INTERNAL MEDICINE

□ CASE REPORT □

Pneumocystis jirovecii Pneumonia and Alveolar Hemorrhage in a Pregnant Woman with Human T Cell Lymphotropic Virus Type-1 Infection

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Abstract

Acute lung injury during pregnancy results in morbidity and mortality in both the mother and the fetus. *Pneumocystis jirovecii* pneumonia (PCP) is a rare disease but may occur in pregnant immune-suppressed women. Here, we describe a case of acute lung injury due to PCP and alveolar hemorrhage in a pregnant woman who was a human T lymphotropic virus type-1 (HTLV-1) carrier. PCP should be considered in the differential diagnosis of pulmonary complications during pregnancy in HTLV-1 endemic areas.

Key words: human T lymphotropic virus type 1, *Pneumocystis jirovecii* pneumonia, pregnancy, alveolar hemorrhage

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Introduction

Acute lung injury during pregnancy causes high morbidity and mortality in both the mother and the fetus. The pathogenesis of acute lung injury includes pneumonia as well as non-infectious pulmonary disorders and extra-pulmonary disorders (1). Infection with human T lymphotropic virus type 1 (HTLV-1), an endemic retrovirus, causes adult T-cell leukemia/lymphoma (ATL) and HTLV-1-associated myelopathy and may result in subclinical immunodeficiency in the carrier state (2). Although opportunistic infections in HTLV-1 carrier state are rarely documented, it is difficult to identify whether HTLV-1 carriers without ATL are immune deficient.

This report describes a very rare case of PCP and alveolar hemorrhage in a pregnant woman who was an HTLV-1 carrier. She developed severe acute lung injury during pregnancy and was successfully treated after a prompt diagnosis on the basis of the results of BAL examination.

Case Report

In September 2007, a 36-year-old woman with acute respiratory failure was transferred to our hospital from another hospital, where she had undergone a caesarean section for breech position at 36 weeks of pregnancy. Before the operation, her SpO_2 was approximately 80% and she required 5 L/min oxygen. The operation was successfully done, but her respiratory condition worsened after the operation and she required oxygen delivery at a rate of 15 L/min via a reservoir mask. Before this event, she had experienced a mild dry cough that had persisted for 1 month. She was an HTLV-1 carrier. At admission to our hospital, she was alert and exhibited fever, tachypnea, and tachycardia. Physical examination revealed late inspiratory crackles in both lungs and edema in both legs. Chest radiography revealed diffuse ground-glass opacities in both lungs, predominantly in the lower lung field (Fig. 1). Chest CT revealed diffuse and anatomic distribution of ground-glass opacities in both lung fields with thickened interlobular septa (referred to as the crazy-paving appearance) (Fig. 2). Laboratory examinations

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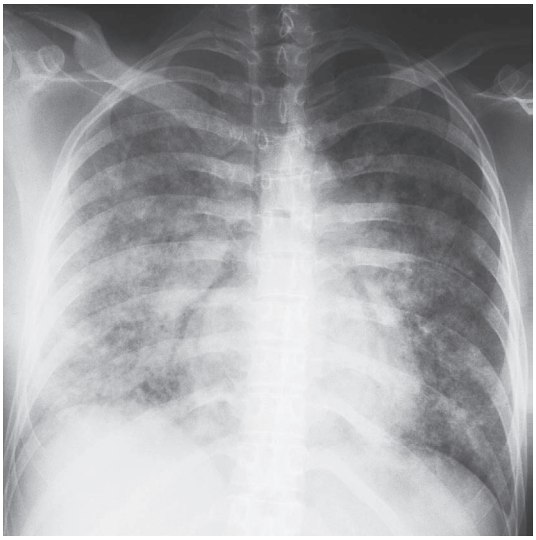

Figure 1. **Chest radiograph obtained at admission. Diffuse consolidations and ground-grass opacities in both lungs were observed.**

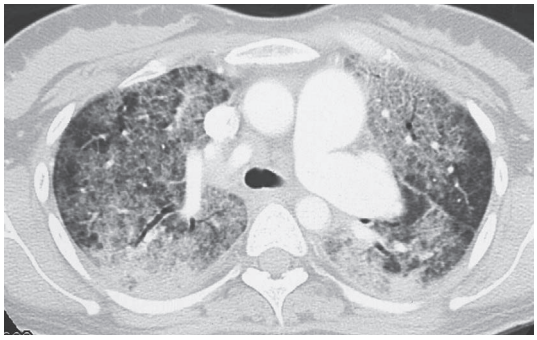

Figure 2. **Chest CT results obtained at admission. Anatomic distribution of ground-glass opacities with thickened interlobular septa was seen.**

revealed leukocytosis, increased lactate dehydrogenase activity, hypoalbuminaemia, and increased C-reactive protein levels (Table 1). The ratio of PaO_2 and FiO_2 at admission was presumed to be 93 Torr (Table 1), indicating acute lung injury. Subsequently she was intubated and on mechanical ventilation. Examination of the BAL fluid revealed alveolar hemorrhage (Fig. 3) and *P. jirovecii* infection. Grocott staining of the smear of the BAL fluid revealed *P. jirovecii* cysts (Fig. 4) and PCR detection of *P. jirovecii*-specific DNA was positive. Her plasma β-D-glucan concentration was very high (860.3 pg/mL) and serum KL-6 level was elevated (7,976 U/mL). Enhanced CT at admission showed neither intra-vascular defects of pulmonary artery nor findings of deep vein thrombosis of lower extremities. ECG showed no right atrium overload, therefore pulmonary thromboembolism was practically excluded. No anti-coagulant was used. Laboratory findings revealed that she did not have any collagen vascular diseases (Table 1). Treatment with trimethoprim-sulfamethoxazole was started. Therapy with methyl prednisolone was also administered for alveolar hemorrhage. Thereafter, the condition of the patient gradually improved. Follow-up chest radiography revealed reduction in the diffuse ground-glass opacities. The patient almost completely recovered without any pulmonary sequelae. Additional laboratory examination revealed that anti-HIV antibody test was negative, but anti-HTLV-I antibody test was positive. She was assumed to be in the carrier state of HTLV-I infection because no abnormal lymphocyte was detected in the peripheral blood and monoclonal integration of HTLV-I proviral DNA in the peripheral blood leukocytes was not detected. Skin reaction against purified protein derivative (PPD) of *Mycobacterium tuberculosis* was negative.

Discussion

Pulmonary infections during pregnancy affect maternal and peri-natal health. In general, the pathogens that cause pneumonia in pregnant women are similar to those that cause pneumonia in immuno-competent adults (3). However, opportunistic infections during pregnancy as well as in a community become major problems as HIV pandemic has emerged. PCP often complicates pregnant women with HIV infection (4). This patient had PCP, but she was not infected with HIV. Instead, this patient was HTLV-I carrier. No known co-morbidity associated with immuno-suppression was recognized. Therefore, a clinical diagnosis of PCP before BAL examination seems to be difficult.

Chronic/smoldering ATL may remain in a steady state for a long period. To discriminate a carrier state from these types of ATL is not straightforward. In the present patient, neither abnormal lymphocytes nor monoclonal integration of HTLV-I proviral DNA in the peripheral blood was detected. Clinically she was in the HTLV-I carrier state. Subclinical deficiency in immunity among healthy carriers of HTLV-I was demonstrated (2). Decreased reactivity to PPD of *M. tuberculosis* among HTLV-I carriers is associated with hematological status (5). This patient did not have lymphocytepenia or abnormal lymphocytes, but her skin reaction to PPD was diminished at the time of discharge. Her cellular immunity might have been impaired. On the other hand, pregnancy itself may have affected the immune system (6). Surgery can affect immunity, but in this case PCP developed before the operation and the operation did not influence development of PCP. The precise mechanism of immunosuppression in this patient was unclear but this case clearly showed that PCP should be considered in the differential diagnosis of pulmonary complications during pregnancy in HTLV-I carriers. Opportunistic infections may have prognostic value for the development of ATL (7). Therefore, the present patient should be carefully followed-up.

The present patient had a mild cough for a month before the diagnosis of PCP. Plasma beta-D glucan and serum KL-6 were extremely high, suggesting subacute progression of

Table 1. Laboratory Data on Admission

CBC:		ABG(mask reservoir 10L)	
WBC	15,000/ μL	PH	7.464
(Neutro. 83%, Lym. 12, Mono. 5, Eo. 3.1, Baso. 0.3)		pO_2	90 Torr
RBC	397×10^4/ μL	pCO_2	30.1 Torr
Hb	11.1 g/dL	HCO_3	21.6 mmol/L
Hct	33.5%	BE	-2 mmol/L
Plt	29.6×10^4/ μL		
ESR	87mm/hr	Serology	
		CRP	6.54 mg/dL
Biochemistry		IgG	595 mg/dL
TP	4.7g/dL	IgA	165 mg/dL
Alb	1.6 g/dL	IgM	111 mg/dL
Glu	80 mg/dL	IgE	20 IU/dL
BUN	6 mg/dL	C_3	131 mg/dL
Cre	0.53 mg/dL	C_4	43 mg/dL
Na	136 mEq/L		
K	4.3 mEq/L	HTLV-1 Ab	516x,
Cl	105 mEq/L	HIV Ab	negative
T-Bil	0.3 mg/dL	Mycoplasma Ab (PA)	<40
AST	38 IU/L	β - D - glucan	860.3 pg/mL,
ALT	13 IU/L	Soluble IL-2R	2,002 U/mL,
LDH	468 IU/L	KL-6	7,976 U/mL,
γ - GTP	12 IU/L	SP-D	208 ng/mL,
PT INR	0.89	Anti-nuclear antibody	negative
APTT	32.1 sec	RA	negative
Fib	914 mg/dL,	PR_3–ANCA	negative
D-dimer	11.2 μg/mL	MPO-ANCA	negative
FDP	12 μg/mL	CMVp65 antigen	negative

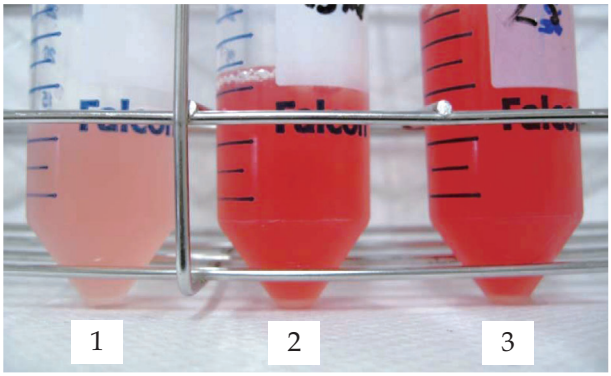

Figure 3. Gross findings of examination of the BAL fluid. Examination of serially collected BAL fluid revealed increased red coloration, suggesting alveolar hemorrhage. The tubes represent the first (1), second (2), and third (3) collection of BAL fluid.

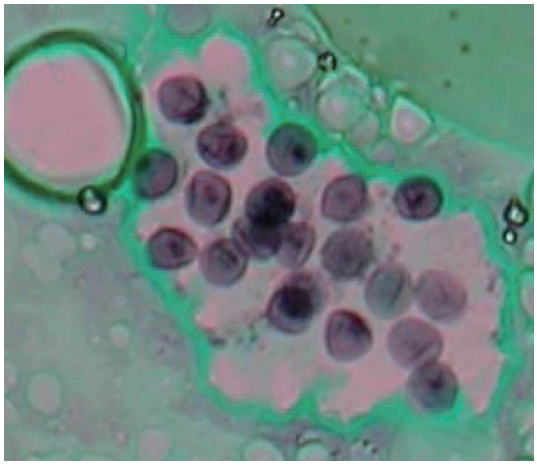

Figure 4. Grocott staining of BAL smear. *Pneumocystis* cysts were demonstrated by Grocott stain.

PCP. Taken together, the mild cough seemed to be a symptom of PCP and onset of PCP was one month before the diagnosis. In this patient, diffuse alveolar hemorrhage complicated PCP. There are various causes of diffuse alveolar hemorrhage (8), but previously the reports suggesting an association of PCP and alveolar hemorrhage were scarce (9). A recent study on autopsy findings of HIV/AIDS patients showed that PCP was often associated with diffuse alveolar hemorrhage (10). In this case, in addition to PCP, the surgery might have influenced the development of alveolar hemorrhage. The precise pathophysiology is unknown, but the simultaneous occurrence of PCP and alveolar hemorrhage should be noted.

In conclusion, this case report describes PCP and diffuse alveolar hemorrhage as a very rare pulmonary complication during pregnancy. PCP may be considered as an etiology of acute lung injury during pregnancy in HTLV-I endemic areas.

The authors state that they have no Conflict of Interest (COI).

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