Journal of Acute Medicine 7(2): 75-78, 2017
DOI: 10.6705/j.jacme.2017.0702.005
Case Report

Pneumocystis Pneumonia Infection in a Survivor of Paraquat Intoxication

Chih-Yu Chen, Yi-Ming Weng*, Jih-Chang Chen

Department of Emergency Medicine, Chang Gung Memorial Hospital and Chang Gung University College of Medicine, Linko, Taiwan

Patients who survived recent paraquat intoxication might be treated with glucocorticoid and cyclophosphamide to avoid further lung fibrosis. Such patients might be susceptible to opportunistic infections. Pneumocystis pneumonia (PCP) is an important opportunistic lung infection in hematologic malignancy patients on chemotherapy. We report a patient who recently survived paraquat intoxication and presented with acute respiratory insufficiency post glucocorticoid and cyclosporine treatment. A fulminant clinical course, and a clear medical history of immunocompromised state draw physician's attention to the possible opportunistic lung infection. PCP infection was confirmed by a PCP deoxyribonucleic acid test. The symptoms improved markedly after appropriate antibiotics treatment. This report suggests that clinicians should consider PCP infection in patients who develop secondary pneumonia after paraquat intoxication. PCP treatment as part of empirical antibiotics should be added, especially in such patients presented with rapidly progressive course.

Key words: *opportunistic infection, paraquat, pneumocystis pneumonia, pulmonary fibrosis*

Introduction

Patients who survived recent paraquat intoxication might be treated with glucocorticoid and cyclophosphamide to avoid further lung fibrosis.[1] The accumulation of paraquat in the lungs leads to diffuse alveolitis, followed by extensive pulmonary fibrosis.[2] Such patients might be susceptible to opportunistic infections. Pneumocystis pneumonia (PCP) is an important opportunistic lung infection in hematologic malignancy patients on chemotherapy.[3] PCP infection became prevalent with the spread of Human Immunodeficiency Virus (HIV) infection.[4] In the absence of HIV infection, the mortality rate of PCP infection is up to 60%.[5]

We report a patient who recently survived paraquat intoxication and presented with acute respiratory insufficiency post glucocorticoid and cyclosporine treatment. PCP infection was confirmed by a PCP deoxyribonucleic acid (DNA) test. The symptoms improved markedly after TMP-SMX treatment.

Case Report

A 36-year-old female presented with progressive shortness of breath for 2 days at Emergency Department (ED). Reviewing her past history, she had been discharged from Nephrology ward 2 weeks before. She had drunk 5 mL of paraquat after quarreling with her husband 3 months earlier. She underwent a complete course of hemoperfusion combined with cyclosporine and steroid pulse therapy during last admission. The steroid dose was tapered to cortisone acetate 25 mg twice daily during outpatient follow-up 4 days earlier and no discomfort was found.

The patient's dyspnea progressed rapidly and persisted at rest 2 days before admission. Associated symptoms included a dry cough and mild fever. There

Received: December 24, 2015; Revised: September 12, 2016; Accepted: Octomber 3, 2016.
*Corresponding author: Yi-Ming Weng, MD, Department of Emergency Medicine, Chang Gung Memorial Hospital and Chang Gung University College of Medicine, Linko, No. 5 Fushing St., Gueishan Shiang Dist., Taoyuan 333, Taiwan. E-mail: wengym33@gmail.com

aikiti

were no chills, night sweats, weight loss/gain, chest pain, palpitations, decreased urine output, gastrointestinal upset, bowel habit change, skin rash, or leg edema. In the ED, the patient appeared acutely ill and showed air hunger. The initial vital signs were body temperature 36.9°C, pulse 111 per minute, respiratory rate 30 per minute, and oxygen saturation 88% by pulse oximetry on a oxygen flow of 6 L/min via mask. The physical examination showed bilateral crackles in the inspiratory phase. The patient was breathing laboriously with subcostal retraction and accessory muscle use. There was no jugular vein engorgement or peripheral edema. The chest X-ray revealed bilateral perihilar infiltration and a reticular interstitial pulmonary pattern (Fig. 1).

The laboratory evaluation included white blood cell count 9,800/μL (normal 3,500-11,000/μL), bands 11%, lymphocyte 24%, platelets 243,000/μL (150-400 K/μL), C-reactive protein 141 mg/L (< 5 mg/L), procalcitonin 1.1 ng/mL (< 0.5 ng/mL, ≥ 2 Sepsis Likely, ≥ 10 Sepsis), lactate dehydrogenase 721 U/L (125-225 U/L), aspartate transaminase 928 U/L (< 34 U/L), alanine transaminase 702 U/L (< 36 U/L), total bilirubin 0.5 mg/dL (< 1.3 mg/dL), blood urea nitrogen 15.5 mg/dL (6-21 mg/dL), and creatinine 0.86 mg/dL (0.44-1.03 mg/dL). An HIV test was negative.

The initial impression of this patient was pneumonia complicated with hypoxic respiratory failure. Empirical antibiotic treatment with Tienam (imipenem/cilastatin) and Teicoplanin was started in the ED. The respiratory pattern deteriorated despite high-flow oxygen by mask.

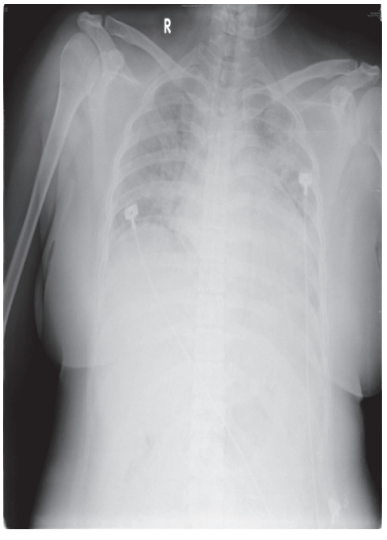

Fig. 1. Initial chest X-ray at emergency department.

To treat a possible PCP infection, TMP-SMX 15 mg/kg/day in a divided dose was started on admission to the Intensive Care Unit (ICU) with adjunctive methylprednisolone 40 mg twice daily. The symptoms improved markedly and follow-up chest X-rays on 2 and 7 days after admission revealed resolution of the lung infiltration (Fig. 2A, 2B). A second PCP DNA test confirmed the diagnosis. She was transferred to a general ward on day 3 and discharged 2 weeks later on oral TMP-SMX for the complete treatment.

Discussion

There are several aspects should be mentioned. First, this case echoed previous studies with a non-specific and insidious presentation, with the symptoms

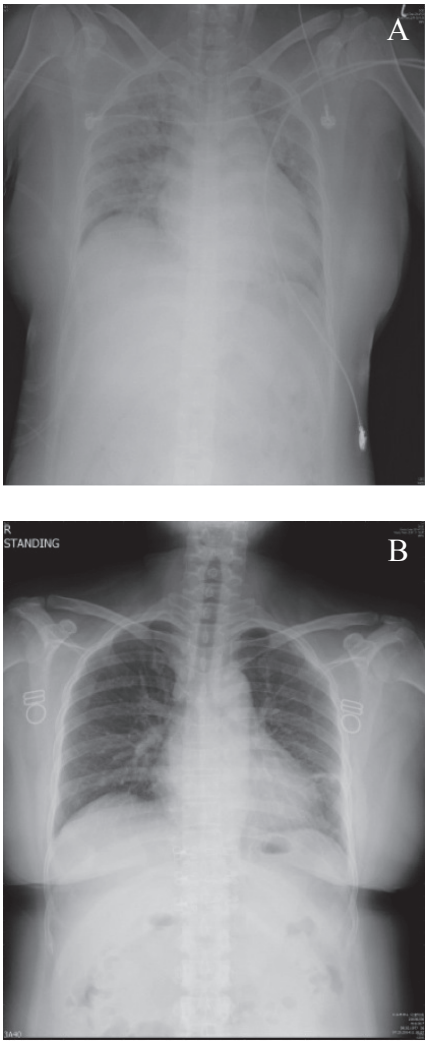

Fig. 2. Follow-up chest x-rays on the second day (A) and the seventh day (B) after admission.

airiti

being dyspnea and a non-productive cough at ED visit.[6] However, a rapidly progressive clinical course, and a clear medical history of immunocompromised state draw physician's attention to the possible opportunistic lung infection.[7,8] Coyle et al. performed a retrospective review of PCP in Northern Ireland, and found a rising incidence of PCP of iatrogenic exposure related immune-compromised patients.[9] PCP in patients without acquired immunodeficiency syndrome had been reported before. The risk factor for PCP in patients without HIV infection is defects in cell-mediated immunity.[7,10] A case series in 1996 demonstrated a median prednisolone equivalent dose of 30 mg daily for a median duration of 12 weeks among PCP in patients without acquired immunodeficiency syndrome.[8] The author made the conclusion about steroid used increasing risk of PCP infection due to 90.5% patient used steroid within 1 month before the diagnosis of PCP. Lower lymphocyte counts (< 750 cells/mm^3) and high prednisolone dosage (mean 49 mg/day) were considered as other risk factors of PCP infection.[11] Our patient received a mean prednisolone equivalent dose of 100 mg/day for 82 days and absolute lymphocyte counts 2,352 cells/mm^3. Therefore, she was susceptible to the PCP infection.

Second, the findings of the plain film in patients with PCP pneumonia are mostly non-specific or inconclusive.[12] In contrast, the chest X-ray of this case showed a perihilar infiltration, and a reticular interstitial pattern, which was highly suggestive of PCP in profound immunocompromised patients.[13] Opravil et al. reported a 36% of interstitial and 25% acinar infiltrates of the radiographic presentation of PCP in 93 consecutive patients.[13] Besides, the mortality was correlated with the severity of infiltrates.[9]

Third, paraquat intoxication causes oxidative damage of the alveolar epithelium with subsequent obliterating fibrosis.[14] One review collect 9 case reports in Spain found PCP infection in an immunocompetent patient after paraquat spraying.[15] It would be interesting to determine whether Pneumocystis can easily penetrate and proliferate after attaching to alveolar epithelium damaged by paraquat.

Conclusion

This report suggests that clinicians should consider PCP infection in patients who develop secondary pneumonia after paraquat intoxication. PCP treatment as part of empirical antibiotics should be added, especially in such patients presented with rapidly progressive course.

References

1. Li LR, Sydenham E, Chaudhary B, Beecher D, You C. Glucocorticoid with cyclophosphamide for paraquat-induced lung fibrosis. *Cochrane Database Syst Rev*. 2010;6:CD008084.
2. Bismuth C, Garnier R, Baud FJ, Muszynski J, Keyes C. Paraquat poisoning. An overview of the current status. *Drug Saf*. 1990;5:243-251.
3. Hughes WT, Feldman S, Aur RJ, Verzosa MS, Hustu HO, Simone JV. Intensity of immunosuppressive therapy and the incidence of Pneumocystis carinii pneumonitis. *Cancer* 1975;36:2004-2009.
4. Weissler JC, Mootz AR. Pulmonary disease in AIDS patients. *Am J Med Sci*. 1990;300:330-343.
5. Festic E, Gajic O, Limper AH, Aksamit TR. Acute respiratory failure due to pneumocystis pneumonia in patients without human immunodeficiency virus infection: outcome and associated features. *Chest* 2005;128:573-579.
6. Thomas CF Jr, Limper AH. Pneumocystis pneumonia. *N Engl J Med* 2004;350:2487-2498.
7. Sepkowitz KA, Brown AE, Armstrong D. Pneumocystis carinii pneumonia without acquired immunodeficiency syndrome. More patients, same risk. *Arch Intern Med*. 1995;155:1125-1128.
8. Yale SH, Limper AH. Pneumocystis carinii pneumonia in patients without acquired immunodeficiency syndrome: associated illness and prior corticosteroid therapy. *Mayo Clin Proc*. 1996;71:5-13.
9. Coyle PV, McCaughey C, Nager A, et al. Rising incidence of Pneumocystis jirovecii pneumonia suggests iatrogenic exposure of immune-compromised patients may be becoming a significant problem. *J Med Microbiol*. 2012;61(Pt 7):1009-1015.
10. Rodriguez M, Fishman JA. Prevention of infection due to Pneumocystis spp. in human immunodeficiency virus-negative immunocompromised patients. *Clinical Microbiology Reviews* 2004;17:770-782.
11. Lertnawapan R, Totemchokchyakarn K, Nantiruj K, Janwityanujit S. Risk factors of Pneumocystis jeroveci pneumonia in patients with systemic lupus erythematosus. *Rheumatol Int*. 2009;29:491-496.
12. Opravil M, Marincek B, Fuchs WA, et al. Shortcomings of chest radiography in detecting Pneumocystis carinii pneumonia. *J Acquir Immune Defic Syndr*. 1994;7:39-45.
13. Fillatre P, Decaux O, Jouneau S, et al. Incidence of Pneumocystis jiroveci pneumonia among groups at risk in HIV-negative patients. *Am J Med*. 2014;127:1242.e11-

airiti

1242.e17.
14. Suntres ZE. Role of antioxidants in paraquat toxicity. *Toxicology* 2002;180:65-77.
15. Lillo A, Usó J, Gil MJ, Prada PL, Simón E. Pneumocystis carinii pneumonia in an immunocompetent patient after paraquat spraying. *An Med Interna*. 1999;16:381.