

# Two infants with COVID-19 acquired from infected mothers: The incompatibility of maternal intensity and infant lung involvement: A case report

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## Case Report

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# Abstract

## Introduction

The outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was declared a public health emergency by world health organization (WHO) on 30 January 2020. Recent studies have suggested that infants present the symptoms of COVID-19. Although the presentation of the disease in babies is variable, there are limited studies about the infected babies with 2019-nCoV.

## Case presentation

In this study, we have presented a case report of two infants with COVID-19. According to the simultaneity of maternal infection, maternal-fetal transmission or postnatal transmission was suggested. The chest radiography of one of the neonates suggested severe lung involvement. Despite the supportive and resuscitation attempts, poor clinical condition of him led to his death. Fortunately, the two mothers and one of the babies were discharged from the hospital with a good general condition.

## Conclusion

In this paper, we have reported two infants who had positive results of COVID-19 testing at day one of life. The babies had worse clinical conditions than their mothers and the intensity of pneumonia and the level of lung involvement of the infants were not associated with the stage and disease severity of the mothers who infected with 2019-nCoV.

## Background

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the third coronavirus that make a global concern in 21th century. This virus causes a new viral respiratory disease that named coronavirus disease 2019 (COVID-19) by World Health Organization (WHO). [1]. Infected people with this coronavirus are reported globally by WHO, through 216 countries with 4761559 confirmed cases and 317529 confirmed deaths [2]. As the epidemic progresses, scarcity of our knowledge about pediatrics COVID-19 infections and their clinical view stands still [3].

Recent reports have suggested that the disease is less severe generally in children, but fatal cases have been reported [3, 4]. It is indistinctive whether children are less susceptible to get infected or less symptomatic. Indeed, age and pre-existing and underlying conditions have an association with severity [5, 6]. Nevertheless, the presentation of the disease in children is variable, and sometimes requires aggressive management [6, 7]. Many studies have indicated the signs and symptoms of infected adults with SARS-CoV-2. Although some of articles have indicated the complication of COVID-19 in children but, the existing information on pediatrics who infected with 2019-nCoV is scarce. [2, 8]. The clinical features and maternal-fetal transmission of COVID-19 in pregnant population are unclear and the topic

discuss is whether 2019-nCoV can be transmitted during pregnancy and cause serious infection in infants. [9–11].

In this study, we have reported two cases of infected infants who were born from infected mothers with different related symptoms in Imam Reza hospital, Mashhad, Iran.

## Case Presentation

### Case 1

A 35-year-old woman, gravida 4, para 3, with a history of 3 previous cesarean sections, was hospitalized at 39 weeks of pregnancy due to uterine contractions. The patient had no history of underlying diseases and no contact with infected cases with COVID-19. She did not have a fever or any symptoms such as cough, sore throat or muscle weakness on admission. She also did not complain of gastrointestinal disorders such as diarrhea and vomiting. On the first patient's visit, blood pressure (BP): 110 /70 mm Hg, Heart Rate (HR): 130 beats/min, Temperature (T): 37.5 °c, Respiratory Rate (RR): 26 breaths/min and oxygen saturation (SpO<sub>2</sub>): 96% were recorded. According to the laboratory results, lymphocyte count were lower than normal (lymphocyte count:  $1 \times 10^9$ /L) and platelet count, hepatic enzymes and creatinine level were within the normal range while, C-reactive protein levels (CRP) were significantly increased. (Table 1). Coagulation function and blood biochemistry were normal. Due to the high level of C-reactive protein and the probability of COVID-19 infection, a GeneXpert COVID-19 RNA polymerase chain reaction (RT-PCR) test was performed which turned positive. Computed Tomography (CT) images of the lungs revealed the bilateral involvement of the lungs and multifocal rounded consolidations with surrounding ground-glass opacities (GGO) (Fig. 1). The pregnant patient underwent a cesarean section due to the onset of uterine contractions and a history of previous cesarean sections. One full-term female infant was born with a birth weight >3000 gr. She had a 1-min Apgar score of 8 and a 5-min Apgar score of 9. The throat swab sample was tested within 24 hours after birth and positive result confirmed that the baby was infected with SARS-CoV-2. She suffered from transient tachypnea of the newborn (TTN) and needed nasal-Continuous Positive Airway Pressure (nCPAP) after birth. CT-chest was carried out and it showed no abnormal opacities (Fig. 2). Breathing became normal 3 days after birth and the infant was discharged from neonatal intensive care unit (NICU) 6 days later. It should be noted that the mother was discharged from the hospital with a satisfying general condition a week after delivery.

### Case 2

A 31-year-old patient, gravida 2, para 1, with a gestational age of 39 weeks and a history of cesarean section referred to hospital because of the increase in uterine contractions. She had no underlying diseases and her vital signs were recorded as BP: 120 /70 mm Hg, (SpO<sub>2</sub>):96%, HR: 110 beats/min, T: 39 °c and RR: 26 breaths/min. She had experienced coughing and sore throat during the previous week and complained of muscle weakness. She mentioned that her husband had experienced the same symptoms.

Laboratory tests showed an increased level of CRP and lymphopenia (lymphocyte count:  $1.0 \times 10^9/L$ ) (Table 1). Since the infection of COVID-19 was probable, Chest X-ray and RT-PCR test were carried out in the first 24 hours. Lung appearance was normal and it had no signs of typical viral pneumonia (Figure 3). COVID-19 test was done for the patient and the positive result of RT-PCR assay confirmed that the pregnant woman was infected with SARS-CoV-2. The patient underwent a cesarean section due to the onset of uterine contractions and a history of previous cesarean section. She gave birth to a male infant with a birth weight of 3400 g, a 1-min Apgar score of 2 and a 5-min Apgar score of 6. The baby was intubated due to severe respiratory distress and transferred to the NICU. His arterial blood gas (ABG) showed a pH of 6.86,  $pCO_2$  of 97 mm Hg,  $pO_2$  of 49 mm Hg,  $HCO_3$  of 16 mEq/L, and a base excess (BE) of -18.5 mmol/L. Since a decrease in oxygen saturation was observed and the respiratory distress exacerbated, echocardiography and chest radiography were performed. The echocardiogram was normal but the chest radiography suggested severe lung involvement (Fig. 4). The positive result of COVID-19 testing confirmed that the newborn was infected with 2019-nCoV. Despite the supportive and resuscitation attempts, the infant died. Fortunately the mother discharged from the hospital 5 days after delivery with a good general condition.

Table 1. Clinical and laboratory characteristics of mothers

Signs and symptom	Case1	Case2
Fever	No	Yes
Cough	No	Yes
Fatigue	No	Yes
Headache	No	No
Dyspnea	Yes	No
Heart rate(per min, at arrival)	130	110
White blood cell count $\times 10^9/L$	17.2	9.2
Lymphocyte count $\times 10^9/L$	1.0	1.0
Hemoglobin,g/L	12.8	11
Platelet count $\times 10^9/L$	158	120
C-reactive protein, mg/L	79	50
Alanine aminotransferase U/L	15	30
Aspartate aminotransferase U/L	25	35
Creatinine,mmol/L	0.6	0.8

## Discussion And Conclusion

In this study, we have reported two infants infected with COVID-19. The infants were born from mothers who were infected at the end of the third trimester and had a cesarean section to terminate the pregnancy due to the onset of uterine contractions and a history of cesarean section. The throat swab samples of two babies were tested by RT-PCR assay in the first 24 hours and positive results confirmed that the infants were infected with 2019-nCoV. Although *brief* abnormality changes were observed in the mother's CT-Chest, there were *extensive* involvement and bilateral multifocal rounded consolidations in one of the infants' lungs, which eventually led to his death.

A similar study has reported one positive case of neonatal infection with COVID-19 36 hours after birth [12]. According to the published studies, people with COVID-19 can infect others through respiratory droplets. Also human-to-human transmission is proved as a way of spreading the disease [13] but, there is limited data about intrauterine vertical transmission and 2019-nCoV has not been detected in placental and fetal membrane samples [14]. Previous studies on vaginal swab samples of pregnant women who infected with human coronavirus (HCoV) have shown the possibility of maternal transmission of this

virus.[15]. Contamination of the operating room and medical staff may have influenced our positive result, even though we attempted to reduce the spread of respiratory droplets and aerosols. Previous reports have suggested that SARS-CoV [16] and other respiratory pathogens like influenza [17] were associated with various maternal morbidity such as spontaneous abortion, severe maternal infection or, maternal death. [18, 19]. Physiological and biochemical changes and immunosuppressed condition during pregnancy can decrease inflammatory immune responses. Thus, pregnant women are exposed to numerous respiratory pathogens however these changes are necessary for continuation of the pregnancy [20, 21].

A limitation of this report was that no PCR testing of amniotic fluid or placenta was performed and no vaginal swabs were tested. Additional studies of maternal and newborn samples are needed to confirm this positive outcome of infants.

The intensity of pneumonia and the level of lung involvement of the infants were not associated with the stage and disease severity of the infected mothers with COVID-19.

## **Abbreviations**

COVID 19	2019 coronavirus disease
WHO	World Health Organization
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
RT-PCR	Real-time polymerase chain reaction
CT	computed tomography
BP	Blood Pressure
HR	Heart Rate
GGO	ground-glass opacity
T	Temperature
RR	Respiratory Rate
CRP	C-reactive protein
TTN	transient tachypnea of the newborn
SpO <sub>2</sub>	oxygen saturation
nCPAP	nasal-Continuous Positive Airway Pressure
NICU	neonatal intensive care unit
ABG	arterial blood gas
BE	base excess
HCoV	human coronavirus

## Declarations

### Consent for publication

Written informed consent was obtained from the patients for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal

### Availability of data and materials

The patient's information and medical records used for the case report are available from the corresponding author upon request.

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## Author Contributions

AP and PL conceived the idea. SM collected patient data and described it in the case report with literature review. ZSh, FF, MB and MR had the primary responsibility to the writing of the manuscript. All authors read and approved the final manuscript.

## Ethics approval and consent to participate

This study did not include experiments on animals or humans. The patient consented to the use of his personal data for the purpose of this case report.

## Competing interests

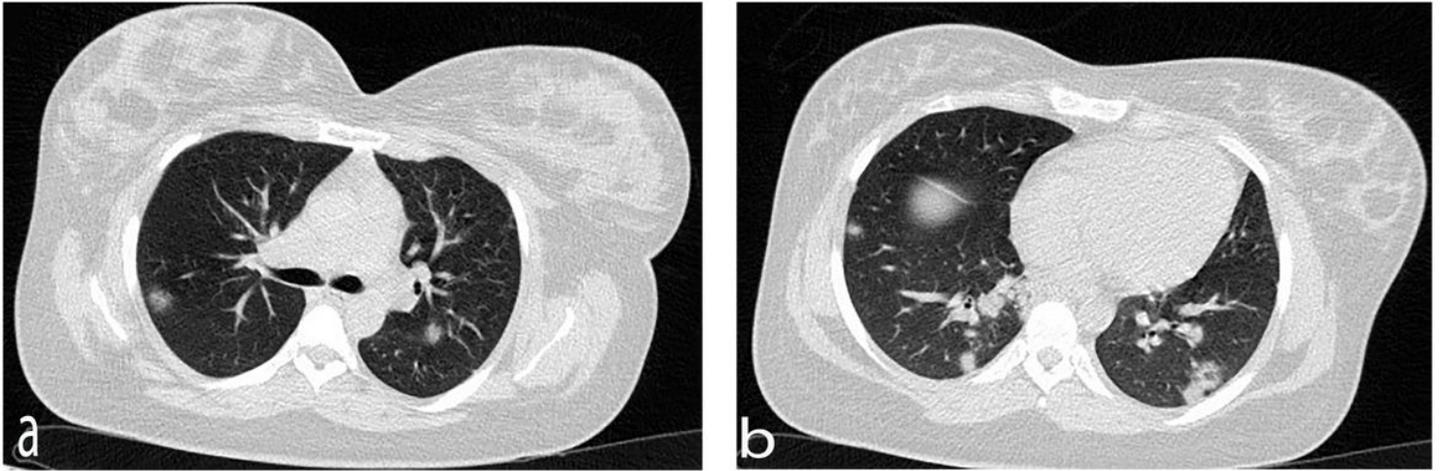
The authors declare that they have no competing interests.

## References

1. Dong, Y., et al., *Epidemiology of COVID-19 Among Children in China*. Pediatrics, 2020.
2. Li, Q., et al., *Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia*. Engl J Med, 2020. **382**(13): p. 1199-1207.
3. Liu, W., et al., *Detection of Covid-19 in Children in Early January 2020 in Wuhan, China*. N Engl J Med, 2020. **382**(14): p. 1370-1371.
4. *Coronavirus Disease 2019 in Children - United States, February 12-April 2, 2020*. MMWR Morb Mortal Wkly Rep, 2020. **69**(14): p. 422-426
5. Xia, W., et al., *Clinical and CT features in pediatric patients with COVID-19 infection: Different points from adults*. Pediatr Pulmonol, 2020. **55**(5): p. 1169-1174.
6. Zhou, F., et al., *Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study*. Lancet, 2020. **395**(10229): p. 1054-1062.
7. Ashour, H.M., et al., *Insights into the Recent 2019 Novel Coronavirus (SARS-CoV-2) in Light of Past Human Coronavirus Outbreaks*. Pathogens, 2020. **9**(3).
8. Fu, L., et al., *Clinical characteristics of coronavirus disease 2019 (COVID-19) in China: A systematic review and meta-analysis*. J Infect, 2020.

9. Chen, Y., et al., *Infants Born to Mothers With a New Coronavirus (COVID-19)*. *Frontiers in Pediatrics*, .5. 28(104).
10. Huang, C., et al., *Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China*. *Lancet*, 2020. **395**(10223): p. 497-506.
11. Wang, S.X., et al., *Diagnosis and treatment of novel coronavirus pneumonia based on the theory of traditional Chinese medicine*. *J Integr Med*. 2020 Apr 15. doi: 10.1016/j.joim.2020.04.001.
12. Wang SS, G.L., Chen L, et al. , *A case report of neonatal COVID-19 infection in China [J/OL]*. *Clinical infectious diseases: an official publication of the Infectious Diseases Society of America*, 2020-3-12
13. Chan, J.F.-W., et al., *A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster*. *The Lancet*, 2020. **395**(10223): p. 514-523.
14. Penfield, C.A., et al., *Detection of SARS-COV-2 in Placental and Fetal Membrane Samples*. *Am J Obstet Gynecol MFM*, 2020: p. 100133.
15. Zhu, H., et al., *Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia*. *Transl Pediatr*, 2020. 9(1): 51-60.
16. Shek, C.C., et al., *Infants born to mothers with severe acute respiratory syndrome*. *Pediatrics*, 2003. **112**(4): p. e254.
17. Wong, S.F., et al., *Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome*. *American journal of obstetrics and gynecology*, 2004. **191**(1): p. 292-297.
18. Assiri, A., et al., *Middle East Respiratory Syndrome Coronavirus Infection During Pregnancy: A Report of 5 Cases From Saudi Arabia*. *Clin Infect Dis*, 2016. **63**(7): p. 951-3.
19. Shek, C., et al., *Infants Born to Mothers With Severe Acute Respiratory Syndrome*. *Pediatrics*, 2003. **112**(4): p. e254-e254.
20. Robinson, D.P. and S.L. Klein, *Pregnancy and pregnancy-associated hormones alter immune responses and disease pathogenesis*. *Hormones and behavior*, 2012. **62**(3): p. 263-271.
21. Weinberger, S.E., et al., *Pregnancy and the lung*. *American Review of Respiratory Disease*, 1980. **121**(3): p. 559-581.

## Figures



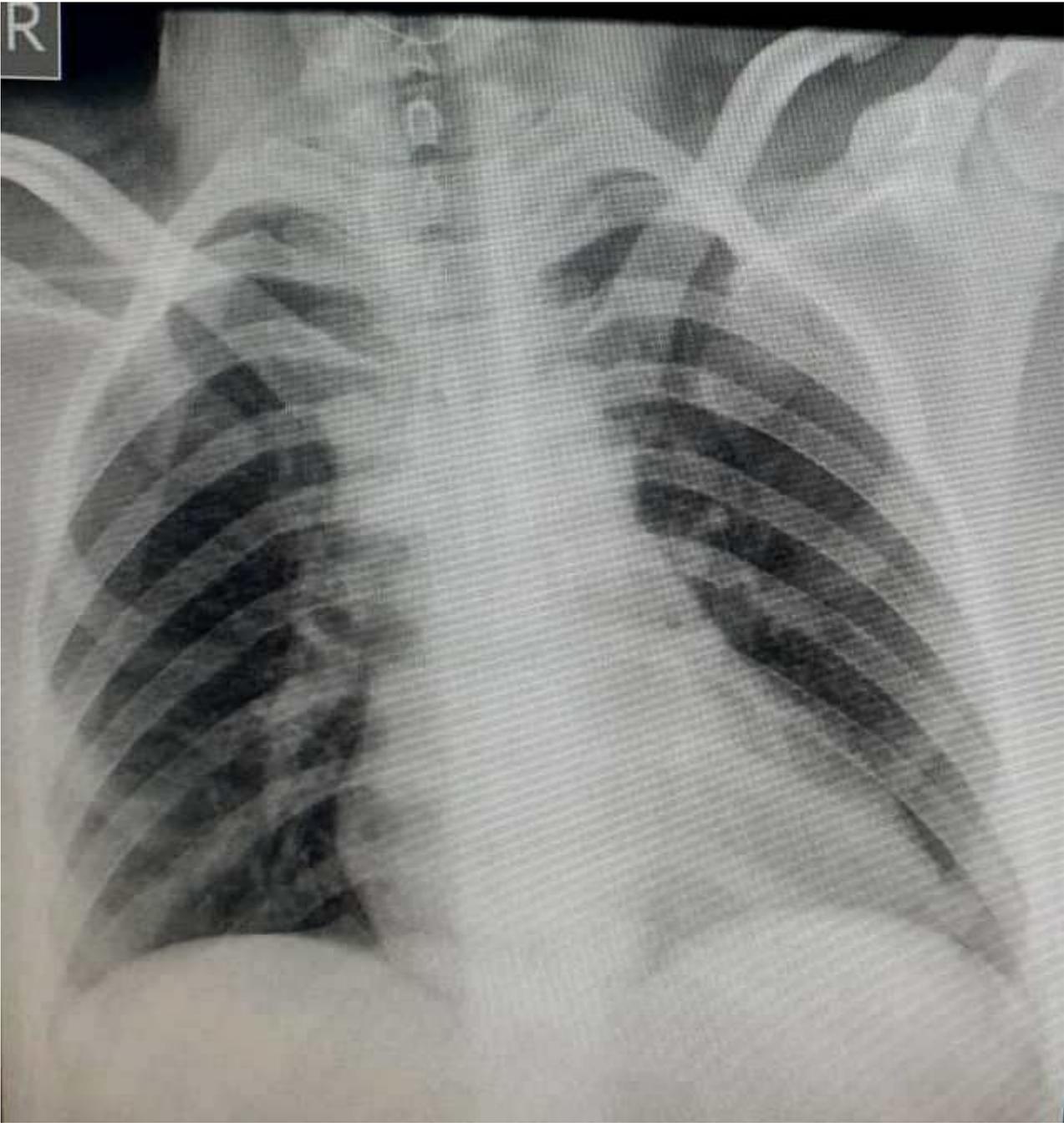
**Figure 1**

Axial chest CT shows bilateral multifocal rounded consolidations with surrounding ground glass opacities.



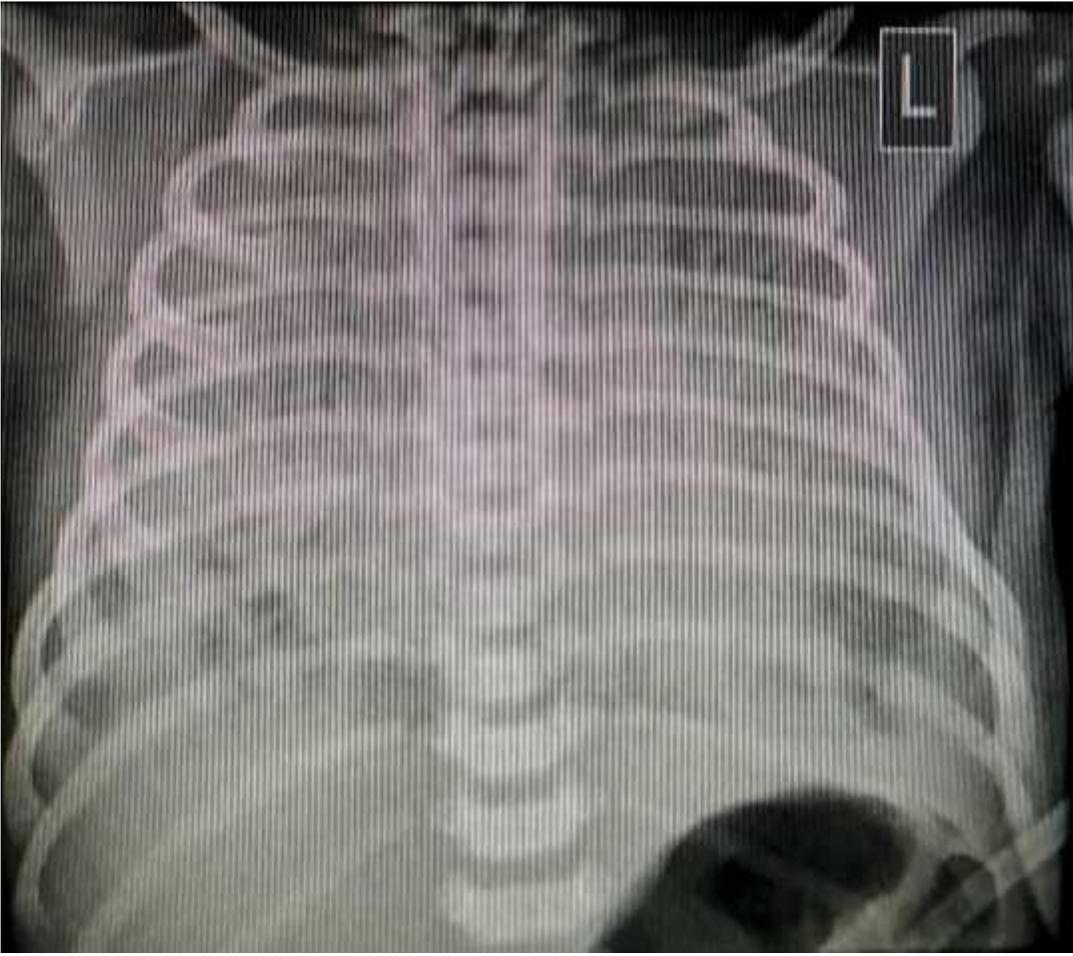
**Figure 2**

Chest x-ray (AP) view of term newborn shows no abnormal opacity in both lungs and it seems overall normal lung CXR.



**Figure 3**

Chest x-ray (PA) view with normal lung appearance.



**Figure 4**

Plain radiography (AP) view on supine position , shows diffuse ground glass opacity of both lungs.