

Gestational psittacosis: A case report and literature review

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Short Title: Gestational psittacosis

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Abstract

Gestational psittacosis is a rare disease that is associated with significant maternal and fetal morbidity and mortality. Currently, there is no examination method which allows for a quick diagnosis. We report a case of gestational psittacosis that could not be diagnosed as psittacosis during treatment and resulted in maternal and fetal death despite intensive treatment. We also reviewed 23 cases of gestational psittacosis. Fetal and maternal mortality was 82.6% (19/23) and 8.7% (2/23), respectively. In pregnant women with high fever and flu-like symptoms, we should suspect *chlamydia psittaci* infection if at least one of the following is present; contact with sheep, parrots, parakeets, or goats; normal or moderately decreased leucocyte count, thrombocytopenia, and hepatic and/or renal dysfunction; cough and/or lobe consolidation or infiltration on chest X-ray. Antibiotic therapy with macrolide prenatally, macrolide or tetracycline postnatally, and termination of pregnancy should be considered.

Keywords: diagnosis, gestational psittacosis, pregnancy women, *chlamydia psittaci*, therapy.

Introduction

Psittacosis is a zoonosis caused by *Chlamydia psittaci*, which enters the body via the respiratory tract by inhaling the dust in the excrement of birds such as parrots and parakeets, and develops as flu-like illness or pneumonia after an incubation period of one to four weeks. Although tetracycline, macrolide, and new quinolone are effective, the infection may become severe if treatment is delayed due to a late diagnosis. Pathogens can be detected using isolated cultures; pathogen genes can be identified using polymerase chain reaction (PCR) and a rising antibody titer to chlamydia antigen may also be useful for diagnosis¹⁻³. However, these detection methods of pathogens can only be performed in specialized facilities; therefore, no examination method is available to establish a diagnosis in the acute phase.

Psittacosis is a relatively common cause of abortion in sheep, cattle, and goats. Gestational psittacosis is reportedly a rare disease but associated with significant morbidity and mortality^{4,5}. Previous reports suggest that pregnant women should be advised to avoid close contact with sheep, goats, and birds; if a *chlamydia psittaci* infection is suspected, doxycycline or erythromycin is the treatment of choice; early administration is mandatory^{5,6}. However, the details of the clinical course, especially with regard to factors that raise the suspicion of gestational psittacosis, remain unclear.

We report a case of gestational psittacosis that could not be diagnosed as psittacosis during treatment and resulted in maternal and fetal death despite intensive treatment and present a review of gestational psittacosis literature⁵⁻²⁴.

Case Report

A 31-year-old woman, gravida 1, para 0, was impregnated through artificial insemination. At 17 weeks and 1 day of gestation, she had a temperature of 38°C, headache, malaise, and muscle pain and Influenza test was negative. Over the next 2 days, her condition progressively worsened. She was referred and admitted to our hospital with a temperature of 40°C, thrombocytopenia, hepatic dysfunction, and coagulopathy.

On admission, she presented with a pulse rate of 160 bpm and a blood pressure of 129/88 mmHg. Laboratory test findings were as follows: Hemoglobin, 10.4 g/dL; white blood cell count, 4.9×10^9 /l; platelet count, 1.5×10^4 μ L; aspartate aminotransferase, 289 U/l; alanine aminotransferase, 74 U/l; blood urea nitrogen, 11.9 mg/dl; creatinine, 1.42 mg/dl; C-reactive protein, 13.8 mg/dl; fibrinogen, 123 mg/dL. Intrauterine fetal death was confirmed by ultrasonography. Her respiratory condition rapidly worsened and she was placed on conventional mechanical ventilation and treated with meropenem, gamma globulin, and plasmapheresis for infection, blood transfusion for disseminated intravascular coagulation (DIC) and continuous hemodiafiltration for renal failure. The next day, she developed stillbirth but the placenta remained. Acute respiratory distress syndrome (ARDS) was detected on chest computed tomography scan. Her circulatory condition worsened and she was placed on percutaneous cardiopulmonary support. Despite intensive treatment, her condition worsened and she died 3 days after admission.

Blood culture and serological tests for Herpes simplex, Epstein-Barr, Cytomegalovirus, Mumps virus, and rubella were all negative. We did not obtain consent for pathological anatomy testing. For further examination, we sent her serum, and multi-virus and microbial real-time PCR were performed²⁵; only Chlamydia psittaci genes were detected. Although

recent contact with sheep, parrots, parakeets, or goats could not be confirmed, she had contact with a parrot at least a year ago. We did not measure the chlamydia antibody titer.

Discussion

Gestational psittacosis is a rare disease with a fetal and maternal mortality of 94% and 6.3%, respectively¹⁰. We encountered a case of gestational psittacosis that could not be diagnosed as psittacosis during treatment and resulted in maternal and fetal death despite intensive treatment. Factors that raise the suspicion of gestational psittacosis remain unclear. A summary of previous cases and our case regarding the clinical course of gestational psittacosis is shown in Table 1⁵⁻²⁴.

In previous studies, mean age at infection was 29 years (range, 20-36) and mean gestational age at infection was 24.7 weeks (range, 6-36). *Chlamydia psittaci* infection is not likely to occur in younger or older pregnant women, but can occur at any time during pregnancy. Sources of infection in previous studies were sheep (74%, 17/23), parrots (13%, 3/23), and goats (13%, 3/23). All cases except our own had contact with the infectious agent within a month of onset, since our case had contact with a parrot a year ago. Sheep maintain a persistent systemic antibody response to the organism for up to 2.5 years after *chlamydia psittaci* infection, and abortion usually occurs within 2 years of contact with other aborting sheep⁸. However, there is no similar report in humans, and it is unclear whether the same applies to pregnant woman. Therefore, this could be the subject of a future study.

In previous studies, symptoms at first visit were fever (100%, 22/22), headache (72.7%, 16/22), nausea (45.4%, 10/22), cough (36.3%, 8/22), sore throat (18.1%, 4/22), chest pain (27.2%, 6/22), abdominal pain (36.3%, 8/22), and back pain (22.7%, 5/22). Twelve cases had fever for more than 2 days at first visit; the longest period of fever was one week, with a mean temperature of 39.3°C (range, 37.4-40°C), 94.4% (17/18) cases had high fever ($\geq 38^\circ\text{C}$). Since

there was no description of symptoms in patient 19, this patient was excluded. Although most cases ultimately resulted in DIC and ARDS, complications at first visit were thrombopenia (82.6%, 19/23), hepatic dysfunction (60.8%, 12/23), renal dysfunction (52.1%, 12/23), and DIC (43.4%, 10/23). Only 54.5% (6/ 11) cases had chest X-ray findings of lobe consolidation or infiltration. In patients 2, 7, and 13, although no chest X-ray findings were confirmed at the first visit, lobe infiltration or consolidation was confirmed after the next day. Leukocyte count was also normal or moderately decreased in all cases.

Macrolide or/and tetracycline was administered to 76.4% (13/17) of patients. Among them, 8 cases were treated with macrolide from the first visit because patients 8, 10, 12, and 13 had chest X-ray findings; patient 15, 21, and 22 had known contact with sheep; and patient 16 had cough. Other cases were treated with macrolide or tetracycline after suspecting pneumonia from chest X-ray findings and deterioration of respiratory condition in patient 2, a confirmed positive PCR using serum and rising chlamydia antibody titer in patient 6, the presence of chlamydia antigen in the placenta in patient 9, and a rising chlamydia antibody titer in patient 20. In patient 18, the reason for administration was unknown. In Patient 2, 15, 20, and 21, chlamydia antibody titer at first visit was less than 8 to 16 and subsequently rose. Therefore, even if the antibody titer is not elevated at the first visit, it should be examined at later visits. Although tetracycline is reportedly more effective for gestational psittacosis than erythromycin¹⁰, the recommended antibiotic treatment for gestational psittacosis is generally erythromycin because tetracycline adversely affects fetal dentition and bone growth⁵. In our review, there was no difference in the effects of macrolide and tetracycline.

Fetal mortality was 82.6% (19/23); cesarean section was performed within 36 hours from the first visit in the survival cases for maternal adaptation. In addition, patients 12 and 22 had fetal tachycardia and patient 12 had late decelerations. Abortion or stillbirth occurred between 12 hours and 14 days after admission, but 82.3% (14/17) of cases occurred within 2

days. Fetal infection was diagnosed by chlamydia psittaci cultured from fetal organs in patient 5, positive chlamydia psittaci serology in patient 13, and chlamydia inclusions in fetal organs in patients 16 and 17. However, because abortion or stillbirth had occurred even without fetal infection, impaired uteroplacental perfusion by placental infection is more likely to be the fetal cause of death, as previously reported^{6-9,20,23,24}.

Maternal mortality was 8.7% (2/23). Patient 23 was diagnosed with atonic hemorrhage with DIC which resulted in maternal death; macrolide or tetracycline was not administered²⁴. At necropsy, there was no evidence of amniotic embolism²⁴. The other case of maternal mortality was our case; although macrolide or tetracycline was not administered and the placenta remained, it is unclear whether they were the cause of maternal death. However, previous reports show that early delivery can reportedly help reduce fetal mortality and maternal morbidity, since the source of infection is located in the placenta^{6,7,23,24}; once the placenta was infected, neither macrolide nor tetracycline were proven able to maintain pregnancy. The focus should then be redirected for clinical recovery¹⁰. In our review, patients 5, 14, and 17 did not result in maternal death regardless of macrolide or tetracycline administration. Therefore, removing the placenta, which is the source of infection, may be necessary. Diagnosis of placental infection is suggested by the placental histopathologic findings which acute intervillitis, perivillous fibrin deposition with villous necrosis, and large irregular basophilic intracytoplasmic inclusions within the syncytiotrophoblasts seen on hematoxylin and eosin, Giemsa, and methylene blue staining⁵. Inclusions were stained specifically for chlamydia antigen by a direct technique using immunoperoxidase²⁰.

In gestational psittacosis, delays in diagnosis lead to serious consequences; however, there is no quick diagnostic method. Considering our summary, gestational psittacosis usually presents with high fever persisting for more than 2 days with flu-like illness, normal or moderately decreased leucocyte count and thrombopenia, and often had hepatic and renal

dysfunction and chest X-ray findings at first visit. Regarding chest X-ray findings, we should be careful they might be present only after the next day even when no findings were confirmed at the first visit. All but our case had contact with the infectious agent within a month of onset. Therefore, when encountering pregnant women with high fever (especially when fever persists for more than 2 days) and flu-like illness, we should suspect chlamydia psittaci infection if at least one of the following is present: contact with sheep, parrots, parakeets, or goats; normal or moderately decreased leucocyte count, thrombopenia, and hepatic and/or renal dysfunction; cough and/or lobe consolidation or infiltration on chest X-ray (imaging should be obtained on multiple occasions even if there are no findings). Antibiotic therapy with macrolide prenatally, macrolide or tetracycline postnatally, and termination of pregnancy should be considered. This treatment course might be able to save both mother and fetus even if placental and fetal infections occur as in Patient 13.

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Disclosure

The authors have no conflicts of interest to declare.

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Table 1. Comparisons of clinical course of gestational psittacosis.

DIC, disseminated intravascular coagulation; EM, erythromycin; CAM, clarithromycin; TC, tetracycline; DOXY, doxycycline; P, parrot; S, sheep; G, goat;

Chest X-ray findings: lobe consolidation or infiltration, not adult respiratory distress syndrome.

Patients reference (ref): 1, our report; 2, ref 6; 3, ref 7; 4, ref 8; 5, ref 9; 6, ref 10; 7, ref 5; 8, ref 11; 9, ref 12; 10, ref 13; 11, ref 14; 12, ref 15; 13, ref 16; 14, ref 17; 15, ref 18; 16, ref 19; 17, ref 20; 18, ref 21; 19, ref 22; 20, ref 23; 21, ref 23; 22, ref 24; 23, ref 24.

+ = present, - = absent, blank = not described.

Patients		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Age (years)		3 1	36	20	25	28	32	25	3 0	35	32		31	26	26	29	24	28	22	30	29	31	34	34
Source		P	S	S	S	S	G	S	S	S	S	G	P	P	G	S	S	S	S	S	S	S	S	S
Gestational age (weeks)		1 7	31	26	19	28	16	22	1 5	19	6	32	31	32	32	27	14	28	24	27	28	25	34	36
At first visit																								
Symptom	Fever	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+

	Headache	+	+	+	+	+		+					+	+	+	+	+	+			+	+	+	+
	Nausea			+		+		+		+			+	+				+	+			+		+
	Cough							+	+	+	+		+	+	+		+							
	Sore throat					+								+		+						+		
	Chest pain								+		+		+						+		+		+	
	Abdominal pain		+	+	+					+				+			+						+	+
	Back pain				+								+				+		+					+
Complications	Thrombopenia	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+			+	+	+	+	+
	Hepatic dysfunction	+	+	+	+	+		+	+	+		+		+	+	+		+	-			+		
	Renal dysfunction	+	+		+	+		+		-		+		-	+	+		+	+	+		+		

	DIC	+				+		+	+		+			+		+						+	+	+
	Chest X-ray findings		-		-			+	+	-	+	+	+	+					-				-	
Subsequent progress																								
Treatment	EM/CAM	-	-			-	+		+	-	+		+	+	-	+	+	-	-		-	+	+	-
	TC/DOXY	-	+			-	+		+	+	+		+	-	-	+	-	-	+		+	+	-	-
Fetal death		+	-	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	-	+
Maternal death		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Placental infection			+	+	+	+			+	+				+	+	+	+	+	+			+		
Fetal infection			-	-		+			-					+	-	-	+	+						