 2011). This rarity may be due to under-recognition in malaria-endemic regions or misattribution to more common causes (Diop *et al*., 2023).

The pathophysiology of SPG remains poorly understood. In *P. falciparum* malaria, microcirculatory disturbances likely result from high parasite density, which triggers cytoadherence of infected erythrocytes to endothelial receptors, activation of the complement system, and coagulation pathways, leading to thrombus formation in peripheral microcirculation and subsequent tissue hypoxia (SPILF-Infectiologie, 2025; Diop *et al*., 2023).

In our case, SPG was limited to the lower limb extremities, with lesion regression under etiological treatment. This contrasts with most reported cases where all four limbs were affected, often leading to amputations. This difference may be explained by the parasite density in our patient, which was not exceedingly high (<100,000 p/μL), unlike in most severe cases.

## Conclusion

This case illustrates a rare presentation of symmetrical peripheral gangrene in a patient with falciparum malaria, a complication infrequently documented in the medical literature. It underscores the importance of considering this complication in the differential diagnosis of patients presenting with symmetrical distal ischemic damage, particularly in regions endemic for *P. falciparum.* Prompt management, including correction of tissue hypoperfusion and effective etiological treatment, can improve prognosis.

## Acknowledgment

We express our gratitude to Professor Ndeye Fatou Ngom for her valuable guidance and insightful remarks in drafting this case report.

We also thank the entire medical and paramedical team of the Internal Medicine and Medical Specialties Department at the Matlaboul Fawzaini National Hospital Center in Touba for their dedicated care and follow-up of this patient throughout hospitalization.

## Funding Information

The authors have no support or funding to report.

## Authors' Contributions

**Jules Yindoni Zande, Ndeye Fatou Ngom, Babacar Ndiaye, Alle Gueye and Ousseynou Ka:** Designed the study.

**Jules Yindoni Zande** and **Ndeye Fatou Ngom:** Collected and wrote the first draft of the case report. Franck Botalema Gelengi and Charles Henri Mbaya did the translation in English. All authors reviewed and commented on the case report and approved the final version.

## Ethics

The study was conducted with the authorization of the head physician of the internal Medicine of Matlaboul Fawzaini National hospital Center, Touba. The data and medical records were handled with strict adherence to medical confidentiality. Furthermore, ethical principles were scrupulously respected throughout. We also obtained informed consent from parents before taking photos to publish the case.

### *Limitations of the Study*

This study has limitations, including its retrospective design and incomplete data caused by limited funding.

### *Competing Interests*

We declare no competing interests.

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