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Lung Ultrasound for Rapid Diagnosis of COVID-19-Induced Pulmonary Pathology: A Case Report of a Pregnant Infected Woman

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Abstract

Lung ultrasound is an easy, reproducible and quickly learnt technique for obstetricians for examination of pregnant women suspected COVID-19 infection. Starting from the concrete example of a patient, we present the ease, safety and relevance of lung ultrasound, as a diagnostic orientation tool for pulmonary involvement in pregnant women in the context of COVID-19 infections.

Keywords: Lung ultrasound; COVID-19; Pregnant woman; Lung infection; CT scan

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Introduction

Currently, the gold standard for the etiological diagnosis of COVID-19 infection is the RT-PCR of samples from the respiratory tract. However, there is a significant rate of false negative results linked to the sampling method or to the viral load, 30-40% according to certain studies [1]. In this context, a rapid and reproducible diagnostic orientation can favour a reduction in the number of COVID-19 false negative patients before the clinical picture worsens.

Lung ultrasound is vast area of interest, with several aspects and specialties, particularly when applied to pregnant women. It's a non-irradiating examination with easy access to the patient's bed that's inexpensive and available in all countries including in third world countries.

Since the 1990s, various teams have highlighted the advantages that lung ultrasound brings to diagnosis of acute pulmonary involvement in patients hospitalized in intensive care units [2,3]. Recently, this was underscored in the context of viral infection with SARS-Cov2 [4].

The availability of this technique, its ease of learning and its immediate accessibility to any obstetric team on call means that lung ultrasound can provide a rapid response in an emergency without the risk of maternal-foetal radiation. It makes possible deferring biology and computed tomography: the only reliable diagnostic methods currently recommended.

For these reasons the Italian team of Francesca Moro has proposed to integrate lung ultrasound into the hierarchy of diagnostic tools to allow rapid sorting and appropriate management of suspected or confirmed for COVID-19 pregnant patients [4]. Indeed, Lung ultrasound brings several advantages including availability, safety, speed, reduced cost, increased comfort for the patient and above all the absence of radiation in an obstetric context. Starting from the concrete example of a patient, we present the ease, safety and relevance of lung ultrasound, as a diagnostic orientation tool for pulmonary involvement in pregnant women in the context of COVID-19 infections.

Case Report

A 32-year-old patient was referred [03/25/2020] by her gynaecologist to obstetric emergencies and presented with 38°C of fever [first episode 03/22/2020], a cough and fatigue with difficulty in breathing. It was a third pregnancy and and her

second had a history of a scar uterus for obstructed labour and an instrumental vaginal delivery. The current pregnancy had a start date of 08/25/2019 and is marked by gestational diabetes.

Faced with a reassuring clinical picture [normal maternal pulmonary auscultation, O_2 saturation at 99%, foetal heart rate without particularities) a test sample for COVID-19 was taken and the patient received instructions for daily home and telephone follow-up according to the current COVID-19 suspected case management protocol.

The sample returns two days later negative for COVID-19. Seven days after the symptoms declared, the clinical evolution of the patient required hospitalization on 03/30/2020 at 33 weeks of amenorrhea:

Clinically, there was significant asthenia, slight dyspnea and hyperthermia at 39.7°C. Free and symmetrical pulmonary auscultation, with an O_2 saturation of 97-100%. Testing for COVID-19 was redone and found to be positive. A complete infection assessment was carried out and treatment with amoxicillin initiated.

Concerning obstetrics, the ultrasound showed good foetal vitality, growth at the 89th percentile and normal appendages. The evolution 24 hours after hospitalization was marked by episodes of desaturation up to 93-94% resolving under 3L of O_2, which motivated the request for a chest scan.

The CT scan showed a lung lesion suggestive of COVID-19 infection (**Figure 1**). It was almost exclusively located in the left lung with the some “frosted glass” lesions, especially of alveolar condensation of the entire left base, and a degree of moderate to extensive involvement [25-50% of the total pulmonary parenchyma].

On 04/01/2020, a desaturation test was carried out according to the service protocol that indicated an O_2 saturation of around 93%. Maternal lung ultrasound, see (**Box 1**) for methodology, revealed a normal aspect for the right lung (F**igure 2a**). In the left lung, there was an irregularity in the pleural line and multiple hyperechoic vertical cone images compatible with a parenchymal pulmonary lesion consistent with COVID-19 pulmonary infection (**Figure 2b**).

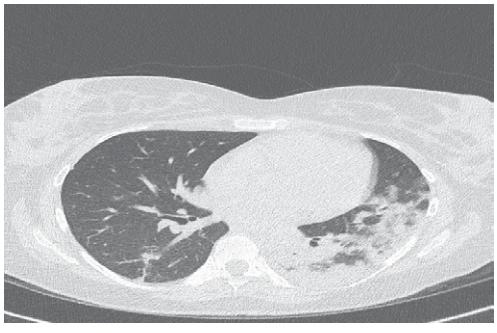


Figure 1 Chest CT scan showing a lesion compatible with a pulmonary damage typical of COVID-19 infection

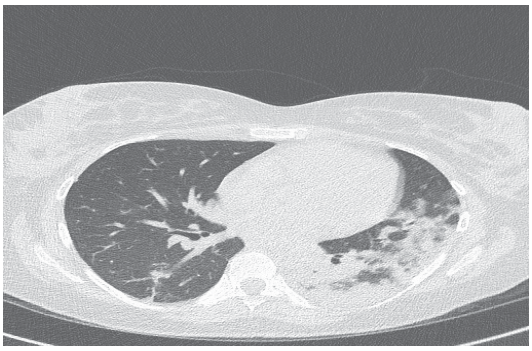


Figure 2 Ultrasound image showing regularity of the right pleural line (a) and semiological aspect compatible with left pulmonary involvement (b).

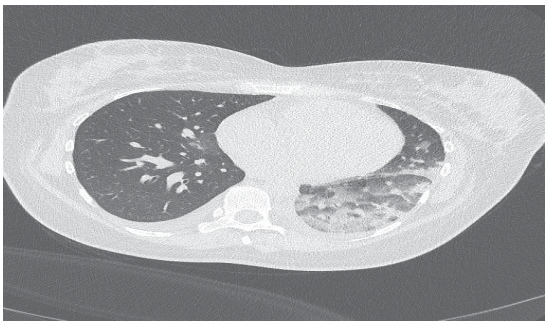
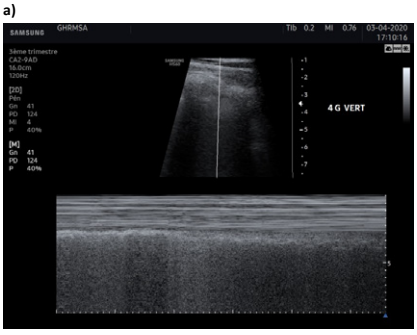


Figure 3 Chest CT scan showing residual lesions in the left lung.

a)



b)

Figure 4 Semiological ultrasound appearance compatible with left lung involvement, pleural line irregularity and pleural line irregularity cones, left basal effusion. Thickened pleura, less effusion without echogenic points (a) and thick pleura, irregular in consolidation (b).

Box 1: Lung Ultrasound in practice.

The chest cavity and the air in the lung have long been considered obstacles to ultrasound lung exploration. Despite the advent of more advanced and efficient imaging techniques in terms of diagnostic relevance, such as computed tomography and nuclear magnetic resonance imaging, in recent decades there has nevertheless been a growing interest in pleuropulmonary ultrasound [2].

Lichtenstein [5] proposes an examination technique, which seems easier to us by the smaller number of points compared with other studies [4].

Technically, the pulmonary assessment can be performed following a routine obstetrical ultrasound scan indicating an abnormal aspect that warrants further investigation [4].

As far as setting up the ultrasound machine, it is preferable to keep the same settings that you are used to working with (4). The gain can nevertheless be reduced to facilitate contrast and highlight hyperechoic lines of pleural structures, and the focal length must be adjusted to the pleural area under study.

Pulmonary ultrasound semiology has already been described and is standardized allowing a well-evaluated discriminative diagnostic input in the intensive care units [6].

Standardized signs allow the localization of the lung (pleural line sign), diagnoses of normality (pleural slip, A-line sign), pleural effusion (pulmonary line sign, sinusoid sign), lung consolidation (fractal and pseudo-tissue lung sign), interstitial syndrome (pleural flares) and pneumothorax (stratosphere sign, A-line, lung point) [2].

In longitudinal incidence (craniocaudal) the normal wall is presented by the hyperechoic apex of the ribs, their acoustic shadow cone and the intercostal space. Located approximately 0.5 cm below the signal of the ribs, the hyperechoic horizontal line materializes the parieto-pulmonary interface or pleural line that corresponds to the visceral pleura [3].

Normal static signs [3,5,6]: Resulting from the reflection of ultrasound and the drastic change in acoustic impedance between the wall and the ventilated lung, artefacts form the basis of pleuropulmonary semiology. The A-lines, wall reverberation artefacts, are horizontal and predominate in the normal lung. The B lines are vertical from the pleural line, crossing the entire acoustic window. They are present in cases of underlying pneumopathy, however, they can be visible at the bases of the normal lung and are then isolated.

Normal dynamic signs [3,5]: The movement of the two pleural sheets during breathing creates the famous "slip sign" in B mode. They contrast with the immobility of the underlying parietal structures. In motion time mode (TM mode) it becomes the "sign of the seaside".

Abnormal signs [4]:

- Irregular pleural line and sporadic B lines
- « White lung » sign
- Presence of sub-pleural consolidations

The obstetric staff decided on foetal extraction faced with the mother's worsening clinical picture.

A caesarean was performed under spinal anaesthesia allowing extraction of a child of 2450 g, Apgar 10, pHAo = 7.29. The post-operative course of the mother and child was favourable [maternal O_2 saturation = 100%]. At D2 post caesarean section a comparative imagistic control is performed which shows an improvement in the affected pulmonary regions with a predominantly left basal location (**Figure 3**). We find a perfect correspondence between CT and lung ultrasound results (**Figure 4**).

Discussion

Lung ultrasound is an easy, reproducible and quickly learnt technique for obstetricians for examination of pregnant women suspected COVID-19 infection. To our knowledge, this is the first case report describing the use of ultrasound to determine pulmonary involvement in a pregnant patient infected with COVID-19.

This easily reproducible examination can become, after a wider assessment and greater number of patients, a tool to help in the management of pregnant patients infected with corona virus. It can be easily used by any team and in particular, can facilitate the logistics of monitoring COVID-19 patients in intensive care units [5,6].

The COVID-19 pandemic will not spare low-income countries, where healthcare services are limited and in particular, where intensive care is often non-existent. If currently the management of respiratory distress due to COVID-19 infections remains

symptoms-based, and mainly related to settings on respirators, due to global mobilization it's necessary that a therapeutic regimen be quickly defined to reduce patients being admitted to intensive care. We believe that lung ultrasound can replace CT scans for rapid and cheap diagnosis of severe COVID-19-related pulmonary infections and thus, allow patients to receive appropriate and early management of their symptoms.

Conclusion

The COVID-19 pandemic will not spare low-income countries, where healthcare services are limited and in particular, where intensive care is often non-existent. If currently the management of respiratory distress due to COVID-19 infections remains symptoms-based, and mainly related to settings on respirators, due to global mobilization it's necessary that a therapeutic regimen be quickly defined to reduce patients being admitted to intensive care. We believe that lung ultrasound can replace CT scans for rapid and cheap diagnosis of severe COVID-19-related pulmonary infections and thus, allow patients to receive appropriate and early management of their symptoms.

References

1 Wang Z, Yang B, Li Q, Wen L, Zhang R (2020) Clinical features of 69 cases with coronavirus disease 2019 in Wuhan, China. Clin Infect Dis p. 272.

2 Lichtenstein D (2017) Novel approaches to ultrasonography of the lung and pleural space: Where are we now? Breathe 13: 100-111.

3 Noirez L, Laurent P (2020) Nicod, L'echographie pleuro pulmonaire pour le radiologue. Rev Med Suisse 2: 1.

4 Moro F, Buonsenso D, Moruzzi MC, Inchingolo R, Smargiassi A, et al. (2020) How to perform lung ultrasound in pregnant women with suspected COVID-19 infection. Ultrasound Obstet Gynecol 55 (5): 593-598.

5 Lichtenstein D (2017) Echographie thoracique. 13:1990-1995.

6 Lichtenstein D, Mezière G, Seitz J (2009) The dynamic air bronchogram. A lung ultrasound sign of alveolar consolidation ruling out atelectasis. Chest 135 (6): 1421-1425.