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Review Article

Obstetrics Changes Caused by Covid-19

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Abstract:

The COVID-19 pandemic has imposed on all workers in the Italian, European and World National Health System a rapid adaptation in the management of multiple clinical situations. In the obstetric-gynecological area, the care of mothers and newborns has become difficult and full of challenges. The adaptations necessary to ensure good quality obstetric care have concerned the pregnancy management, the recovery of pregnant patients and their children, the labour time and the breastfeeding and puerperal care. The present paper summarizes the impact of COVID-19 on obstetric habits based on scientific evidence and clinical experience in the context of the rapidly evolving regulations promulgated in Italy.

Keywords: COVID-19; pregnancy; labour; breastfeeding; antibodies; vaccination

Introduction

The COVID-19 pandemic is an ongoing global pandemic caused by a severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It started in 2020 and has dramatically affected our daily lives and common habits. The most relevant changes have concerned the health care system and pregnant women have been considered one of the high-risk group of patients since the beginning of the epidemic.

The aim of the manuscript is to analyze the impact of COVID-19 on obstetric habits in the past three years, highlighting clinical and human difficulties, challenges, and changes in managing pregnancy, recovery, labor and delivery, breastfeeding and puerperal follow-up.

We have reviewed the current literature and guidelines dealing with the effect of COVID-19 on obstetric assistance of mother and child. A search of the PubMed database was carried out by two researchers independently and the following search strings were used: “pregnancy AND COVID-19”, “Labour AND COVID-19”, “breastfeeding AND COVID-19”. Only papers related to the issue of the role of COVID-19 in the context of obstetrics area and published from March 2020 to March 2023 were considered.

Pregnancy management

COVID-19 causes more severe disease in symptomatic pregnant patients with respect to non-pregnant women, due to the immunosuppressive state pregnancy-induced as well as physiological and mechanical changes [1]. Data shows that SARS-CoV-2 infection during pregnancy is associated with specific adverse pregnancy outcomes like preeclampsia, preterm birth, and stillbirth [2].

An indirect impact of COVID-19 on pregnancy outcomes due to the effects of the pandemic on healthcare systems played an important role which caused adverse pregnancy outcomes such as increased stillbirths and maternal deaths. Therefore, to protect pregnant women from the disease and complications, it is essential to prioritize vaccination and immunization plans and, on the other hand, healthcare workers must be adequately educated about the prognoses and management of pregnant women with COVID-19 [3, 4]. As far as the pregnancy management is concerned, there are several points that healthcare workers must consider when they take care of a pregnant woman in the COVID era.

First of all, it must not be forgotten that every woman, even if SARS-CoV-2 positive, should participate in her care choices and the presence of a “care giver”, a person chosen by the woman to be present during visits, examinations, meetings and hospitalizations, should be guaranteed. In 2020 and 2021 the presence of a caregiver was not recommended by health and local authorities and many classes and information were given via online meetings, but finally in 2022, thanks to the spread of vaccines and their positive effects on COVID-19 natural history, many limitations were gradually reduced, although the use of a mask for women and for health professionals is still recommended in many medical centers [5, 6].

For low-risk pregnancies, the Italian National Institute of Health (INIH) update in February 2021 recommended to maintain a minimum of 6 face-to-

face prenatal visits and, when possible, carry out the check-up, ultrasounds (US) and any other diagnostic tests in a single appointment [7]. High-risk pregnancies may require a greater number of check-ups, so international guidelines suggested that at the end of each appointment, the patient and her health care provider should decide whether the following appointment should be face-to-face or remotely. These recommendations have not been updated after the vaccination campaign, therefore leaving the indications up to the local health systems and hospitals [7].

Even in the middle of the pandemic, the guidelines underlined the importance of keeping appointments for the recommended US scans and the duty of pre-natal services for the assessment and surveillance of fetal growth during the pandemic, as in the pre-COVID era [8].

A controversial aspect about pregnancy management is the need for further US because the evidence supporting an increased risk of fetal underdevelopment is still not conclusive. Many of the clinical practice guidelines suggest performing a fetal growth US scan in women who have been seriously or critically symptomatic for COVID-19 within the first 14 days following recovery and to consider further US monitoring on individual basis. A recent multicentric prospective observational study conducted by Researcher from "Careggi University Hospital" in Florence and "S. Stefano Hospital" in Prato from 2020 to 2022, showed that fetal growth appears to be affected by COVID-19 with a higher incidence of impaired growth velocity compared to the general population [12].

Other important aspects about COVID-19 that should be discussed during a counseling with the pregnant patient are the risk of vertical transmission and the vaccination plans during pregnancy., Maternal-fetal infection transmission is possible but generally low and fetal invasive procedures are considered to be safe also in pregnant women with SARS-CoV-2 infection [9]. Counsel a pregnant woman about vaccination plans other than only COVID-19 vaccination is also mandatory because flu and pertussis vaccination are recommended also for COVID-19 positive women.

Regarding the vaccination against COVID-19, primary vaccination against COVID-19 and booster doses (third and fourth dose) with mRNA vaccines are recommended for all pregnant women at all times of pregnancy, especially if there is an increased risk of developing a serious disease [7]. In fact, now severe COVID-19 in pregnancy is almost exclusively limited to unvaccinated women [13].

Primary vaccination and booster doses (third and fourth dose) can be administered at the same time as the vaccinations recommended during pregnancy against flu and pertussis.

An Italian survey from Cavaliere et al. showed that the COVID-19 experience may positively change attitudes toward immunization in pregnancy [14]. The obstetric and medical staff has an important role during prenatal care in recommending and organizing COVID-19, flu and Tdap vaccination but also in reducing vaccination hesitancy in pregnancy [15].

Recovery issues

The management of SARS-COV-2 infection in pregnancy is described in a systematic review published in May 2022 which analyzed 28 clinical practice guidelines. None of the above-mentioned guidelines recommended maternal hospitalization only for SARS-CoV-2 infection in asymptomatic women, and in many guidelines, authors agree that their admission to hospital should be restricted to women with severe infection or rapidly worsening clinical conditions. Therefore, pregnant women should be made aware by physicians of maternal and neonatal signs, including signs of worsening COVID-19 symptoms and reduced active fetal movements, which require assistance [10].

When hospitalization is required, local protocols need to ensure that pregnant women with confirmed or suspected COVID-19 infection are identified and isolated upon arrival at the hospital before proceeding with the visit. Therefore, hospitals have provided separate spaces, clean and protected pathways, physical distancing but also instructions to sanitize settings and equipment, using appropriate personal protective equipment (PPE), both for pregnant women and for workers.

In case of infection and room isolation of the patient, routine, in-person visits in hospitals should be postponed if possible, using alternative means of communication to reduce access to hospitals. Once the isolation period is over, visits could be rescheduled following national and international guidelines and recommendations.

According to United Kingdom Obstetric Surveillance System (UKOSS) data, overweight or obese foreign pregnant women with pre-existing comorbidities (such as diabetes and chronic hypertension), aged >35 years or with socio-economic difficulties, appear to be at greater risk of hospitalization and severe pneumonia when affected by the Sars-CoV-2. Pregnant women with suspected pneumonia or severe illness due to COIVD-19 should not be denied imaging diagnostic based on chest radiography, or computed tomography pulmonary angiography (CTPA) where indicated [16, 17]. Concerns and misconceptions about potential radiation-related risks for the embryo or fetus are still widespread among clinicians and can lead to excessive anxiety among patients, but evidence has showed the safety of these procedure and it's a medical duty to reassure women that the radiation dose during single chest CT or even CT pulmonary angiogram is much lower than the one potentially causing fetal complications [18, 19].

It is proven that SARS-CoV-2 infection can be a risk factor for venous thromboembolism (VTE) and pregnancy is a known hypercoagulable state, which can be even higher due to the immobility during the isolation and hospitalization of the woman. In fact, an important issue during the hospital recovery is the thromboprophylaxis with low-molecular-weight heparin (LMWH), that was recommended for symptomatic women by many guidelines, even if its prescription should be assessed on a case-by-case basis, taking into account several factors including hospitalization, comorbidities, severity of the disease and the timing of delivery [9, 10].

In case of severe complications from COVID-19, patients should be treated by a multidisciplinary team. It should include an expert in the treatment of VTE during pregnancy, in order to correctly define the dosage of LMWH to be delivered.

COVID-19 may be also associated with thrombocytopenia, so acetylsalicylic acid prescribed for pre-eclampsia prophylaxis should be stopped during the period of illness to reduce the risk of bleeding in case of low platelets count (<50000/micro-L) [11].

About corticosteroids, none of the guidelines recommends their administration only for the presence of SARS-CoV-2 infection in preterm gestation, so corticosteroid therapy should only be used specifically for fetal lung maturity [10]. However, the Royal College of Obstetricians and Gynecologists (RCOG) guidelines produced in 2021 and updated in December 2022, suggested the use of corticosteroid in case of severe maternal infection that requires oxygen therapy for ten days, in association with PPE cover. In this scenario, the most appropriate choices of corticosteroids include oral prednisolone 40 mg once daily or intravenous hydrocortisone 80 mg twice daily [11]. If steroids are indicated at the same time for fetal lung maturity, the intramuscular dexamethasone 12 mg twice (24 hours apart), should be followed by oral prednisolone 40 mg once a day, or IV hydrocortisone 80 mg twice daily for 10 days [11].

Other therapeutic strategies include the use of interleukin-6 receptor antagonists that has been shown to improve outcomes in hospitalized patients with hypoxia and systemic inflammation; neutralizing monoclonal antibodies (n MAB's) in pregnant and breastfeeding women strongly symptomatic in hospital settings, particularly if they are unvaccinated or have additional risk factors for develop severe illness; Remdesivir should only be considered in pregnant women with COVID-19 who are not improving or who are deteriorating [11].

Labour and delivery management

Since the early beginning of the pandemic, the management of women in labor has been a great challenge for healthcare workers. Appropriate health care of COVID-19 pregnant women represented a priority for governments and local health authorities, needing to re-organize birth centers worldwide in order to provide the best care possible for the mother and the newborn, but at the same time limiting the spread of SARS-COV-2 and keeping health workers safe.

At first, hospitals had implemented policies to limit the number of people allowed in the delivery room during childbirth and this has led to some hospitals restricting the presence of care givers during labour. This restriction caused the woman fear of being left alone, adding it to the concerns about exposure to the virus, which led to an increase in the number of home births [20]. Thus, the World Health Organization (WHO) stated that every birth center should guarantee to the woman the presence of a single, asymptomatic, support person during labour and delivery and possibly during the whole hospitalization time. In Italy, the Italian Obstetric Surveillance System (It OSS) study found that, during the first phase of the pandemic, more than 50% of mothers were able to have a support person of their choice during labour and delivery [7]. Several Italian experiences about extensive re-organization of inpatient and outpatient services has been reported by Simeone et al [21] where optimal care has been provided thanks to a multidisciplinary group, and by Barchi et al [22] who showed that centralization of birth centers did not worsen perinatal diseases as far as concerns stillbirth, perinatal asphyxia and hypoxic-ischemic encephalopathy rate but it seems to have improved patients' outcomes.

It has become a routine practice to perform a quick triage for Sars-CoV-2 exposure before the admission to a maternity ward both for the woman and the care giver, asking if they have had signs or symptoms suggestive of COVID-19 in the previous 14 days, and to give them instructions on the importance of precautionary measures (including the use of PPE) to be used during labour, childbirth and hospitalization.

At the admission for delivery, it's still required by most centers an antigenic SARS-COV-2 test, and the choice of a rapid versus a molecular nasopharyngeal swab is up to the hospital protocol. In case of a positive result, specific measures must be taken: first the woman should be transferred to the nearest birth center that has a dedicated COVID-ward and delivery room; the latter must have a dedicated pathway for COVID-19 positive patients and a multidisciplinary team to provide care for the pregnant woman [8, 11]. Specific issues and decisions regarding the labour and the delivery phase such as the preference of a birth position, the observation and fetal monitoring using cardiotocography, and the induction of labour or an operative vaginal delivery should be made on an individual basis as it was before COVID-19 era. Particular attention should be paid to the use of fluid management to avoid the risk of fluid overload which could expose pregnant women with moderate to severe clinical presentations to an increased risk of respiratory distress syndrome [7, 11]. The physicians should inform the patients that epidural anesthesia isn't contraindicated in case of SARS-COV-2 positivity and that COVID-19 positivity does not constitute an indication for an elective caesarean section but in case of worsening of the woman's respiratory conditions it might be required for her to deliver urgently and thus with a risk of caesarian section or operative vaginal delivery [8, 23].

About water birth, it is not contraindicated for women who are asymptomatic of COVID-19, (providing adequate PPE for healthcare workers), but women with symptomatic COVID-19 should not labour or give birth in water [11, 24]. Delayed umbilical cord clamping (1-3 minutes after birth) is recommended because the known health and nutrition benefits to mother and infant outweigh any theoretical and unproven harm [8], and it's demonstrated to be safe in mothers with confirmed SARS-CoV-2 infection [25].

Breastfeeding and follow-up

In the last decade for all newborns, skin-to-skin contact and rooming-in practices have been highly encouraged from the WHO to increase breastfeeding rates and duration but, at the very beginning of the pandemic, some birth centers didn't allow these practices for the hypothetical risk of infection transmission [26]. Nowadays, many studies have been performed and evidence has proven no difference in the risk of infection of the newborn even when the mother has suspected or confirmed SARS-CoV-2 infection and protected rooming-in practice has proven to be safe and effective in supporting breastfeeding [27]. Therefore, international organizations including WHO and UNICEF have continued to support breastfeeding and the American College of Obstetricians and Gynecologists (ACOG) recommends rooming-in combined with safety measures to minimize the risk of transmission, such as wearing a mask and practicing hand hygiene before any contact with the newborn [8, 28].

For the World Health Organization and the Italian National Health Institute, all mothers, including COVID-19 positive ones and their babies, should be enabled to stay together, practice skin-to-skin contact and rooming-in day and night, especially at birth and during breastfeeding, except when the mother's or infant's clinical conditions are severe, taking preventative measures for COVID-19 positive cases [8, 29].

Breastfeeding short and long-term health benefits, both for the mother and the child, definitely exceed the risks of passing infection from mother to infant so, according to the standards outlined by WHO and UNICEF, breastfeeding must be encouraged and the medical and obstetrician staff have the duty to inform the family that COVID-19 infection is not a contraindication to breastfeeding but the consequences of its failure and the separation of the mother from the child can be important [8]. Also, it is important to aid start breastfeeding as soon as possible in case of mothers who couldn't start breastfeeding within the first hour after delivery, and to help them hand-express their breastmilk safely.

Another important aspect about breastfeeding is its role in passing antibodies from the mother to the newborn and actively help to develop the autoimmune system, protecting him from infection in the first months of life. The specific antibodies against SARS-CoV-2 have been proved in breastmilk from infected or vaccinated mothers and can be transferred to and protect the infants from COVID-19 infection without significant adverse effects can protect infants against COVID-19 infection [30, 31, 32]. So, breastfeeding may be protective to the infant, offering passive immunity against SARS-CoV-2, and vaccination against COVID-19 is safe and effective for pregnant and lactating women, who should be submitted to COVID-19 vaccination at the same time as the general population, with no need to interrupt breastfeeding in order to receive a dose of a COVID-19 vaccine [11].

About postnatal care of the mother and the baby, the pandemic has also affected the number and mode of post-partum visits, in fact, in the Italian reality, in order to reduce the access to the hospitals, many centers stopped offering the regular one-month-after-delivery visit, inviting the woman to do the check-up privately with her gynecologist or in the local public health districts where the service is provided.

It is important, though, to keep providing the best postnatal care to the woman as in the pre-COVID era, following the local and international recommendation and arrange for further assessment and follow up, even with the use of telemedicine [33].

Discussion

The present paper analyzed the impact of COVID-19 on obstetric habits from 2020 to 2023, highlighting clinical and human difficulties, challenges, and changes in managing pregnancy, recovery, labor and delivery, breastfeeding and puerperal follow-up. COVID-19 related obstetric care issues were summarized in Table1. Pregnant women represent hospital users who has unique characteristics that they don't share with any other patient. They are not sick individuals and often the birth event is not burdened by maternal or fetal problems, therefore pregnant women enter the hospital without a real

illness and have the risk of contracting an infection during hospitalization following the contagion from Sars-CoV-2. For that reasons, pregnant women have had reduced access to the utilization of medical services and facilities at the beginning of the pandemic, with a negative impact on maternal and child health [34]. Moreover, the pandemic has led the health personnel of some hospitals heavily affected by the contagion to a state of mind of great stress which has sometimes resulted in the deterioration of the quality of care [35, 36].

Pregnancy	**Labour**	**Breastfeeding**
Management of COVID-19 positive woman	Management of COVID-19 positive woman	Management of COVID-19 positive woman
Counseling on vertical transmission	Counseling on vertical transmission	Counseling on vertical transmission
Use of PPE	Use of PPE	Use of PPE
Caregiver during recovery	Caregiver during labour	Skin to skin contact and rooming in
Vaccination issue	Rapid versus molecular nasopharyngeal swab	Vaccination issue
US scan fetal surveillance	Mode of delivery	
Hospitalization criteria	Waterbirth issue	
	Delayed umbilical cord clamping	

Table 1: COVID-19 related obstetric care issues.

The review of the literature and the clinical experience impose therefore a balance between the excessive restrictions and the loosening of a protective path for pregnant women after the COVID era. Obstetricians should not impede caregiver presence, skin-to-skin contact, rooming in, and breastfeeding. However, screening of pregnant women by nasopharyngeal swab and the use of PPEs by health professionals should still be used. The success of the vaccination must also be evaluated with caution in pregnant patients due to the physiological changes that pregnancy exerts on the maternal immune system.

Conclusions

The COVID-19 pandemic has forced healthcare workers to make rapid changes to their work routine.

Some realities have seen healthcare workers and patients come to a good mutual understanding and acceptance of the rapid changes that may be necessary in cases of health emergency, leading towards mutual aid and the implementation of safety measures such as the use of PPE and undergoing vaccinations.

Overall, the COVID-19 spread has led to significant changes in obstetric habits and, with the gradual loosening of restrictions that many countries have lived in the last year, thanks to the global vaccination campaign, it will be interesting to see how long-lasting these changes will be.

Author Contributions

Conceptualization, F.P.; Methodology, F.P., AF.C.; Writing – Original Draft Preparation, F.P., C.B.;

Writing – Review & Editing, F.P.; Visualization, AF.C., M.DT.; Supervision, AF.C., M.DT. All

authors read and approved the final manuscript.

Ethics Approval and Consent to Participate

Not applicable.

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Conflict of Interest

The authors declare no conflict of interest.

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