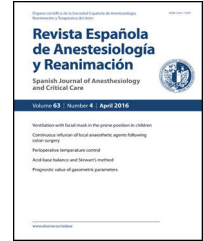




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## CASE REPORT

# Anesthetic planning and management for a caesarian section in a pregnant woman affected by SARS-COV-2 pneumonía<sup>☆</sup>



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### KEYWORDS

Pregnancy;  
Caesarian section;  
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COVID-19

**Abstract** Pregnant women experience physiological and immunological changes which make them more prone to all kind of viral and bacterial infections, this is because they have been considered as vulnerable group if infected by SARS-CoV-2. They could even deploy a severe form of this disease which may require to end pregnancy to improve oxygenation and to safeguard foetal wellbeing the in case the mother situation gets worse. In this scenario, any intervention would require a detailed planning by the whole surgical team, and, specifically, by the anaesthesiologists, in order to guarantee both mother and child wellbeing and to prevent from infections all the healthcare team. We describe the case of 37 week pregnant woman, admitted in our Critical Care Unit with respiratory high flows device support, due to severe respiratory failure due to COVID-19 which needed an urgent caesarean section.

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### PALABRAS CLAVE

Embarazo;  
Cesárea;  
Oxígeno de alto flujo;  
COVID-19

### Planificación y manejo anestésico para cesárea en gestante con neumonía por SARS-CoV-2

**Resumen** Las mujeres embarazadas experimentan cambios fisiológicos e inmunológicos que les hacen más susceptibles a infecciones víricas o bacterianas, por lo que se les ha considerado grupo vulnerable frente al SARS-CoV-2. Así mismo, pueden desarrollar una forma grave de la enfermedad que requiera finalizar la gestación para mejorar la situación respiratoria o para salvaguardar el bienestar fetal que puede verse afectado por el estado crítico de la madre.

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En este contexto, cualquier intervención demanda una minuciosa planificación por parte del equipo quirúrgico en general y del anestesiólogo en particular tanto para asegurar el bienestar materno-fetal como para evitar posibles contagios del personal sanitario. Describimos el caso de una gestante de 37 semanas ingresada en la Unidad de Reanimación con soporte ventilatorio mediante alto flujo por insuficiencia respiratoria severa debida a COVID-19 que precisa ser sometida a cesárea urgente.

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## Introduction

The incidence of SARS-CoV-2 (COVID-19) infection in pregnant women is similar to that of the general population,<sup>1</sup> and the clinical manifestations of the disease do not differ significantly between the two groups.<sup>1–3</sup>

Although pregnant women are particularly susceptible to respiratory pathogens and severe pneumonia due to their immunosuppressive state and the physiological adaptations typical of pregnancy, the severity of this infection is less than that produced by previous coronaviruses (SARS, MERS) in this population.<sup>4</sup> Furthermore, studies so far have not shown pregnancy and childbirth to aggravate the course of the disease, and the vast majority of women recover without needing to end the pregnancy.<sup>2</sup> The rate of severe pneumonia in these patients is low, but most patients with these symptoms will require admission to critical care units.<sup>1</sup>

There are insufficient data to confirm whether or not COVID-19 increases the incidence of obstetric complications, such as pre-eclampsia and miscarriage,<sup>3</sup> although there appears to be evidence that infected women, especially those who develop pneumonia, have a higher incidence of preterm delivery.<sup>1,4</sup>

Therefore, although in most cases pregnancy does not aggravate the COVID-19, it can be an aggravating factor in patients presenting respiratory failure due to severe pneumonia. In these circumstances, ending the pregnancy can contribute to the clinical improvement of the patient.

We present the case of woman in the 37th week of pregnancy admitted to the resuscitation unit for severe respiratory failure due to COVID-19 who needed ventilatory support and required urgent caesarean section.

## Case report

A 43-year-old woman, 76 kg and 156 cm, in the 37th week of pregnancy, came to the emergency room with a 10-day history of dry cough, dyspnoea and low-grade fever; she had had contact with a family member who tested positive for COVID-19. Her personal history was significant for mild intermittent bronchial asthma, with no exacerbations and no treatment.

A chest X-ray was performed, showing lung parenchyma with diffuse predominantly central bilateral perihilar opac-

ities compatible with COVID-19 pneumonia. Polymerase chain reaction (PCR) was also positive for the virus.

Given the patient's clinical worsening, with arterial oxygen saturation (SaO<sub>2</sub>) 90% with bag mask oxygen at 10 l/min and her advanced state of gestation, she was admitted to the resuscitation unit, where high-flow oxygen (HFO) was started using nasal cannulas and 0.6 fraction of inspired oxygen. The therapy was well tolerated, and the following blood gas measurements were obtained: pH 7.32, PO<sub>2</sub> 138 mmHg, PCO<sub>2</sub> 37 mmHg, HCO<sub>3</sub> 19 mmol/l, base excess –6.2 mmol/l, SaO<sub>2</sub> 99%. Labs at admission showed LDH 360 l/u (26–245), fibrinogen > 750 mg/dl (180–400), d-dimer 930 ng/mL (0–500), and 1.2410 lymphocytes<sup>3</sup>/μl (1.3–2.9). Other parameters were normal.

The cardiococography performed by the gynaecology service was unremarkable. Given the impossibility of reducing oxygen therapy, which could have been partly due to the patient's pregnancy, and in order to avoid an emergency situation in this context due to a possible worsening of symptoms, it was decided to end the pregnancy by caesarean section. Corticosteroids were not needed for foetal maturation or to treat the respiratory process.

The transfer from the resuscitation unit was planned and the operating room was prepared according to our institutional protocol for interventions in patients infected by COVID-19. For anaesthesia, an HFO system was installed in the operating room, and we anticipated haemodynamic instability secondary to neuraxial anaesthesia and a possible conversion to general anaesthesia. Two anaesthesiologists were present during the intervention while a third waited on standby in a clean room to perform administrative procedures, fetch additional material, etc.

The patient arrived in the operating room with a bag oxygen mask and 98% saturation, so we decided not to connect the HFO system in order to avoid aerosolization. Monitoring was performed with pulse oximetry, electrocardiogram and invasive blood pressure. Ceftriaxone prophylaxis had previously been administered in the resuscitation unit. Spinal anaesthesia, with 9 mg 0.5% hyperbaric bupivacaine, 10 μg fentanyl, and 0.2 mg morphic chloride, was performed by the most experienced anaesthesiologist and was uneventful. The patient received 500 ml crystalloids during the procedure.

The patient tolerated the supine position, requiring only a slight elevation of the head of the surgical table. Once adequate sensory blocked had been verified by applying a cold

spray, a standard caesarean section was performed using a Pfannenstiel incision. The intervention lasted 60 min, and was uneventful. The patient remained stable without the need for vasoactive support and with good oxygen saturation at all times using bag mask oxygen at 10 l/min and  $\text{FiO}_2$  of 1. The HFO system was not required.

Finally, she was transferred to the post-anaesthesia care unit, where HFO therapy was restarted.

The infant had an Apgar score of 7 at 1 min and 9 at 5 min, with 96% saturation at 15 min with oxygen. The blood gas test showed pH 7.22,  $\text{PCO}_2$  69 mmHg, base excess  $-1.6$  mmol/l, and  $\text{HCO}_3$  26 mmol/l. Due to the need for ventilatory support, the infant was transferred to the neonatal unit and placed in closed incubator after taking contact and droplet precautions until the results of nasal and pharyngeal PCRs were received, which were negative for COVID-19.

The patient made good progressive in the following hours, so HFO weaning was started. When the fraction of inspired oxygen had been reduced to 0.4, the following blood gas parameters were obtained: pH 7.37,  $\text{PO}_2$  137,  $\text{PCO}_2$  42,  $\text{HCO}_3$  24, base excess  $-1$ ,  $\text{SaO}_2$  99%. Labs showed: LDH 280 I/U, haemoglobin 10.6 mg/dl, d-dimer 1,030 ng/mL, no lymphopenia; all other parameters were normal.

At 48 h, the patient was discharged to one of the wards prepared for the isolation of COVID+ patients, where she remained for 7 more days until she was discharged home. The infant was separated from the mother until her PCR was negative.

## Discussion

The decision to end the pregnancy by caesarean section in a patient infected by COVID-19 requires a multidisciplinary consensus,<sup>3,5</sup> and special measures are required in terms of planning and organizing the operating room and the surgical team. Pregnancy can cause a restrictive syndrome that complicates the evolution of pregnant women with prior severe respiratory involvement. There is a likelihood that patients admitted to a critical care unit with respiratory failure requiring specific ventilatory support will worsen and require urgent action. In the context of COVID-19, it is important to anticipate such an event<sup>3,5</sup> in order to guarantee the safety of the mother and infant, and also of the surgical team itself.

Protection of healthcare personnel is a priority.<sup>3</sup> The number of staff within the operating room should be minimized, but help should always be available.<sup>3,6</sup> Proper personal protective equipment must be used, regardless of the type of anaesthesia, and institutional donning and doffing guidelines must be strictly followed.

Careful planning is needed to ensure the availability of the necessary resources.<sup>6</sup> This will involve creating COVID kits with all the equipment and drugs needed, deciding which material will be kept inside the operating room and which will be on hand outside, and who will be responsible for providing this material if needed.

In our case, the patient had been admitted to the resuscitation unit for acute respiratory failure due to bilateral pneumonia that required HFO therapy. We believe that the possibility of administering HFO in the operating room should

be guaranteed, but as some studies advise against its use in COVID-19 due to the dispersion of microdroplets and the risk of aerosol generation that would favour the spread of the virus, all necessary precautions must be taken.<sup>7</sup>

Regarding the anaesthetic technique, anaesthesiology societies recommend performing neuraxial anaesthesia in pregnant women undergoing caesarean section in the context of COVID-19 infection, due to the high risk of general anaesthesia.<sup>5,6</sup> This approach has several advantages: it avoids the risks and complications associated with general anaesthesia in pregnant patients, such as intubation failure (the primary anaesthesia-related cause of obstetric mortality) and bronchopulmonary aspiration; it prevents anaesthetic drugs being passed to the foetus; and it precludes the need for airway management in a patient with COVID-19, and with it the aerosolization of secretions that favours the spread of the virus. Healthcare workers caring for patients undergoing intubation present a 6.6-fold higher risk of contracting an acute respiratory infection compared to those caring for patients not undergoing these procedures.<sup>8</sup>

Despite this, the surgical team must always be prepared for conversion to general anaesthesia if necessary, particularly in the context of a COVID-19 infection. They must plan for this eventuality and make sure all the material required is on hand (video laryngoscope, suitable endotracheal tube, medication, high efficiency filters, etc.).<sup>4</sup> Unplanned intubation should be avoided at all cost.<sup>6</sup>

In our case, we opted for spinal anaesthesia, a procedure recommended in the literature for COVID 19 + patients.<sup>6</sup> The presence of thrombocytopenia, which can develop in patients with severe COVID-19, must be ruled out.<sup>9</sup> Anaesthesia must be administered by the most experienced anaesthesiologist,<sup>5</sup> ensuring adequate sensory blockade before beginning surgery. During administration, it may be advisable to prevent CSF from escaping from the introducer, as the virus has been isolated from the CSF of a patient with COVID-19 encephalitis.<sup>10</sup> The usual aseptic precautions should be taken. Some studies suggest that virus particles survive longer on plastic surfaces than on cardboard, so it is probably best to use sterile drapes instead of plastic when performing the technique.<sup>11</sup>

Although pregnant women with positive PCR for COVID-19 have not shown any particular propensity to hypotension after the administration of neuraxial anaesthesia, a small case series reported a tendency in this regard if vasopressors for prophylaxis are not administered.<sup>12</sup> It is important to bear in mind that patients with the most severe forms of the disease have a predisposition to haemodynamic instability, so hypotension must be treated appropriately due to its serious effect on both the mother and foetus.<sup>13</sup>

In patients with severe COVID 19 presenting respiratory failure, such as our case, regional anaesthesia is also the best way to avoid worsening respiratory function; however, adequate ventilatory support must be guaranteed during surgery, while taking every measure to create an aerosol-free environment. As the use of oxygen masks is preferable to nasal cannulas,<sup>14</sup> we used a bag mask covered by a protective surgical mask during the procedure and the lowest possible flow setting to maintain saturation and reduce the risk of aerosolization.<sup>15</sup>

## Conflict of interests

The authors declare that they have no conflict of interest.

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