# CASE REPORT

# ACUTE RESPIRATORY DISTRESS SYNDROME IN *PLASMODIUM FALCIPARUM* MALARIA

Emel Eryüksel[1], Derya Gün[1], Zekaver Odabaşi[2], Sait Karakurt[1] and Turgay Çelikel[1]

[1]Pulmonary and Critical Care, [2]Department of Infectious Disease,
Marmara University Hospital, Istanbul, Turkey

**Abstract.** Acute respiratory distress syndrome (ARDS) as a complication of malaria infection is rare but with a very high mortality rate. We report the case of a patient who developed high fever, then respiratory distress during a trip to Haiti who was admitted to our hospital and diagnosed with malaria. During recovery the patient developed ARDS in the hospital.

## INTRODUCTION

Malaria is a parasitic infection mostly seen in tropical regions. Complications and death are more frequent when *Plasmodium falciparum* is the cause. Acute respiratory distress syndrome (ARDS) is a rarely seen complication with malaria infection with a high mortality rate.

We present here a patient who developed high fever during travel to Haiti and was admitted to our hospital with dyspnea. He was diagnosed with malaria and developed ARDS in the hospital.

## CASE REPORT

A 48 year old Turkish male was admitted to our intensive care unit with fever and dyspnea. The patient had been in Haiti for 2 months and developed fever, vomiting and diarrhea 1 week prior to admission to the hospital. He received no malaria prophylaxis before traveling to Haiti. When the severity of his symptoms increased with time, he decided to return to Turkey. After arrival in Turkey, he was admitted to the hospital. On admission he was conscious, oriented and cooperative. He had dyspnea and tachypnea (40/minuites), a pulse rate of 110 bpm with regular rhythm, the blood pressure was 160/80 mmHg, the oxygen saturation was 88% on room air and he had a temperature of 36.8ºC. During initial hospitalization the maximum body temperature was 39ºC and he had shaking chills. A thick blood smear revealed *P. falciparum* trophozoites. The parasite count was 960/µl. After diagnosis, because there is no parenteral antimalarial drug available in our country, oral quinine 300 mg 3 times a day and doxycycline 100 mg twice a day were initiated. The patient subsequently developed hypoxemia and was intubated and moved to the intensive care unit.

The laboratory findings of the patient are summarized in Table 1. His lung and cardiac sounds were normal. The liver was

Correspondence: Dr Emel Eryüksel, Marmara Universitesi Tip Fakultesi, Gogus Hastaliklari ve Yogun Bakim A.B.D., Tophanelioglu Cad. Altunizade / Istanbul, Turkey.
Tel: +90 216 327 10 10; Fax: +90 216 428 03 35
E-mail: emeleryuksel@yahoo.com

Table 1
Laboratory findings of the patient on admission.

| | |
|---|---|
| WBC ($mm^3$) | 9,100 |
| Hemoglobin (g/dl) | 9.3 |
| Platelet ($mm^3$) | 42,000 |
| Glucose (mg/dl) | 154 |
| BUN (mg/dl) | 42 |
| Creatinin ( mg/dl) | 1.19 |
| AST (U/l) | 74 |
| ALT (U/l) | 28 |
| ALP (Ul) | 201 |
| GGT (U/l) | 49 |
| LDH (U/l) | 1,425 |
| Sodium (mEq/l) | 137 |
| Potasium (mEq/l) | 3.39 |

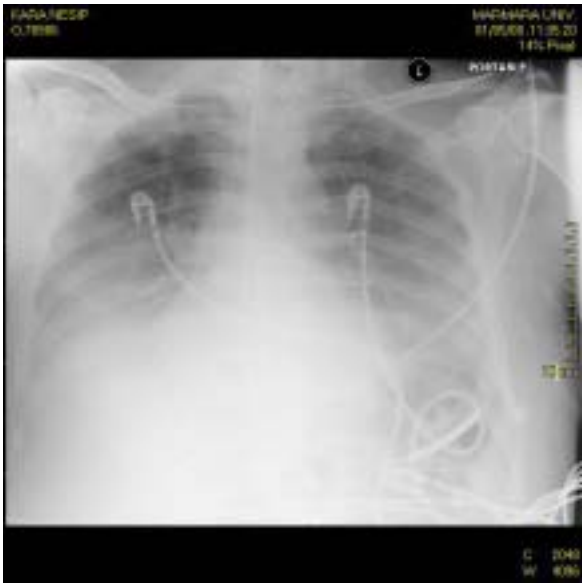

Fig 1–Chest x-ray of malaria patient with ARDS.

palpable at the costal margin. The rest of the examination was unremarkable. His $PaO_2$ on the ventilator was <200 mmHg. An echocardiogram was normal. A central venous catheter was not inserted due to thrombocytopenia. There were bilateral infiltrations on chest x-ray (Fig 1).

The patient was diagnosed as having ARDS. Mechanical ventilation with a low tidal volume and a high positive end-expiratory pressure with heavy sedation was carried out. In the ICU fever rose to 40ºC and, then hypotension developed. Having been intubated for 5 day, a possible diagnosis of ventilator associated pneumonia was made and meropenem 2 g 3 times a day IV and amikacin 1 g daily IV were initiated. Samples of thin and thick blood films taken during the febrile periods revealed no parasites. On the eighth day in the ICU he needed an $FiO_2$ of less than 50% to give adequate oxygenation. On day 12 of his ICU stay, *Acinetobacter* at a concentration of 1,000,000 cfu/ml was grown from a deep tracheal aspirate sample. The patient was extubated on day 15 and discharged from the hospital on day 22.

## DISCUSSION

Malaria is a parasitic infection mostly seen in tropical regions. Each year approximately 1 million people die due to malaria infection throughout the world (Rowe *et al*, 2006). With increasing traveling and immigration of people from endemic areas, malaria has become a global health problem. Its incidence has started to increase in regions where the parasite had previously been eradicated (Maitland *et al*, 2003). In Turkey, according to a report of the Ministry of Health, the incidence decreased from 14.7/100,000 to 0.5/100,000 between 2002 and 2007. Forty-five out of 313 cases were reported in travelers to endemic regions; in 29 of these cases, the causative agent was *P. falciparum*. Our case was infected in an endemic region of Haiti. Travel history to a high risk location is important and can lead the diagnostic work up for malaria.

Complications and death due to malaria

are more frequent with *P. falciparum*. In our case, *P. falciparum* was the causative agent of malaria.

ARDS is an uncommon complication in malaria infection but carries a high mortality rate (Mohan *et al*, 2008). There is no precise data regarding the prevalence of ARDS during malaria infection. However, it is predicted that nearly 20-30% of malaria patients admitted to the ICU develop ARDS (Taylor *et al*, 2006).

Autopsy of patients who died from respiratory failure associated with malaria reveal lung edema, thickening of pulmonary capillary and alveolar septae, intraalveolar hemorrhages and hyaline membrane formation (James *et al*, 1985). This process starts with sequestration of parasitized erythrocytes in tissue capillaries. Erythrocyte products and parasites trigger inflammation. The release of pro- and anti-inflammatory cytokines increases alveolar permeability and causes ARDS (Day *et al*, 1999).

The clinical findings of ARDS in malaria are suddenly developing tachypnea, dyspnea and cough. Life threatening hypoxemia may develop within a few hours (Wheeler *et al*, 2007). Our case developed this clinical picture and needed mechanical ventilation soon after the occurrence of respiratory symptoms. Acute renal failure, hypoglycemia, metabolic acidosis, DIC and bacterial sepsis may accompany ARDS.

Early initiation of treatment in severe and complicated malaria is vitally important and life saving. Currently, there are two groups of drugs used in the parenteral treatment of severe malaria: cinchona alkaloids (quinine and quinidine) and artemisinin derivatives (artesunate, artemeter) (Lalloo *et al*, 2007). In our case, parenteral antimalarial drugs are not available in our country, so quinine and doxycycline were administered per the recommended guidelines.

For respiratory support, the patient was intubated and mechanically ventilated with a low tidal volume as recommended by the ARDS Net study (ARDSNetwork, 2000).

The data regarding survival of malaria patients, who develop ARDS and are treated in the ICU, is limited. Mortality is high even if adequate treatment is given. It has been reported that mortality may reach 80% in ARDS associated with falciparum malaria (Taylor *et al*, 2006).

Lung involvement may develop during the clinical course of malaria. The most frequently seen presentations are noncardiogenic pulmonary edema and ARDS. Malaria sould be considered as an etiologic factor for ARDS in patients with a history of living in or travelling to malaria endemic regions and without any other explanation for ARDS. Proper treatment and follow-up in the ICU may decrease mortality.

## REFERENCES

Day NP, Hien TT, Schollaardt T, *et al*. The prognostic and pathophysiologic role of pro- and antiinflammatory cytokines in severe malaria. *J Infect Dis* 1999;1 80: 1288-97.

James MF. Pulmonary damage associated with falciparum malaria: a report of ten cases. *Ann Trop Med Parasitol* 1985; 79: 123-38.

Lalloo DG, Shingadia D, Pasvol G, *et al*. Advisory Committee on Malaria Prevention in UK Travellers. UK malaria treatment guidelines. *J Infect* 2007; 54: 111-21.

Maitland K, Bejon P, Newton CR. Malaria. *Curr Opin Infect Dis* 2003; 16: 389-95.

Mohan A, Sharma SK, Bollineni S. Acute lung injury and acute respiratory distress syndrome in malaria [Review]. *J Vector Borne Dis* 2008; 45: 179-93.

Rowe AK, Rowe SY, Snow RW, *et al*. The burden of malaria mortality among African children in the year 2000. *Int J Epidemiol* 2006; 35: 691-704.

Taylor WR, Cañon V, White NJ. Pulmonary manifestations of malaria: recognition and management. *Treat Respir Med* 2006; 5: 419-28.

The Acute Respiratory Distress Syndrome Network (ARDS Network). Ventilation with lower tidal volumes as compared with traditional tidal volumes for acute lung injury and the acute respiratory distress syndrome. *N Engl J Med* 2000; 342: 1301-8.

Wheeler AP, Bernard GR. Acute lung injury and the acute respiratory distress syndrome: a clinical review. *Lancet* 2007; 369: 1553-64.