

Case Report

Judgment value of dynamic observation of the level of C-reactive protein and procalcitonin for malaria curative effect

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Abstract: Aim: This study aimed to investigate the judgment indicator for the malaria curative effect. Methods: C-reactive protein (CRP) and procalcitonin (PCT) of a patient with malaria recrudescence before and after the recrudescence treatment were dynamically observed. Results: The patient was clinically cured after the initial treatment, but CRP and PCT failed to return to normal. The patient suffered from the malaria recrudescence after one month and CRP and PCT rapidly returned to normal again after the treatment, with the patient no longer having symptoms of malaria. Conclusion: If CRP and PCT fail to return to normal after the treatment of malaria, this indicates that the patient may suffer from malaria recrudescence.

Keywords: Malaria, procalcitonin, C-reactive protein, recrudescence, curative effect

Introduction

C-reactive protein (CRP) and procalcitonin (PCT) have been widely applied as inflammatory markers in diagnosing and monitoring infectious diseases in clinic [1-3]. With the development of tourism and increase in labor service export, imported malaria cases have constantly increased. It has been reported in the literature that CRP and PCT levels of malaria patients, especially falciparum malaria patients, can significantly increase [4-6], and studies have reported that CRP and PCT levels are correlated with malaria severity [7-9]. Through dynamic observation of the CRP and PCT levels of a patient with falciparum malaria recrudescence, it was found that CRP and PCT levels have value in judging the curative effect of malaria and the occurrence of recrudescence. The report is as follows.

Case presentation

The patient was a 45-year-old male. This patient went to Mozambique in Africa for labor service in June 2016, was diagnosed with malaria due to fever, and was hospitalized in a local institute in July 2016. The patient was in a coma for

four days during the hospitalization. Considering that it might be cerebral malaria, the patient received anti-malaria treatment, and the body temperature returned to normal after symptomatic treatment (the specific treatment scheme is unknown). After being discharged from hospital and returning home from abroad, the patient continued to have normal body temperature, ordinary vigor and normal appetite, and had no dizziness. Then, the patient made a return visit to the hospital on August 16, 2016, and a blood routine examination was performed. The results showed that: hemoglobin (Hb) was 84 g/L, white blood cell (WBC) count was $5.22 \times 10^9/L$, and blood platelet (platelet count) was $162 \times 10^9/L$. However, plasmodium was not found on the thick blood smear. Furthermore, PCT was 0.89 ng/ml and CRP was 43.60 mg/L, suggesting regular follow-ups. The patient suffered from high fever again, which was accompanied by mild intolerance of cold and chill in the case of no obvious inducement on September 25, 2016. Hence, the patient visited a doctor in the Internal Medicine Department. Considering that it may be upper respiratory infection, symptomatic treatment was given, but the fever did not improve, and the

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Table 1. Changes of PCT, CRP and platelet count index before and after the treatment

Time	PCT (ng/ml)	CRP (mg/L)	Platelet count ($\times 10^9/L$)
Before the treatment	19.21	96.10	28
4 days after the treatment	1.25	9.44	68
10 days after the treatment	0.17	2.50	106
37 days after the treatment	0.04	1.75	126

patient suffered from the light headache and vomiting. The patient saw a doctor in the Infections Department on September 30, 2016, and the plasmodium falciparum was found through a blood smear test. Considering that it may be malaria recrudescence, hospitalization was given. The patient continued to have a normal body temperature, ordinary vigor and normal appetite, and could live normally for one month before the hospitalization. Routine blood examination on admission day (September 30, 2016) revealed an Hb of 96 g/L, a WBC count of $4.02 \times 10^9/L$, and platelet count of $28 \times 10^9/L$. Furthermore, PCT was 19.21 ng/ml and CRP was 96.10 mg/L. The patient took anti-malaria treatment through the intravenous drip of artesunate, but did not receive antibiotics. The body temperature of the patient returned to normal after two days. During the October 4, 2016 reexamination: PCT was 1.25 ng/ml, CRP was 9.44 mg/L, and platelet count was $68 \times 10^9/L$. During the reexamination (October 10, 2016) before discharge after the end of the course of anti-malaria treatment: PCT was 0.17 ng/ml, CRP was 2.50 mg/L, and platelet count was $10^6 \times 10^9/L$. The patient had normal body temperature and normal vigor and appetite after discharge. During the December 6, 2016 Outpatient follow-up: PCT was 0.04 ng/ml, CRP was 1.75 mg/L, and the platelet count was $126 \times 10^9/L$ (Table 1). The patient has not suffered from fever to date (October 2018) since the follow-up visit.

Discussion

Criterion of malaria cure [10]: After the malaria patient took the formal anti-malaria treatment, the patient's body temperature returned to normal, the clinical symptoms improved, the plasmodium was negative for two consecutive blood smear tests, and Hb and blood Platelet count increased again. The patient suffered from malaria in Mozambique, and continued to

have normal body temperature, normal vigor and appetite, and had no dizziness and headache after treatment. After returning home from abroad, the patient's blood platelet count returned to normal upon blood routine examination and plasmodium was not found on the blood smear. Hence, it could be considered that the patient was cured. However, CRP and PCT failed to return to normal,

the patient suffered from fever within two months after the first onset, and plasmodium falciparum was found on the blood smear. Considering that it could have been malaria recrudescence, the patient was hospitalized. After formal anti-malaria treatment, the patient's body temperature returned to be normal, blood platelet count increased again, CRP and PCT returned to normal, and the patient no longer suffered from fever in recent two years of follow-up visit. If CRP and PCT obviously increased during the period of the malaria attack and decline sharply during the reexamination at 2-3 days after the anti-malaria treatment, it would indicate that the anti-malaria treatment was effective. If CRP and PCT return to normal upon reexamination after the course of treatment, would indicate that the malaria was completely cured. If CRP and PCT fail to return to normal, even though the patient's body temperature was normal and the vigor and appetite returned to normal, this still would indicate that the patient suffered from malaria recrudescence.

Disclosure of conflict of interest

None.

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