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document an education in alignment with global midwifery standards. There is an identified need to train more midwives, and a program that addresses this critical gap in maternal health services is of utmost importance for mothers and newborns [3].

Author contributions

ASN conceived of the education program with feedback and input from all of the authors and significant input from MSH, and EH, LM, LN, and EB. MSH manages the research arm of the maternal health programs and supports the development of the program evaluation components. EH, LM, LN and EB all are working on the development and implementation of the pilot module.

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Ethical statement

The Colorado Multiple Institutional Review Board approved this de-identified secondary analysis of data prospectively collected as part of a quality improvement database (COMIRB # 15-0909).

Declaration of Competing Interest

The authors report no declarations of interest.

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References

- [1] Asturias EJ, Heinrichs G, Domek G, et al. The Center for Human Development in Guatemala. *Adv Pediatr* 2016;63(1):357–87.
- [2] Kim T, Kim T, Zuckerman JE. Realizing the potential of telemedicine in global health. *J Glob Health* 2019;9(December (2)):020307.
- [3] Ten Hoope-Bender P, Renfrew MJ. Midwifery - a vital path to quality maternal and newborn care: the story of the Lancet Series on Midwifery. *Midwifery* 2014;30(November (11)):1105–6.

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Signs suggestive of congenital SARS-CoV-2 infection with intrauterine fetal death: A case report



Sir,

We found signs suggestive of congenital severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection ending in stillbirth in an asymptomatic pregnant woman with coronavirus disease 2019 (COVID-19).

COVID-19 is caused by SARS-CoV-2, and the main mode of transmission is person-to-person by respiratory droplets. Vertical transmission has not been demonstrated clearly to date, but the possibility of such transmission cannot be excluded as a few possible or probable cases of in-utero infection have been reported. However, the risk of such transmission remains unclear [1,2].

We report a case of a pregnant 19-year-old woman with no previous medical history. The pregnancy was supervised in primary health care from an early stage.

At 34 weeks of gestation, the woman underwent a fetal ultrasound scan which revealed: fetus in the 0.3 percentile (weight

estimate 1.407 g) with pleural effusion, cardiomegaly and ascites; oligohydramnios; and umbilical arterial pulsatility index >95th percentile. As a result, the woman attended hospital, where repeat ultrasound found that the fetus no longer had a heartbeat.

The pregnant woman was hospitalized to induce labour due to fetal death. Naso-oro-pharyngeal swab testing for SARS-CoV-2 by reverse transcriptase polymerase chain reaction (PCR) revealed that the woman was positive for the virus. Serologies for Epstein-Barr virus, parvovirus B19, cytomegalovirus, syphilis, rubella and toxoplasmosis were negative.

While hospitalized, the pregnant woman remained asymptomatic, haemodynamically stable and afebrile. Vaginal delivery occurred 16 h after labour induction. The female stillborn weighed 1.460 g, and the mother chose to have no contact with the baby.

An autopsy was performed on the fetus after the pathology team had taken lung samples through fine needle puncture, a technique similar to fine needle aspiration. PCR for SARS-CoV-2 was positive for lung samples. The fetus had biometrics compatible with 31 weeks of pregnancy, generalized oedema, serous cavity effusions, mild cardiomegaly and incomplete right lung segmentation. Preliminary histological findings showed generalized massive vascular congestion, and stasis was apparent throughout all the organs, with scarce

microthrombi. The placenta revealed numerous large, confluent acute infarcts, with vascular congestion and thrombi in the vessels.

This report describes a case with signs suggestive of congenital SARS-CoV-2 infection ending in stillbirth in an asymptomatic pregnant woman. The findings from the fetal ultrasound scan suggest congenital infection [3]. Viral screening was negative. On autopsy, lung samples were obtained from the fetus which revealed SARS-CoV-2 on PCR. The diagnosis of maternal–fetal transmission of SARS-CoV-2 is supported by the criteria of Shah et al., which affirm congenital infection with intrauterine fetal death if a virus is detected by PCR from fetal tissue [4]. The placenta was not tested for SARS-CoV-2, which is a limitation of this case. However, the histological findings are compatible with those found in pregnant women with COVID-19 [5]. Immunohistochemical studies focusing on SARS-CoV-2 viral particles will be performed on placenta and fetal tissues soon.

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Ethical approval

Written informed consent was obtained from the patient for anonymized information to be published in this article. Ethical approval to report this case was obtained from the Ethics Committee of Hospital Prof. Doutor Fernando Fonseca (Approval ID: 73/2020).

Declaration of Competing Interest

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References

- [1] Deniz M, Tezer H. Vertical transmission of SARS CoV-2: a systematic review. *J Matern Fetal Neonatal Med* 2020;21:1–8.
- [2] Vivanti AJ, Vauloup-Fellous C, Prevot S, et al. Transplacental transmission of SARS-CoV-2 infection. *Nat Commun* 2020;11:572.
- [3] Khalil A, Sotiriadis A, Chaoui R, et al. ISUOG practice guidelines: role of ultrasound in congenital infection. *Ultrasound Obstet Gynecol* 2020;56:128–51.
- [4] Shah PS, Diambomba Y, Acharya G, Morris SK, Bitnun A. Classification system and case definition for SARS-CoV-2 infection in pregnant women, fetuses, and neonates. *Acta Obstet Gynecol Scand* 2020;99:565–8.
- [5] Shanes ED, Mithal LB, Otero S, Azad HA, Miller ES, Goldstein JA. Placental pathology in COVID-19. *Am J Clin Pathol* 2020;154:23–32.

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Auscultating with personal protective equipment (PPE) during COVID-19 pandemic – Challenges and solutions



Dear Editor,

Ever since the COVID-19 outbreak was reported in December 2019, the standard of precautions to be followed by healthcare workers (HCW) to avoid exposure has continuously evolved. As COVID-19 spreads via respiratory droplets and aerosols from infected person and also through contaminated fomites, wearing personal protective equipment (PPE) has become the essential method of preventing infection among HCWs across the world [1]. PPE includes items such as gloves, goggles, faceshields, N-95 masks, hoods, shoe-covers, and full body suits or gowns.

Wearing a standard PPE while providing direct care to COVID19 patients or during aerosol generating procedures involves complete covering of entire body [1,2]. However, wearing a full PPE is not without limitations like personal discomfort, claustrophobia, fogging of goggles or faceshields, difficulty in communication and performing procedures [2]. One of the main limitations is the difficulty to healthcare workers carrying out auscultation using stethoscope. Since both ears are covered completely with hood of PPE suit, earpieces of stethoscope cannot be directly placed into ears. The ear piece can only be placed over PPE gown and it is

difficult to auscultate this way. Creating opening in PPE is not advisable as it might breach the sterile barrier and increase the risk of transmission. Moreover, a stethoscope can also serve as a potential fomite which can facilitate cross contamination between patients.

Auscultation with stethoscope is a very critical part of clinical assessment which is used in respiratory, cardiovascular and obstetric examinations. COVID-19 being a primary respiratory disease needs frequent respiratory system examination, especially auscultation for assessment of clinical status throughout the hospital course. Auscultation may also be needed after intubation to check air entry, cardiovascular auscultation, obstetric examination to hear fetal heart sounds and emergency conditions like pneumothorax to take quick management decisions. Inability to perform auscultation can significantly affect assessment and hence management and outcome of patients with COVID-19.

This issue can be addressed by using innovative equipment instead of traditional stethoscopes. Creating ear pouches on either side of PPE hood using the fabric of surgical masks to allow access to earpieces of stethoscopes have been tried in resource limited setup but its safety has not been established [3]. Digital/electronic stethoscopes are a novel alternative, where a 'receiver' portion of the stethoscope remotely connects to a smartphone app and plays the sound picked by 'receiver' via the phone's speakers [4,5]. Various models of digital stethoscope are available for commercial use including iStethoscope Pro (Peter Bentley, UK), SensiCardiac (Stone