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A Case Report of Severe Scrub Typhus with Unexplained Multiple Organ Dysfunction and Literature Review

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Abstract: Objective: To explore the difficulties in the early diagnosis, clinical features and treatment strategies of severe scrub typhus, and to enhance clinicians' understanding of multiple organ dysfunction (MODS) caused by it. Methods: A retrospective analysis was conducted on the data of one case that presented with high fever, shock, acute respiratory distress syndrome (ARDS), acute kidney injury (AKI), abnormal liver function and was eventually diagnosed with severe scrub typhus, and the relevant literature was reviewed. Results: The patient was an elderly male who was admitted to the Department of Respiratory Medicine due to "fever and cough for 5 days". Upon admission, the patient was in critical condition and rapidly progressed to septic shock, ARDS (requiring invasive mechanical ventilation), AKI, liver injury, and coagulation dysfunction, and was transferred to the ICU 2 days after admission. Early empirical broad-spectrum antibacterial treatment was ineffective, and a black eschar was found in the right thoracolumbar area during a detailed re-examination. The patient denied travel history, fieldwork, outdoor activities, etc. As the patient lived alone and his family members were unable to provide more medical history, there was a high suspicion of scrub typhus based on the characteristic black eschae on the skin at the time. Metagenomic sequencing of bronchoalveolar lavage fluid (BALF mNGS) suggested that scrub typhus was in the middle of the body, and the antibiotic was changed to doxycycline before reporting. After 48 hours, the patient's body temperature began to drop, hemodynamics gradually stabilized, organ function gradually recovered, and he was discharged after 14 days. Conclusion: Severe scrub typhus can lead to MODS and progress to life-threatening MOF, and eschar is a key clue for early diagnosis. For patients with severe infections of unknown cause, a very detailed and comprehensive skin examination should be performed, regardless of whether there is a clear epidemiological history or not. Early application of treatments such as doxycycline is key to improving prognosis.

Keywords: Scrub Typhus; Multiple Organ Failure; Eschar; Bronchoalveolar Lavage Fluid Metagenomic Sequencing (BALF mNGS); Doxycycline.

1. Case Data

1. Chief complaint and present history:

The patient, an elderly male, was admitted to the hospital on June 4, 2025, due to "fever and cough for 5 days". 5 days ago, the patient developed high fever without obvious cause, with a peak temperature of 39 ° C, accompanied by cough, expectoration, expectoration of yellowish-white thick phlegm, fatigue, anoreaxia, and visited the outpatient and emergency department. The patient was given oseltamivir for 5 days and cefacfacol for 3 days. The patient still has recurrent fever. Emergency department [2025-06-04] rapid CRP^ blood routine 5 categories: Rapid C-reactive protein 156.75mg/L, white blood cell count 14.67×*10^9/L, hemoglobin concentration 150g/L, platelet count 79×*10^9/L; Chest CT showed "multiple infection foci in both lungs", and the patient was admitted to the Department of Respiratory Medicine for treatment.

2. Previous medical history:

Deny a history of chronic diseases such as hypertension, coronary heart disease, and diabetes; Deny a history of infectious diseases such as hepatitis, tuberculosis and malaria; Deny history of trauma; Deny a history of food or drug allergies.

3. Admission examination:

T39 ° C, P100 beats per minute, R22 beats per minute, BP104/85 mmHg. Conscious, poor spirit, slightly shortness of breath, coarse breathing sounds in both lungs, no dry or wet rales heard. Heart rate 100 beats per minute, rhythm, no obvious murmur heard. Abdominal weakness, no tenderness or rebound tenderness, liver and spleen not palpable under the ribs, no edema in both lower extremities, normal muscle tone and muscle strength grade V.

4. Auxiliary examination:

1) Laboratory tests: Blood routine 5 categories: White blood cell count 22.08× 10^9/L, neutrophil percentage 52.6%, hemoglobin concentration 156g/L, platelet count 89× 10^9/L. C-reactive protein 182.4mg/L. Procalcitonin 8.010ng/mL. Lactate 4.56mmol/L. Blood gas analysis: Inhaled oxygen concentration 80%, pH 7.28, partial pressure of oxygen 101mmHg, partial pressure of carbon dioxide 32.9mmHg, arterial partial pressure of oxygen to alveolar partial pressure 18.9%, residual base -10.3mmol/L, actual bicarbonate 15.2mmol/L. Coagulation 4: Prothrombin time 13.7 seconds, prothrombin normalized ratio 1.21, activated partial thromboplastin time 47.3 seconds, fibrinogen 1.29g/L, thrombin time 21.6 seconds. D-dimer 24.73mg/L (FEU). Bilirubin 2 items ^ liver function 2 items ^ albumin ^ ion 4 items ^ urea ^ creatinine: Total bilirubin 40.1μmol/L, direct bilirubin 31.0μmol/L, indirect bilirubin 9.1μmol/L, alanine aminotransferase 86U/L, aspartate aminotransferase 191U/L, albumin 25.5g/L, potassium 4.48mmol/L Sodium

133.8mmol/L, chlorine 95.9mmol/L, calcium 1.87mmol/L, creatinine 282μmol/L, urea 28.04mmol/L, estimated glomerular filtration rate 18×mL/min/1.73m^2. Four myocardial enzymes: Creatine kinase 560U/L, creatine kinase MB isoenzyme 36U/L, lactate dehydrogenase 752U/L,α - hydroxybutyrate dehydrogenase 562U/L, B-type natriuretic peptide precursor assay 1272pg/mL.

2) Imaging examination: Chest CT indicates multiple exudative lesions in both lungs (As shown in Figure 1).

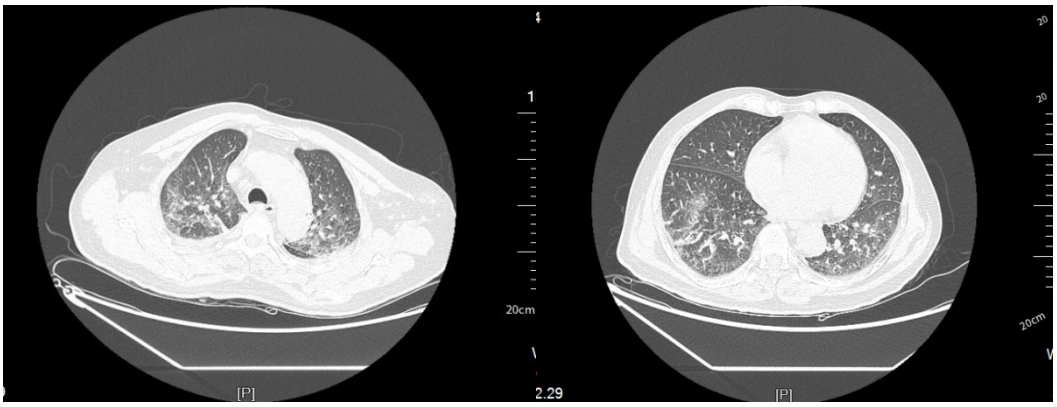

Figure 1. The plain CT scan of the chest shows multiple exudative lesions in both lungs

3) Etiological examination: Negative blood culture; Respiratory multi-pathogen targeted sequencing (tNGS): Candida tropes :7071:<1.0E+3. Metagenomic sequencing of bronchoalveolar lavage fluid (BALF mNGS): Scrub typhus orientalis (As shown in Figure 2).

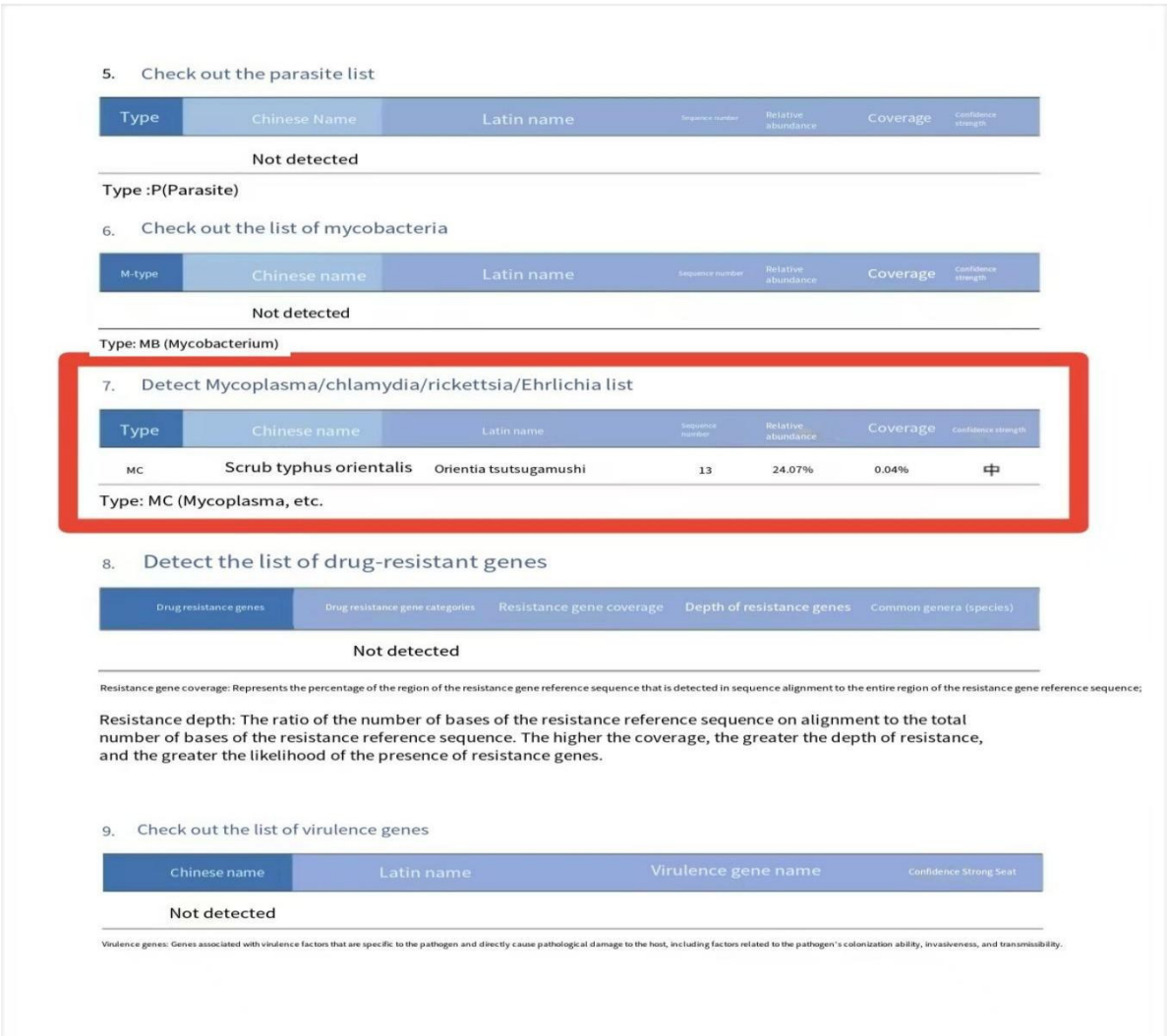

Figure 2. Results of metagenomic sequencing of bronchoalveolar lavage fluid (BALF mNGS): Orientia tsutsugamushi

Characteristic eschar on the skin of the right thoracocostal region (As shown in Figure 3)

Figure 3. Black scabs are observed in the right thoracic and rib area

5. Diagnosis and treatment process:

Initial treatment: Non-invasive positive pressure ventilation (as the patient refused to cooperate), switched to high-flow oxygen therapy [6]; Empirical treatment includes ceftazidime and averbactam, tigecycline combined with anti-infection, expectorant drugs, liver and kidney protection, nutritional support, electrolyte balance maintenance, and internal environment stability. Disease progression and diagnosis: After 2 days of the above treatment, the patient still had persistent high fever, respiratory distress, and no improvement in organ function. At this point, a detailed physical examination revealed a skin eschar on the right side of the chest and ribs. At that time, the patient denied a history of field work and outdoor activities, and the family could not provide the relevant medical history, but still highly suspected scrub typhus. Previously, no specific abnormalities were found in the related etiology. Immediate metagenomic sequencing of bronchoalveolar lavage fluid (BALF mNGS) suggested that scrub typhus was an east body, and the antibiotic was changed to doxycycline before reporting. Treatment effect: 48 hours after the antibiotic change, the patient's body temperature began to drop and norepinephrine was gradually reduced. Platelet counts began to rise on day 5. Successfully weaned off the ventilator on day 7, and liver and kidney function and coagulation function returned to normal within two weeks. After 14 days of hospitalization, the patient recovered and was discharged without any sequelae.

2. Discussion

Scrub typhus is a zoonotic disease caused by the Oriental body of scrub typhus, transmitted through the bite of chigger mite larvae[1,9]. This case is a severe case of scrub typhus with unexplained multiple organ dysfunction and an unclear epidemiological history. The significance lies in:

1. Recognition of the clinical characteristics of severe illness: Severe scrub typhus often involves multiple systems, presenting with high fever, severe toxic symptoms, rapid shock, ARDS, AKI, liver injury, coagulation disease, DIC, etc., with a high fatality rate[4,7,12]. This case covers almost all serious complications and is a typical manifestation of MODS and MOF caused by severe scrub typhus[2,4].

2. The "key" to early diagnosis - eschar: Eschar is the most specific sign of scrub typhus, with an occurrence rate of about 70% to 100%[1,11]. But they are often located in hidden areas such as the armpits, groin, scrotum, external genitalia, perineum, perianal area, etc., and are painless and itchy, easily overlooked by patients and doctors. In this case, the eschar was located on the right side of the chest and ribs, but it was not large and the patient denied the relevant epidemiological history, which could easily be mistaken for common skin injury or senile skin disease. This warns clinicians to be alert to the possibility of scrub typhus in patients with severe infections of unknown cause or multiple organ dysfunction with eschar on the skin[2,11].

3 Laboratory diagnosis and differential diagnosis: The Waive test (OXk agglutination titer ≥1:160) is a commonly used serological method, but with a low early positive rate and requires dynamic monitoring [3,5]. Metagenomic high-throughput sequencing (mNGS) can efficiently capture pathogen information in the early stage of infection and is highly sensitive to scrub typhus. Its diagnostic value is much higher than that of the Fehfeld test and various serum antibody methods, providing key support for diagnosis[10]. Differential diagnosis: It needs to be differentiated from dengue fever, epidemic hemorrhagic fever, typhoid fever, paratyphoid fever, leptospirosis, etc. Eschar and epidemiological history are important differentiating points [1,5].

The core of treatment: Currently, cyclins, macrolides, chloramphenicol and rifampicin are recommended as second-line options for treatment [1,2,8]. For severe cases, intravenous administration is preferred and combination therapy may be required. The key point is "early full dose", and empirical treatment should be initiated immediately once there is a high clinical suspicion, which can significantly reduce mortality [12]. In this case, the treatment was immediately changed to doxycycline after the discovery of the eschab and high suspicion, and the effect was immediate.

3. Conclusion

Scrub typhus is a life-threatening acute infectious disease with diverse clinical manifestations. Severe cases are prone to MODS and progress to MOF. A detailed physical examination for the detection of eschar, combined with an epidemiological history (if any), is the cornerstone of early diagnosis. Clinicians, especially those in emergency and critical care

units, should be on high alert for the disease. For suspected cases, early empirical use of antibiotics such as doxycycline is a decisive measure to save lives and improve prognosis.

References

[1] Expert Consensus on Clinical Diagnosis and Treatment of Scrub typhus, Chinese Society for Microbiology, Zoonotic Disease Etiology, Branch of Biological Diagnostic Technology, China Association of Biotechnology. Chinese Journal of Zoonoses.2024.

[2] Emergency Physicians Branch of the Chinese Medical Doctor Association, Emergency Medicine Branch of the Chinese Medical Association. Expert consensus on Emergency diagnosis and treatment of scrub typhus [J]. Chinese Journal of Emergency Medicine, 2023, 32(4): 442-448.

[3] Kala D, Gupta S, Nagraik R, et al. Diagnosis of scrub typhus: recent advancements and challenges[J]. Journal of Microbiology, Immunology and Infection, 2023, 56(1): 26-33.

[4] Chen Y, Wen Y, Li Z, et al. Severe scrub typhus with multiple organ dysfunction syndrome: a case series from Fujian, China[J]. Journal of Infection in Developing Countries, 2022, 16(4): 678-684.

[5] Wu Jianhua, Li Lanjuan. Research progress on scrub typhus [J]. Chinese Journal of Infectious Diseases, 2021, 39(1): 1-5.

[6] Wang Jing, Qiu Haibo, Yang Yi. Mechanism of sepsis complicated with acute kidney injury and timing of renal replacement therapy [J]. Chinese Medical Journal, 2021, 101 (24): 1881-1885.

[7] Zhang Yun, Wang Yu, Li Xin, et al. Clinical characteristics and prognosis analysis of acute respiratory distress syndrome caused by severe scrub typhus [J]. Chinese Journal of Critical Care Medicine, 2020, 32(11): 1369-1373.

[8] Liu Zhengyin, Du Bin, Li Taisheng, et al. Interpretation of the diagnosis and treatment protocol for scrub typhus (2018 Edition) [J]. Chinese Journal of Internal Medicine, 2019, 58(7): 505-508.

[9] National Health Commission of the People's Republic of China. Technical Guidelines for the Prevention and Control of scrub typhus (Trial) [EB/OL]. (2019-05)

[10] Foll, D., Foley, P., & Phetsouvanh, R. (2023). Advances in the molecular diagnosis of scrub typhus. Current Opinion in Infectious Diseases, 36(3), 171-176.

[11] Lee C S, Hwang J H. Images in clinical medicine. The eschar of scrub typhus[J]. The New England Journal of Medicine, 2017, 376(23): e47.

[12] Taylor A J, Paris D H, Newton P N. A systematic review of mortality from untreated scrub typhus (Orientia tsutsugamushi) [J]. PLoS Neglected Tropical Diseases, 2015, 9(8): e0003971.