

Case Report

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Plasmodium Falciparum Malaria and Concomitant High-Risk Pulmonary Thromboembolism: Case Report

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SUMMARY

The authors describe a case of a patient admitted due to a previous condition of osteomyoarthritis, headache, fever, malaise, which worsened with sudden onset dyspnea, chest pain, syncope, the plasmodium test was positive, the EKG performed at the Emergency department presented the classic pattern of acute cor pulmonale (S1Q3T3). The echocardiogram demonstrated changes compatible with pulmonary thromboembolism. Chest X-ray showed an increase in the cardiothoracic index and dilation of the right pulmonary artery (Fleischner's sign). Computed angiotomography (angioCT) of the chest confirmed the diagnosis, showing the presence of thrombi in the main, segmental and subsegmental branches. The patient underwent fibrinolytic therapy and progressed favorably.

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Introduction

Malaria is endemic in most of the tropics; ongoing transmission occurs in 84 countries and territories. The World Health Organization (WHO) reported 247 million cases and 619,000 deaths from malaria in 2021. Africa carries a disproportionate high share of the global malaria burden, accounting for 95% of cases and 96% of deaths and was largely due to *Plasmodium falciparum* [1]. It has long been known that malaria causes activation of the coagulation cascade and results in disseminated intravascular coagulation (DIC). Hypercoagulable complications of malaria often manifest in the microvasculature. However, several cases of malaria resulting in symmetric peripheral gangrene and intracranial venous thrombosis have been reported [2,3, 4-6]. Two cases were described, one of massive venous thromboembolism due to *plasmodium falciparum* infection associated with disseminated intravascular coagulation and the second of thromboembolism due to *plasmodium vivax* attributed to hypercoagulable changes in malaria [7,8]. This case is one of the rare cases to document an association of pulmonary embolism and *plasmodium falciparum* malaria, which had a favorable outcome.

Case Report

40 years old female patient, with no history of recent surgery or trauma, nor personal or family history of chronic illness. Brought to the Emergency department due to osteomyoarthritis, headache, fever, malaise, worsening of symptoms 24 hours before with sudden onset of dyspnea, chest pain and syncope.

Objectively drowsy, Glasgow coma scale (GCS) 13 points (O3V4M6), hypotensive (81/53 mmHg), MAP 62 mmHg, HR 115 pm, RR 34 bpm, oxygen saturation 82% without oxygen, improving to 97 with a 40% Venturi mask; pulmonary auscultation without adventitious sounds and on cardiac auscultation with rhythmic, tachycardic sounds. The lower limbs did not show twin impasto or Hommans sign.

Analytically, D-Dimers 6.254 ng/ml (< 500ng/ml), Troponin I 0.08 ng/ml (< 0.01 ng/ml) and ProBNP 911 pg/ml (< 200 pg/ml) stand out. In the remaining tests, 1.000/uL of *plasmodium falciparum* trophozoites, platelets 110x10⁹ cells/uL, haemoglobin 10.2 g/dl, normal white blood cell count, TGO 129 U/L (), TGP 118 U/L, total bilirubin 1.0 g/dl, urea 38 mg/dl, creatinine 1.1 mg/dl. Blood gas analysis pH 7.44, pCO₂ 28 mmHg, pO₂ 68 mmHg (P/F= 113), HCO₃ 18 mmol/L, BE -5.4 mmol/L, Lactate 2.5 mmol/L.

The chest X-ray showed an increase in the cardiothoracic index and dilation of the right pulmonary artery - Fleischner's sign (Figure 1). Electrocardiogram showed sinus tachycardia and the classic S1Q3T3 pattern (Figure 2). A summary transthoracic echocardiogram (EcoTT) was performed, which demonstrated significant enlargement of the right ventricle, paradoxical movement of the interventricular septum, left ventricle with preserved systolic function (Figure 3). Angio-CT of the chest that documented thrombi in the main, segmental and subsegmental branches of the right and left pulmonary arteries.

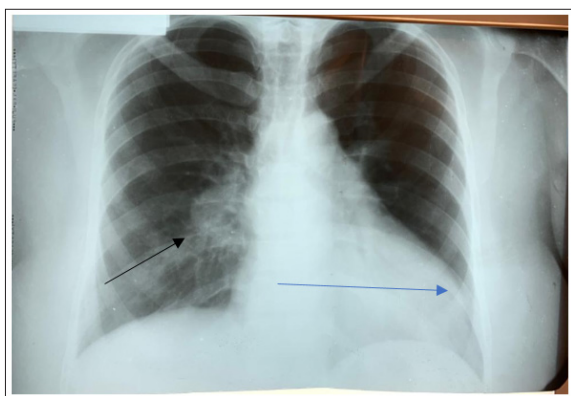


Figure 1: Cardiothoracic index (blue arrow) and dilation of the right pulmonary artery - Fleischner's sign (black arrow).

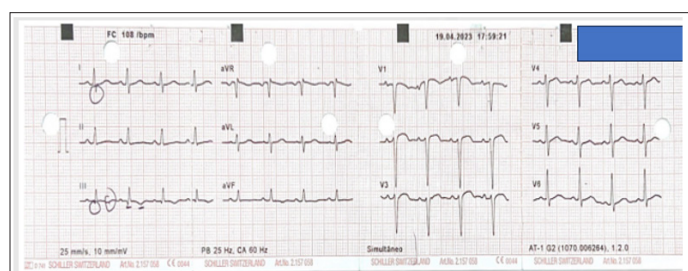


Figure 2: Electrocardiogram that showed sinus tachycardia and S1Q3T3 pattern

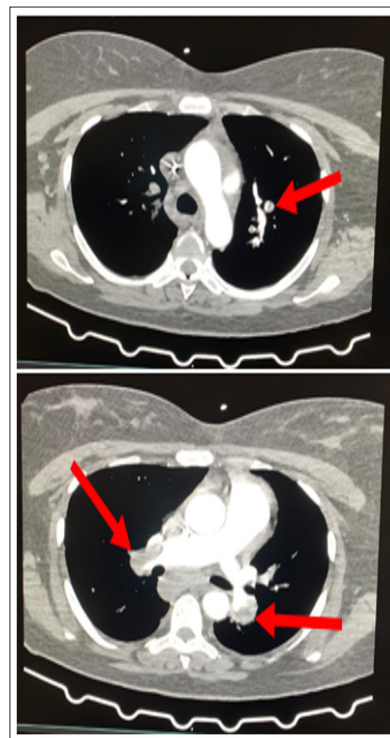


Figure 4: Chest angiotomography shows in the main, segmental and subsegmental branches of the right and left pulmonary arteries

As it was a high-risk pulmonary thromboembolism (PTE) and the patient had no evidence of contraindication for fibrinolysis, she began a fibrinolytic therapy protocol with alteplase (10 mg bolus and 90 mg infusion over 2 hours), aminergic support with norepinephrine and artesunate intravenous for the treatment of severe malaria at a dose of 2.4 mg/kg, on the third day it was replaced by artemether / lumefantrine orally for three days. Because of the potential for bleeding, anticoagulation with unfractionated heparin was started. initial bolus of 80 IU/kg IV, followed by an initial infusion of 18 IU/kg, it was decided to initially associate warfarin at 5 mg/day.

Aminergic support being suspended after 24 hours and oxygen therapy support after 72 hours. During hospitalization, a venous ultrasound with Doppler of the lower limbs was performed, which showed no changes. There were no complications during hospitalization, particularly episodes of bleeding. On the fifth day, she was transferred from the intensive care unit to the Pulmonology Ward and was discharged after 11 days, referred for evaluation in a pulmonology and cardiology consultation.

Discussion

Malaria remains a highly prevalent disease in more than 84 countries and responsible for at least 1 million deaths each year. Around 95% of cases were recorded in Africa, largely due to infection with plasmodium falciparum [9]. There are five species that cause disease in humans, namely plasmodium falciparum, plasmodium vivax, plasmodium ovale, plasmodium malariae and plasmodium knowlesi [7]. Severe malaria is usually caused by plasmodium falciparum, however, severe malaria and even deaths can occur in patients infected with plasmodium vivax [3,10]. Severe manifestations described include changes in consciousness, generalized convulsions, metabolic acidosis, liver dysfunction, hypoglycemia, renal dysfunction, respiratory distress, disseminated intravascular coagulation, severe anemia, shock and death [8].



Figure 3: Transthoracic echocardiography shows dilation of the right ventricle and paradoxical movement of the interventricular septum

Hypercoagulable complications of malaria often manifest in the microvasculature. Some cases of malaria retinopathy and several cases of plasmodium falciparum and vivax malaria resulting in symmetric peripheral gangrene, purpura fulminans [2,3] and cerebral venous thrombosis [2,3,4-6] have been described.

Two cases were described in the literature, one of massive venous thromboembolism due to plasmodium falciparum infection associated with disseminated intravascular coagulation, in which the patient had a poor outcome, the second pulmonary thromboembolism due to plasmodium vivax attributed to hypercoagulable changes in malaria, with favorable evolution of the patient [7,8]. In our case, we believe that plasmodium falciparum infection was the basis for the activation of the coagulation cascade, resulting in high-risk PTE (presence of hemodynamic instability), without evidence of DIC in a patient without identified risk factors for hypercoagulability [9,10].

Conclusion

The concomitant existence of plasmodium falciparum malaria and PTE is a condition rarely described in the literature [11-16]. The hypercoagulable changes of malaria may be implicated in the genesis of PTE, therefore doctors who treat patients with malaria should always suspect this life-threatening complication, investigate and initiate treatment early.

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