

## CASE REPORT

### SYMMETRIC PERIPHERAL GANGRENE IN A CHILD WITH PLASMODIUM FALCIPARUM MALARIA AND SEPSIS: A CASE REPORT

Hawi Mohammed<sup>1\*</sup>, Menberu Shimels<sup>1</sup>  
<sup>1</sup>Dilla University, Dilla, Ethiopia

\*Corresponding author: mohammedhawi11@gmail.com

#### ABSTRACT

*Symmetric peripheral gangrene is a rare clinical syndrome manifesting with bilateral distal ischemic injury leading to gangrene in the absence of large vessel obstruction or vasculitis. Factors responsible for symmetric peripheral gangrene are many and it usually follows diseases like malaria. We reported a 6 year female child presented with fever, chills and leg swelling and admitted with the diagnosis of severe falciparum malaria, cellulitis and sepsis. On third day, she developed symmetric peripheral gangrene of lower extremities. It needs high index of suspicion to detect symmetric peripheral gangrene early and to offer early prompt treatment of underlying causes.*

**Keywords:** Child, peripheral gangrene, plasmodium falciparum, severe malaria

#### Background

Symmetric peripheral gangrene (SPG) is a rare but devastating syndrome first described by Hutchinson in 1891(1). SPG is defined as symmetrical distal ischemic damage in two or more sites in the absence of a major vascular occlusive disease. It carries a high mortality rate with a high frequency of limb amputations in the survivors(2–4).

The pathogenesis of symmetrical peripheral gangrene is not well understood; but it has been related to variety of infective and non-infective factors that are complicated by disseminated intravascular coagulopathy (DIC)

which is associated in 85% of cases of SPG. As it is described by many case reports; sepsis and rarely, severe plasmodium falciparum (in one case report P. vivax) malaria are the infections associated with symmetrical peripheral gangrene; low output states, vasospastic conditions, myeloproliferative disorders and hyperviscosity syndrome may also contribute(2,4–7).

No specific treatment has been shown to consistently prevent progression or to reverse the gangrene(4) but early aggressive and prompt treatment of underlying etiologies (as in our patient) may limit the severity of SPG and decrease its sequela.

**Citation :** Mohammed H., Shimels M., Symmetric peripheral gangrene in a child with plasmodium falciparum malaria and sepsis: a case report. *Ethiop J Pediatr Child Health.* 2023;18 (1):83-87

**Submission date:** 6 December 2022 **Accepted:** 23 March 2023 **Published:** 31 July 2023

## Case presentation

A 6 year old female child came from Kochore woreda, Gedeo zone, SNNPR, Ethiopia where malarial illness is common, with complaint of high grade fever and chills of 5 days. Two days later, she developed pain and swelling of toes and feet bilaterally. There was no history of bleeding, trauma, exposure to drugs/herbal medicines or cardiac illness. She has no known allergy. She usually wears shoes. She was tachypneic (32BPM), febrile (38.5°C). Pulse rate was 100beats/minute and BP was 100/70mmHg. RDT for plasmodium falciparum was positive and blood film showed that no hemo-parasite was seen. Complete blood count (CBC) revealed a white blood cell (WBC) of  $23 \times 10^3$  cells/dl with  $15.44 \times 10^3$  cells/dl of neutrophils, platelets of  $27 \times 10^3$ /dl and hematocrit of 29.1% and ESR was 22mm/hr.

She was admitted to ward with the diagnosis of malaria with bicytopenia (anemia and thrombocytopenia) + sepsis + cellulitis and treated with

IV antimalarials and antibiotics. On next day, lower legs, feet and toes became bluish (figure 1); dorsalis pedis and posterior tibialis were palpable with full volume. On 3rd day, lower 1/3rd of legs, feet and toes became darker with clear boundary (figure 2A and 2B). Doppler study was normal. Coagulation profile and blood culture were not done due to financial constraint. With the consideration of symmetric peripheral gangrene, above managements were continued.

On subsequent days, lower legs, feet and toes became darker and showed gangrenous features bilaterally (figure 2A and 2B). General condition of the child improved, and WBC of  $16.52 \times 10^3$  cell/dl, PLT of  $113 \times 10^3$  /dl and HCT of 25.1%. Orthopedics side evaluated her and planned to see her on follow-up dates. After 3 weeks of stay, she was discharged with appointment; unfortunately her parents failed to bring her on follow date and on phone communication, she was fine and doing well.



Figure 1. Bluish and darkish discoloration of skin seen on 2nd day of presentation.



Figure 2. Gangrene of lower legs, feet and toes seen on 4th day of admission (A and B).

### Discussion

Symmetrical peripheral gangrene (SPG) is a well- documented and rare clinical condition usually associated with symmetric distal ischemic damage of two or more sites leading to gangrene(1,2,6). Many reported cases resulted in different forms of disabling outcomes, with many requiring differing degrees of amputation. It is usually unexpected and comes up suddenly with significant psychological impact on the family(5,8). Like our patient, many of the cases of SPG reported are due to several different systemic illnesses, including malaria and sepsis.

The incidence of symmetric peripheral gangrene is unknown. Patients of any age group can be affected(6,8). A 1 month old young infant in Nigeria initially admitted with sepsis and he was treated with antibiotics and dopamine, he developed gangrene of distal part of all extremities(9). Another 9 month old infant in Nigeria presented with fever of 2days and

admitted and managed for severe malaria and sepsis; he developed peripheral gangrene 24hours after admission (5). Another case of 63 year old woman initially diagnosed with severe malaria and hypotension; on subsequent days she developed symmetric gangrene of the extremities(10).

Cyanosis and pallor of the distal parts of the extremities are typically the first signs of the disease, symmetrically involving the upper and/or lower extremities (like our patient) and gangrene ensues in subsequent days(3).

Unlike our patient, amputation or auto-amputation is a common complication of SPG, seen in 80% of survivors. Generally causes of SPG include heart failure, hypovolemic or septic shock, sickle cell disease, malignancies, drugs (adrenaline, noradrenaline, dopamine) and infections(5). Most of the cases of SPG arising as complications of malaria is due to *plasmodium falciparum*(3).

No specific treatment consistently halts SPG. Treating the underlying cause and DIC is of very important. Various modalities include aggressive management with antibiotics, anti-malarials; if necessary, use of anticoagulants like aspirin, coagulation factors or fluid replacement, plasmapheresis; and IV immunoglobulins with varying success. Amputation is delayed until a clear line of demarcation, followed by rehabilitation with physiotherapy(1).

### Conclusions

Symmetrical peripheral gangrene is a rare but highly disabling complication of many common clinical conditions that may result in varying degree of morbidity and permanent limb disability. Early detection, prompt and appropriate treatment of acute infections and underlying problems is mandatory.

**Limitations:** Screenings tests for cardiovascular, rheumatologic and hematologic diseases were not done due to unavailability of tests in our hospital and/or financial constraints. Final outcome of this patient was not known even though she was discharged with significant improvement.

**Abbreviations:** Activated Partial Thromboplastin Time (APTT); Complete Blood Count (CBC); Hematocrit (HCT); Platelets (PLT); Prothrombin Time (PT); Symmetric Peripheral Gangrene (SPG); White Blood Cells (WBC)

### Declarations

**Ethical clearance and consent for participation:** Informed written consent was obtained from her parents (both father and mother).

The study was conducted in accordance with the Declaration of Helsinki and adhered to Good **Clinical Practice guidelines**. Confidentiality of the information was maintained by excluding names and other personal or social identifications in the case report.

**Consent for publication:** Written consent for publication was taken from parents.

**Availability of data and materials:** All materials and data are available from the corresponding author without any restriction.

**Competing interest:** Authors declare that they have no competing interests.

**Funding:** None.

**Authors' contribution:** HM participated in the management of this patient, propose the concept, review case reports, and prepare the case report. MS participated in the management of this patient and collect the case summary. The author(s) read and approved the final case report.

**Acknowledgement:** We would like to thank child's parents for their willingness to share this case. We are also grateful towards doctors and nurses in Pediatrics ward for their unreserved care and close follow-up of this case during her stay in the ward.

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