

Neonatal COVID-19 Infection Outbreak of Al Dawadmi General Hospital, Middle Region, Saudi Arabia, March 2020: A Case Report.

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Abstract:

Background: Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is the causative strain for the ongoing global pandemic Coronavirus disease 2019 (COVID-19) with varying outcomes in different age groups. Vertical transmission and post-infection immunity have not been completely established.

Objective: To determine the possible source of infection and mode of transmission in a neonate with parents who were tested negative for COVID-19 that can help in recommending prevention and control.

Methods: This is an outbreak case report of 3 days old neonate who was tested positive for COVID-19 on 29th March 2020. Both parents of the neonate were tested negative for COVID-19 at Al Dawadmi General hospital, located in the central region of Saudi Arabia. A team of FETP went to Al Dawadmi General hospital to investigate a 3 days old COVID-19 positive boy, both of whose parents were tested negative. The team worked with the Preventive Department in Health Directorate for data collection. We collected data by in-person interviews of both parents of neonatal COVID-19 case and review of medical files.

Result: We identified one case of neonatal COVID-19 in Al Dawadmi, Saudi Arabia. The neonate was a 3-day old boy brought to the hospital with fever, cough, and rhinorrhoea symptoms. He was otherwise maintaining normal oxygen saturation with no shortness of breath and no gastrointestinal symptoms. He was discharged on 1st April 2019, on the fourth day of admission. Both parents tested negative for the virus. Both vertical and horizontal roots of transmission could have been the source of infection.

Conclusions: Case was diagnosed as neonatal COVID-19 based on clinical features and laboratory results and was mild that might have been acquired horizontally or vertically.

Keywords: Neonatal COVID-19, Vertical transmission, SARS-CoV-2.

مقدمة:

لم يكن من المُتخيل أنه في غضون تسعة أشهر فقط أن ينتشر وباء فيروس كورونا 2019 (كوفيد 19) في العالم بأسره، الأمر الذي وضع أنظمة الرعاية الصحية في تحدي كبير لمواجهة القدرة الهائلة لهذا الوباء في الانتقال بين الأشخاص، حتى الآن، وفقاً لما صرحت به منظمة الصحة العالمية، انتشر هذا الوباء في مائتين وستة عشر دولة من دول العالم، حيث أُصيب حوالي 29,444,198 شخصاً، وأدى إلى وفاة 931,321 من الأشخاص، يُعتبر فيروس المتلازمة التنفسية كورونا 2 (سارس كوفيد 2) السلالة الفيروسية المسببة لجائحة كوفيد 19 العالمية المستمرة حتى الآن، والتي يتفاوت تأثيرها على الأفراد باختلاف الفئات العمرية، على الرغم أن البيانات المُسجلة صنفت النساء الحوامل في الفئة عالية الخطورة لكوفيد 19، إلا أنه لم تُكتشف الحقيقة كاملة حول خطر الانتقال العمودي للفيروس من الأم إلى الطفل أو المناعة المكتسبة بعد العدوى، لقد سجلنا حالة إصابة بفيروس كوفيد 19 لطفل حديث الولادة لأبوين ثبتت لديهما نتائج سلبية للفيروس، ونبحث عن المصادر المنطقية للعدوى في طفل حديثي الولادة.

الكلمات الرئيسية: COVID-19 حديثي الولادة ، انتقال عمودي ، SARS-CoV-2.

الطريقة:

لقد أعدنا تقرير حالة لطفل حديثي الولادة ودراسة الأسباب المحتملة لانتقال عدوى كوفيد 19، في يوم 27 مارس 2020، أحضر طفل حديث الولادة يبلغ ثلاثة أيام من العمر إلى قسم الطوارئ بمستشفى الدوامي العام، وكان يُعاني من الحمى، حيث سجّلت درجة حرارة الجسم 38.1 سيليزيوس، مع السعال وسيلان الأنف، وصُنفت درجة الفرز الصحي رقم 6، عدا ذلك، لم يكن هناك أعراض أخرى كضيق النفس أو أعراض الجهاز الهضمي، وكانت نسبة تشبع الأكسجين طبيعية لدى الطفل.

تم تسجيل تاريخ مرضي كامل لكل من الأم والطفل المولود، وتبين أن الطفل قد وُلد بعد تمام فترة الحمل خلال ولادة طبيعية مهبلية تلقائية من أم تبلغ من العمر 28 عاماً دون مضاعفات طبية أو تاريخ سابق بالسفر، في مستشفى العسكري بالرياض، نفت الأم إصابتها بأي من الأعراض التنفسية أو الحمى قبل الولادة، كما بدأت الأم الرضاعة الطبيعية لمولودها بعد الولادة مباشرة.

النتائج:

تم الحصول على مسحة من بلعوم الطفل التي ظهرت إيجابية لفيروس كوفيد 19، كما أُجري تصوير الصدر بالأشعة السينية (الصورة 1)، وفحوصات الدم المخبرية حيث أظهرت النتائج التالية: تعداد كريات الدم الحمراء: $3 \times 10^8 \times 8.8$ ميكرو لتر، الهيموجلوبين: 19 جرام/ديسيلتر، الصفائح الدموية: $3 \times 10^5 \times 255$ ميكرو لتر، ناقلة أمين الألانين: 16، ناقلة أمين الأسبرتات: 42، البوتاسيوم: 6.4 ميلي مول/لتر، الصوديوم: 141 ميلي مول/لتر، الكرياتينين: 23 ميلي مول/لتر، الجلوكوز: 6 ميلي مول/لتر، دي دايمر: 327، بروتين سي المتفاعل: سلبى، فصيلة الدم: إيجابي ب، خضع الطفل للرعاية الطبية الداعمة، ثم خفت الأعراض بعد يومين من الإدخال، كما أُخذت مسحتان من الطفل في اليوم الثاني والرابع وكانت نتاجهما سلبية.

تم عزل والدي الطفل وفحصهما مع أخذ مسحات بلعومية متكررة خلال فترة العزل، وتبينت سلبية النتائج لكل منهما.

قمنا باستبعاد المصادر الأخرى المحتملة للعدوى، وقد ثبت أنه لم يتم إدخال أي حالة مصابة بفيروس كوفيد 19 خلال وقت الدراسة أو حتى إصابة أحد أفراد طاقم الرعاية الطبية لديها، كما تبين وفقاً لما ذكره الوالدان عدم إصابة أي فرد من أفراد الأسرة بعدوى الفيروس أو حتى ظهور أعراض الإصابة بالفيروس.

المناقشة:

على الرغم من احتمال انتقال الفيروس من الأم إلى الجنين أثناء فترة الحمل أو الولادة، إلا أن معدل الانتقال الذي تم الإبلاغ عنه منخفض، لكنه يجب اتخاذ الاحتياطات السريرية ومتابعة المزيد من الفحوصات، حيث أنه يمكن تقليل معدل الانتقال في الفترة المحيطة بالولادة على نحو أكبر عند اتخاذ الاحتياطات المناسبة، تُمثل نسبة الأطفال حوالي 1-5% تقريباً من الإصابات المؤكدة بفيروس كوفيد 19، حوالي 90% من الأطفال المُصابة لم تظهر لديهم أعراض أو لديهم أعراض خفيفة أو متوسطة، بينما 6-7% من الأطفال المُصابة كانت إصابتهم شديدة، وفي هذه الحالة تكون الإصابة خفيفة وسريعة التعافي، تختلف معدلات انتقال العدوى وأيضاً المناعة المكتسبة بعد العدوى باختلاف الأنماط الجينية لفيروس كوفيد 19، حيث يمكن أن تقي المناعة المكتسبة بعد الإصابة الأولية بفيروس سارس كوفيد 2 من فرصة تكرار الإصابة، وقد يكون ذلك تفسيراً لسلبية نتائج الأم، كما تشير البيانات المسجلة إلى إمكانية انتقال العدوى بين كل من الأم وطفلها أو بين الأشخاص، ورغم ذلك، يمكن الوقاية من انتقال العدوى في الفترة المحيطة بالولادة باتخاذ التدابير الاحترازية الكافية.

الخلاصة:

يمكن انتقال عدوى كوفيد 19 للطفل حديث الولادة إما عن طريق الانتقال (العمودي) بين الأم والطفل أو الانتقال بين الأشخاص، وغالباً ما تكون الرعاية الطبية الداعمة كافية لعلاج الأطفال حديثي الولادة، كما يمكن اكتساب مناعة واقية من تكرار الإصابة بعد الإصابة الأولى بالعدوى، تسبب عدوى كوفيد 19 أعراضاً خفيفة لدى الأطفال حديثي الولادة ويمكن انتقالها بين الأم والطفل أو بين الأشخاص. (صورة 1): صورة الأشعة السينية لصدر الطفل حديث الولادة أُجريت في اليوم الأول من الإدخال.



Introduction:

Setting:

Al Dawadmi General hospital is a governmental secondary care hospital located in the central region of the Kingdom of Saudi Arabia (KSA), serving around 300,000 people, providing services in different specialities, such as outpatient, inpatient, and critical care units.

Identification:

In March 2020, the Saudi Arabian Field Epidemiology Training Program (FETP) was notified of a neonatal COVID-9 outbreak in the neonatal intensive care unit of Dawadmi General Hospital in the central region of KSA. A 3-day old boy presented to the emergency of Al Dawadmi general hospital on 27th March 2020 with a triage score of 6. The baby was running a 38.1°C fever, with cough and rhinorrhoea. He was otherwise maintaining normal oxygen saturation with no shortness of breath and no gastrointestinal symptoms. He was tested positive for COVID-19 on 29th March 2020.

Background:

The outbreak of Coronavirus Disease-19 (COVID-19) that emerged in December 2019 in Wuhan (China) quickly spread outside of China, leading the World Health Organization (WHO) Emergency Committee to declare a Public Health Emergency of International Concern (PHEIC) on 30th January 2020. According to WHO, the pandemic has spread to 216 countries affecting 33 million individuals worldwide by September 2020 (1). Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is the causative strain for the ongoing global pandemic COVID-19 with varying outcomes in different age groups.

- **Epidemiology of COVID-19:**

Since the first outbreak report of COVID-19 in Wuhan, China, in late 2019, the cases have appeared in all continents except Antarctica. As of 30th September 2020, over 33 million cases and 991,000 deaths have been reported by WHO due to COVID-19 (2). In KSA, 332,790 cases and 4,655 deaths have been reported by WHO till 30th September 2020.

- **Communicability:**

COVID-19 is highly communicable and can be transmitted by both direct (droplet transmission and direct human to human transmission) and indirect means (airborne transmission and contagion transmission) (3). Respiratory droplets (particles >5–10 μm diameter) from coughing and sneezing are considered the primary means of transmission. Aerosol transmission can also transmit the virus in protracted exposure to the high aerosol concentrations in closed settings. It is noteworthy that pre-symptomatic and asymptomatic individuals can contribute to up 80% of COVID-19 transmission (4).

COVID-19 is less commonly observed in children. In all other age groups, the virus can effectively cause the disease. Male, aged over 65, smokers, and various comorbid conditions such as diabetes, hypertension, cardiovascular disease, and pre-existing respiratory diseases can significantly affect the disease prognosis of COVID-19. Certain clinical manifestations, including fever, shortness of breath or dyspnea as well the laboratory examinations such as AST, WBC, PCT, Cr, LDH, D-dimer and hs-cTnI can also influence the progression of the infectious disease (5). The infected individuals recover within a few weeks; however, in the individuals with comorbid conditions, more severe disease can be caused that can spread to other organs and eventually lead to the individual's death. COVID-19 can have a range of outcomes in the infected individuals, ranging from mild self-limiting disease to more severe forms that can eventually cause death depending on the age, the strain of the virus and pre-existing comorbidities in the affected individuals. A US-based study, including 5700 patients who needed hospitalizations, showed that 30.7% of patients were febrile, 17.3% had a respiratory rate greater than 24 breaths/min, and 27.8%

needed supplemental oxygen. The study further reported that out of patients who were investigated and discharged before the study endpoint, 14.2% were admitted to the intensive care unit, 12.2% needed invasive mechanical ventilation, 3.2% progressed to the kidney replacement therapy, while 21% died (6).

Reported data, however, doesn't indicate an increased risk in pregnant women (7). The intrauterine or intrapartum transmission of COVID-19 is possible, yet the rate of transmission is low (8). Chances of perinatal transmission get lower with proper hygiene (9). The infection among neonates is usually mild, and the new-borns recover on their own within a few days with supportive care (9).

The patients are usually suspected of SARS-CoV-2 infection on the basis of clinical presentation or recent contact with the infected individuals before the clinical presentation of the disease. The travel history of the patient to an area with reported cases also merits further investigations. The suspected cases are isolated and tested for the presence of the viral RNA or the presence of viral antigen. Chest X-ray with characteristic findings of pneumonia can also point towards further testing. The most widely used is the direct detection of SARS-CoV-2 RNA by nucleic acid amplification tests (NAATs) through reverse-transcription polymerase chain reaction (RT-PCR). The nasal swab samples are taken from the upper respiratory tract (10, 11). In addition to NAAT, isothermal amplification, CRISPR-based assays, and next-generation sequencing can also be used (12). The test's sensitivity depends on various factors, including the type and quality of the specimen, the duration of COVID-19 at the time of sampling, and the specific assay and the rate of false-negative ranges from less than 5 to 40% (11, 12). An antigen can be used as an alternative to NAATs, but the sensitivity of these tests is highly variable (13). Serological tests detecting the presence of antibodies against the virus can be used for screening any recent infections. These tests can help in the identification of the sub-clinical infections (14).

The global response to the pandemic varied across different countries. In most parts of the world, very strict measures were taken to limit the spread of the virus, and full

resources were devoted to providing adequate medical care to the infected individuals. Among the most common measures taken were lockdown, as a part of which the schools and offices were closed, and people were advised to work from home until further notice. The students were advised to take online classes. Awareness among the community was created through electronic media, print media and social media platforms. People were advised to limit their interactions and wear masks whenever an outside trip was necessary. In case of a reported case, the contact tracing was performed, and all the contacts in the last 14 days were isolated for 14 days. The infected individuals were placed in quarantine until a negative test result (WHO strategy). In KSA, strict precautionary measures were applied to prevent virus entry into the country and to mitigate its impact once it arrived. A national committee was formed to follow the global updates and for preparing an appropriate strategic response.

The timeline of these measures was: on 6th February 2020, all direct flights between KSA and China were halted (15). On 27th February, the government suspended the entry of all international Umrah pilgrims and tourists. Despite these restrictions, on 2nd March, KSA reported its first confirmed case OF COVID-19. Umrah was entirely suspended by 4th March, and the two holy mosques in Makkah and Madinah were cleaned and disinfected daily. On 8th March, remote learning was implemented for all the educational institutes. A travel ban was imposed on all the affected countries, with mandatory quarantine for passengers who already arrived from these countries. This was followed by the decision of postponing or suspension of all the social and governmental gatherings. Eventually, all international travel and major national and international events were postponed. Additionally, the five daily prayers in all mosques were banned (16, 17).

Medical Management:

There is no specific antiviral treatment reported for COVID-19 to date. Symptomatic treatment is used for the management of COVID-19. Oxygen therapy is usually used for addressing respiratory impairments. Non-invasive (NIV) and invasive mechanical ventilation

(IMV) is used for the more complex respiratory syndrome. Corticosteroids (dexamethasone) (18), antiviral agents (lopinavir /ritonavir) (19), remdesivir (20), oseltamivir (21), immunomodulatory drugs (hydroxychloroquine, chloroquine) (22-24), and serotherapy have also been used for the treatment of COVID-19 showing mixed results in various settings. The disease presents with usually mild symptoms among neonates, and no drugs are therefore suggested until indicated otherwise.

Rationale:

Although reported data indicates that the pregnant women are in a high-risk group for COVID-19, vertical transmission and post-infection immunity have not been completely understood owing to the rare occurrence of neonatal COVID-19 (7). We report a case of neonatal COVID-19 of otherwise negative COVID-19 parents.

Objective:

The aim of this report is to investigate the possible mode of transmission in a neonate with parents who were tested negative for COVID-19.

To identify the plausible source of neonatal infection for heightened public awareness on vertical transmission.

Recommendation of the procedures that must be followed to prevent further neonatal COVID-19 cases.

Methods:

Study Design:

This is a case report of neonatal COVID-19 of a 3-day old baby boy who reported at Al Dawadmi General hospital, Kingdom of KSA. The study spans from 27th March 2020 to 1st April 2020.

Overview:

- The hospital notified the FETP team about the case, and the team visited the hospital to collect the data.
- On 27th March 2020, the baby was taken to the hospital complaining of fever, cough and rhinorrhoea.
- On 29th March 2020, the baby's swab result came out as positive; he was diagnosed with COVID-19 and was admitted to the hospital.
- On 1st April 2020, the baby was discharged from the hospital.

Investigation Team:

The Saudi Field Epidemiology Training Program (FETP) conducted a field investigation, visited the admitting hospital, interviewed the consultant responsible for the index case to learn about the baby's health history and contact history, and visited the family's house to gather more information.

Case Finding:

The neonate was identified as a case as per WHO criteria according to which 'acute onset of ANY THREE OR MORE of the following signs or symptoms' classify a COVID-19 case: Fever, cough, general weakness/fatigue, headache, myalgia, sore throat, coryza, dyspnoea, anorexia/nausea/vomiting, diarrhoea, altered mental status. The index case was confirmed by positive PCR test result for the SARS-CoV-2 genome.

The hospital staff and the parents were interviewed for the individuals who came in contact with the neonate.

Data Collection:

The index case and his family lived in Al Dawadmi. An epidemiological team interviewed the physician who reported the case and visited the child's family.

The data that was collected for identifying the source of infection included the following: (Patient demographic information, Reporting Source, clinical signs and symptoms,

Treatment, laboratory investigation, Radiological investigation, vaccination history and epidemiological link).

Investigations:

- **Laboratory (Microbiological) investigation:**
 - Complete Blood Screening was done.
 - A nasopharyngeal swab was taken from the neonate and sent to The National laboratory in Riyadh for PCR.
- **Radiological investigation:**
 - Chest X-Ray screening was done.
- **Environmental screening:**
 - We went to the home of our index case to interview the parents. We also looked for the number of cases reported from that area.
 - We studied the number of cases reported from the hospital setting and looked if adequate measures were in practice to prevent COVID-19 spread. None of the hospital staff who came into contact with the infant during delivery was tested positive for COVID-19 or was symptomatic.

Intervention:

Both parents and neonate were isolated from other patients and family members. A complete and thorough history of the baby and the mother was recorded, revealing that he was delivered full term as a spontaneous vaginal delivery to a 28-year-old mother, with no travelling history or medical complication during the pregnancy and delivery, in Riyadh Military hospital. The mother denied any respiratory tract symptoms or febrile illness pre-delivery. Breastfeeding was initiated and maintained since delivery.

Results:

A 3-day old Saudi neonate presented to the Al Dawadmi General hospital with complaints of fever, cough and rhinorrhoea and was subsequently tested positive for COVID-19. The boy was provided with adequate medical support and was discharged on 1 April 2020. A nasopharyngeal swab was taken from the neonate, which came back positive. Chest X-ray was performed, showing normal lung fields with bilaterally clear costophrenic angles (Figure. 1). The haematological profile is depicted in table 1.

The patient was isolated and provided supportive care therapy. Symptoms resolved on day-2 post-admission. Swabs taken on day 2 and 4 returned negative. Both parents were screened and isolated as well. Repeated swabs of parents during isolation came out negative.

Other possible sources were excluded as well. The hospital confirmed that neither infected health care workers nor cases that were COVID-19 positive were admitted to the hospital during that period of time. Also, parents confirmed during history that no other family member was infected or had any symptom of COVID-19.

Discussion:

While the intrauterine or intrapartum transmission of COVID-19 is possible; however, the rate of transmission is reported to be low, warranting clinical caution and further investigation (3), with chances of perinatal transmission getting even lower with proper precautions (4).

Comparison:

COVID-19 cases are reported throughout the globe. Based on the data from 25 neonatal COVID-19 cases, Bernardo *et al.* suggested that the main symptoms are fever, cough and shortness of breath. They further reported that no death occurred in the neonatal studies they included in their review (10). Aghdam *et al.*, on the contrary, reported a case of 15 days old neonate who presented with fever without cough, lethargy, cutaneous

mottling, and respiratory distress. The mother of the baby was symptomatic, and the NAAT results for the presence of SARS-CoV-2 came positive, suggesting that some cases might present with non-specific symptoms (25).

COVID-19 is less severe in the new-borns and children. Not many reports have been published which look into the detailed epidemiology in neonates. According to one analysis, children account for 1–5% of diagnosed COVID-19 cases. Around 90% of paediatric patients are diagnosed as asymptomatic, mild, or moderate. However, up to 6–7% of cases are severe (26). In our case, the presentation was mild and demonstrated rapid recovery which is concordance with global trend observed among SARS-CoV-2 infected neonates. Different genotypes of COVID-19 have different transmission rates and post-infection immunity. Immunity acquired following primary infection with SARS-CoV-2 might be protective upon subsequent exposure (27). In our case, this can explain the negative test results of mother who might have acquired the virus before the birth of the baby and has completely recovered and thus has immunity against the virus. The reported data indicates the possibility of both vertical and horizontal transmissions; however, perinatal disease transmission is preventable with adequate precautions (7-9).

Our reported case was symptomatic with fever on the third day of birth, and was diagnosed by PCR for SARS-CoV-2 genome. In the literature, so far 11 neonatal COVID-19 cases have been published which were detected by PCR testing (28-35), six out of which match our report for third day of presentation. Similar to our report, seven neonates presented with pyrexia, while eight neonates were born to mothers who tested positive for COVID-19. In contrast to our reported case, however, mode of delivery in those neonates was Caesarean section, whereas mode of transmission was horizontal in three of them.

In the early days of the outbreak, the transmission patterns for the virus were not completely understood. Kulkarni *et al.*, reported the case of a 38 hours old baby presenting with COVID-19 symptoms. The baby was born to a mother who tested positive for COVID-19 by serology, but tested negative by RT-PCR. Placenta, umbilical stump and the

nasopharyngeal aspirate samples collected at the time of birth tested positive. After the appearance of symptoms, the baby tested positive for SARS-CoV-2. This study thus reports high likelihood of vertical transmission (36). Farsi *et al.*, reported a case of COVID-19 positive mother expecting triplets. Two of the triplets died after birth however one was discharge in good health. All three new-borns presented with low Apgar scores at the time of birth and were transferred immediately to the neonatal intensive care unit The second male tested positive on days 3 and 6 for COVID-19, however he finally recovered (37). Abasse *et al.*, reported the presence of COVID-19 in a 14 days old baby who was born pre-term to COVID-19 positive mother. He suggested the probability of vertical transmission (38).

One of the largest of these studies was conducted by Salvatore *et al.*, who performed an observational study on COVID-19 positive pregnant women. The mothers were allowed skin-to skincare and breastfeeding, but after wearing a mask and practising proper hygiene. All the neonates were tested for the virus at 24 hours of life, at which point none were positive. 82 neonates completed all the follow-up process on days 5–7 of their lives. Of these 82 neonates, 83% neonates were roomed in with their mothers. 79 out of 82 neonates were re-tested at 5–7 days of their lives, and all of them again tested negative. On day 14, 72 neonates were tested again, and none were positive. This study ruled out the possibility of transmission via breast milk (9). Carvalho *et al.*, suggested that vertical transmission is unlikely and the transmission occurs primarily through the infected droplets from the caregivers or through contact with the contaminated biological material (39). Dumpa *et al.*, observed the case of a 22 days old COVID-19 neonate and suggested the likelihood of horizontal transmission (40). In our reported case, the neonatal infection indicates the lack of appropriate preventive measures and protocols, since the parents left the hospital after delivery without proper medical leave/ advice. The neonate was born to an otherwise asymptomatic – and later COVID-19 negative -- mother that further decreases the likelihood of vertical transmission. Nevertheless, several plausible causes could have led to the neonatal COVID-19 and the potential source of infection is not evident from contact tracing or investigation of the hospital facility in terms of preventive measures and protocols.

Conclusion:

Both vertical and horizontal transmission could have led to neonatal COVID-19 infection. Supportive care is usually sufficient in neonates, and primary infection might provide immunity on re-exposure. Neonatal COVID-19 infection is mild and can be acquired horizontally or vertically.

Limitations:

- We faced obstacles in tracing the family, once the family went LAMA (leave against medical advice).
- Although, we thoroughly checked the extended family and members of the household for any symptoms of COVID-19, we weren't able to isolate or test them.

Recommendations:

- Ongoing research is required to ascertain the epidemiology of COVID-19 in neonates, and the rate of vertical transmission in that population.
- Current guidelines do not take into consideration the risk of antenatal transmission. Future guidelines need to include the possibility of antenatal transmission, even from mildly symptomatic mothers.
- A robust surveillance system in the form of international registry exploring the impact of emerging pathogens on pregnancy has been initiated (41). There is a need to replicate such models locally to help identify cases of vertical transmission of COVID-19.
- We recommend that hospitals establish clear contact-tracing system and validated protocol to test all asymptomatic – but having high index of suspicion – expectant mothers undergoing delivery; those coming from an area of reported outbreak or having household members with symptoms or proven COVID-19.

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Table 1: Haematological Profile

White blood cell	8.8 x10 ³ /uL
Haemoglobin	19 g/dL
Platelets	255 x10 ³ /uL
ALT	16
AST	42
Potassium	6.4 mmol/L
Sodium	141 mmol/L
Creatinine	23 mmol/L
Glucose	6 mmol/L
D-dimer	327
CRP	negative,
Blood group	B+

X-Ray:

Figure 1. CXR of the neonate performed on day1 of admission showing normal lung fields with bilaterally clear costophrenic angles

