International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Wani RJ et al. Int J Reprod Contracept Obstet Gynecol. 2022 May;11(5):1477-1482
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20221280

Original Research Article

Perioperative concerns and outcomes in obstetric patients undergoing lower segment caesarean section in the wake of the COVID-19 pandemic: a retrospective analysis

Reena J. Wani, Kruti P. Doshi, Sumayya S. Ansari, Mahin C. Bhatt*

Department of Obstetrics and Gynecology, Dr. R. N. Cooper Municipal General Hospital and H. B. T. Medical College, Mumbai, Maharashtra, India

Received: 27 February 2022
Revised: 12 April 2022
Accepted: 13 April 2022

***Correspondence:**
Dr. Mahin C. Bhatt,
E-mail: drmahinbhatt@gmail.com

ABSTRACT

Background: In the current COVID-19 pandemic, pregnant women are considered high risk due to adverse maternal and foetal complications that are known to occur with antepartum viral infections. In addition to immunological changes in pregnancy that alter the response to severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection, the disruption of routine antenatal services as a result of the pandemic has also adversely affected expectant mothers.
Methods: We conducted this retrospective observational study as a comprehensive comparative analysis of the method of delivery in COVID positive women, the choice of anaesthesia and maternal and foetal outcomes in women undergoing lower segment caesarean sections with COVID infection as well as the COVID negative patients during the first wave of the pandemic.
Results: The rate of caesarean section was comparable between the two groups. The rates of general and regional anaesthesia did not change with COVID positive status. However, we found that meconium-stained liquor with foetal distress as an indication for lower segment caesarean section (LSCS) was markedly higher in COVID positive patients. There was also a significantly higher requirement for ICU admission and ventilator support in the positive patients as a result of COVID-related complications. No significant difference was observed in the maternal and neonatal mortality rate between the two groups.
Conclusions: In our experience, COVID-19 positive status did not impact the rate of LSCS, but significantly increased the need for intensive care.

Keywords: COVID, LSCS, Caesarean, Maternal, Neonatal, Pandemic

INTRODUCTION

The ongoing COVID-19 pandemic has altered the delivery of medical services worldwide, and has undone decades worth of progress in the sphere of global public health.[1] All branches of the medical profession have had to incorporate testing for the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) virus, and managing the complications that arise from high-risk groups testing positive, whilst continuing to care for their patients.

Pregnant women constitute one such group. Women who are pregnant, do not appear to be at a higher risk of contracting a coronavirus infection as compared to the general population. While some studies have shown no increase in the maternal mortality ratio during the pandemic, it is known that pregnancy alters one's immune system and response to viral infections, which may lead to

adverse outcomes, increased morbidity and a higher rate of operative interventions.[2]

Thus, pregnant women might be affected out of proportion due to disruption of routine antenatal services as well as the innate clinical challenges posed by COVID-19 in pregnancy. Caesarean birth itself has inherent risks as compared to vaginal delivery.

We analysed data of COVID positive and negative women who underwent lower segment caesarean sections during the first wave, as well as various operative and anaesthesia parameters. We also compared outcomes in both groups.

Aims and objectives

Aims and objectives of the study were: to observe the modes of delivery in COVID positive patients; to assess the impact of COVID-19 on the choice of anaesthesia for LSCS; to assess the outcomes in COVID positive women undergoing LSCS, and need for intensive care; and to study foetal and neonatal outcomes in COVID positive mothers.

METHODS

Our centre, Dr. R. N. Cooper Municipal General Hospital, Mumbai, was working in a hybrid model, and despite not being a dedicated COVID centre, from the beginning of the pandemic, we had been updating medical records and data to the state and national covid registries, along with daily reporting.

After institutional ethics committee approval, we conducted a retrospective observational study over a period of 8 months from April 2020 to November 2020, during the COVID-19 pandemic, amongst women coming for intrapartum care who required a lower segment caesarean section as a mode of delivery at our hospital.

Our criteria for inclusion into the study extended to patients who underwent LSCS with singleton pregnancies. We excluded from analysis, pregnant women who underwent LSCS with multifetal pregnancies and any case with incomplete or missing patient details as required.

All the women were subjected to nasopharyngeal swab tests (RT-PCR) for COVID-19 according to the ICMR guidelines.[3] Neonates of the COVID positive mothers were subjected to a swab test for COVID-19.

Reports were made available within 48-72 hours and positive as well as symptomatic patients were shifted to COVID isolation wards or the ICCU as per clinical requirements whereas other patients were kept in the holding area.

We compared various operative and anaesthesia parameters, maternal and neonatal outcomes, amongst women undergoing LSCS both COVID positive with the negative group.

Statistical tests to calculate the p value were conducted with Microsoft (MS) excel. To identify any statistically significant difference in the proportions of complications between COVID positive and negative patients, 'two-sample Z test' for proportions was performed such that, the null hypothesis was: 'There is no difference between the proportions of incidence of complications between COVID positive and negative patients' and the alternate hypothesis: 'There is a difference between the proportions of incidence of complications between COVID positive and negative patients.' Once the Z statistic was found, we calculated the p value assuming the data follows a two tailed normal distribution using the following formula in MS excel: two-tailed tests.

$$P\ value = 2\ (1 - NORM.S.DIST\ (Z, TRUE))$$

RESULTS

Out of the 2200 confinements during the study period of 8 months (April 2020– November 2020), we reviewed the medical records of 929 women who underwent LSCS, of which 142 patients were COVID-19 positive and 787 were COVID-19 negative.

Of the 2200 pregnant patients tested, 351 were found to be COVID positive while the remaining 1849 were diagnosed to be COVID negative based on RT-PCR test results.

Table 1: Incidence of LSCS amongst COVID-19 positive and negative patients.

Parameters	No of vaginal births	No. of LSCS	Total	LSCS rate
COVID positive	209	142	351	40.46
COVID negative	1062	787	1849	42.56

The LSCS rate was comparable in both groups, in fact, it was slightly higher in COVID negative patients. The overall LSCS rate in our hospital was 42.3%.

$$LSCS\ rate = \frac{Total\ number\ of\ LSCS}{Total\ number\ of\ deliveries\ (vaginal + LSCS)}$$

We compared the difference between the two groups using a two-sample t-test to understand whether the difference between the groups is significant by comparing their p values. A p value of less than 0.05 would indicate that the null hypothesis, which states that there exists no difference between the two groups, can be rejected.

Type of anaesthesia administered: we compared the need for general anaesthesia over regional anaesthesia for LSCS.

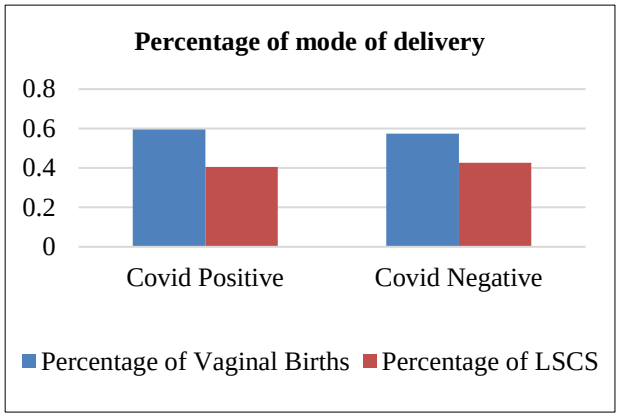

Figure 1: Percentage of LSCS and vaginal births.

Table 2: Choice of anaesthesia for LSCS.

Parameters	General anaesthesia	Total LSCS	%
COVID positive	6	142	4.23
COVID negative	36	787	4.57

Of the 142 COVID positive patients who underwent LSCS, only 16.1% (23 patients) showed symptoms associated with COVID-19. Data shows a lower percentage of LSCS for foetal indications and hypertensive diseases as our institute followed scientific practices with a view to delivering patients vaginally.

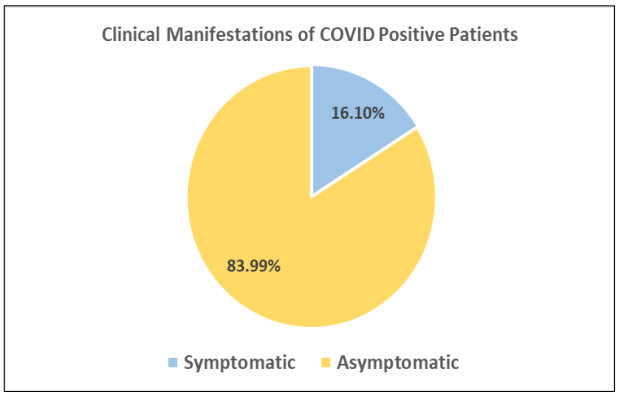

Figure 2: Clinical manifestations of COVID positive patients undergoing LSCS.

We found that only one-fifths of COVID positive patients were symptomatic, while the majority remained asymptomatic.

Table 3: The indications for LSCS that were compared.

Parameters	No of LSCS for each indication						
	MSAF	Oligohydra-mnios	Hypertensive disorders	Total LSCS	% for MSAF	% for oligohydramnios	% for hypertensive disorders
COVID positive	28	8	9	142	19.72	5.63	6.34
COVID negative	93	50	79	787	11.82	6.35	10.04
P value (<0.05)					0.01	0.7	0.17

Table 4: Details of COVID positive patients requiring ICU admission.

Parameters	Case 1	Case 2	Case 3	Case 4	Case 5
Age	22 years	35 years	24 years	25 years	28 years
Coexisting disorders	Eclampsia	Anaemia seizures (GTCS)	Placenta previa thrombocytopenia	Pre-eclampsia with abruptio placenta	
Parity	Primipara	Multipara	Primipara	Primipara	Multipara
Gestational age in weeks	36 weeks	37 weeks	37 weeks	31 weeks	38 weeks
Type of anaesthesia	General anaesthesia due to ARDS	Spinal anaesthesia	General anaesthesia due to thrombocytopenia	General anaesthesia due to ARDS	Spinal anaesthesia
Newborn babies	Alive	Alive	Alive	Still birth	Alive
Gender	Female	Male	Female	Male	Male
Weight (kg)	2 kg	2.6 kg	3 kg	1.2 kg	3.2 kg
Reason for ICCU admission	ARDS	Generalised convulsion with bradycardia	Anaemia with thrombocytopenia with bradycardia	ARDS WITH MODS	Hypotension due to postpartum haemorrhage

Continued.

Parameters	Case 1	Case 2	Case 3	Case 4	Case 5
Duration of mechanical ventilation (days)	4 days	-	1 day	3 days	1 day
Oxygen by cannula	14 days	2 days	1 day	4 days	
Length of stay in intensive care, day	18 days	3 days	3 days	10 days	2 days
Final situation	Death	Discharged	Discharged	Discharged	Discharged

In the symptomatic group, fever was the most common symptom with 78.3% patients (18/23) experiencing it during their illness.

We assessed the need for ventilatory/ICCU support needed by the patients in two groups. It was found that 5 (3.47%) patients from COVID positive group and 2 (0.25%) patients from the COVID negative group needed ventilatory/ICCU admission.

The difference between the two is highly significant; p value=3.9^{e-10} <<0.05.

We had 0.7% (1 of 142) maternal mortality amongst COVID positive patients while 0.13% (1 of 787) maternal mortality amongst COVID negative patients. The difference between the two is not significant (p value=0.17>0.05).

Table 5: Perinatal mortality for COVID positive and negative patients.

Parameters	Still birth	Total LSCS	%
COVID positive	6	142	4.23
COVID negative	32	787	4.07
P value (<0.05)			0.93

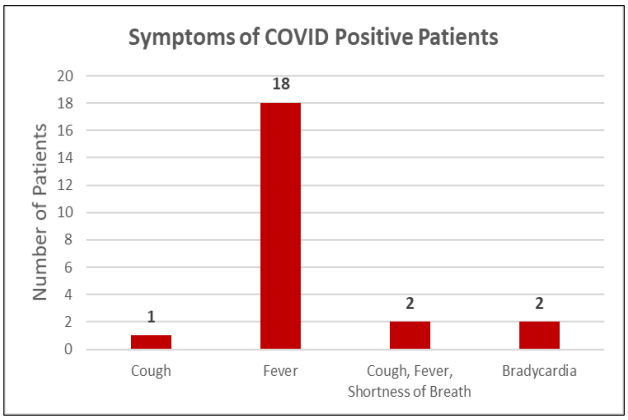

Figure 3: Symptoms experienced by COVID positive patients.

DISCUSSION

Our institute is a public, general, tertiary care hospital and a major referral centre for about 20 peripheral centres as well as other establishments. Despite not being a dedicated COVID care centre, we have faced an increased obstetric workload throughout the pandemic.

In the 8 months of our study, we found no difference in the caesarean section rate between COVID positive group of patients with the non-COVID group as evidenced in Table 1.

Anaesthetic concerns have been a constant and valid issue due to the risk of aerosol generating procedures. The diagnosis of COVID-19 itself is not accepted as a contraindication for regional anaesthesia.[4] However, regional anaesthesia cannot be administered to patients with severe pneumonia having ARDS or with coagulopathies such as thrombocytopenia, DIC or for patients on anticoagulation therapy.[5]

In our study, the rates of general and regional anaesthesia were comparable as seen in Table 2, as a result of multidisciplinary decision-making, recommendations from COVID anaesthetic guidelines and the presence of an on-call anaesthesia and obstetric team in the event of emergencies.

Out of the 6 patients administered general anaesthesia in the COVID positive group, 2 patients had ARDS, 1 patient had thrombocytopenia and the remaining 3 were given general anaesthesia for obstetric indications. In another study, general anaesthesia was administered to only three patients (4.9%) due to severe pneumonia, thrombocytopenia and maternal aortic valve insufficiency; while spinal anaesthesia was administered to the remaining 58 patients (95.1%).[6,7]

We also analysed the indications for caesarean section, namely, meconium-stained amniotic fluid (MSAF), oligohydramnios, anhydramnios and hypertension related disorders among both groups.

28 women in the COVID positive group (19.7%), had a caesarean section for MSAF, compared to 11.8% in the negative group, with a p value=0.01<0.05 which is significant. This indicates that the COVID-19 infection was a factor in causing foetal distress. 8 COVID positive patients (5.63%) had caesarean sections for oligohydramnios, compared to 6.3% in negative group and 9 patients underwent LSCS for hypertension related disorders compared to 10% in negative group. None of these differences were statistically significant.

A literature review showed that the majority of obstetric patients were asymptomatic at the time of admission or had COVID-19 like symptoms (fatigue, muscle pain, shortness of breath, and congestion) which are commonly seen in pregnancy.[8-10]

In our study, we found that only 16.1% COVID-19 positive patients (23 patients) were symptomatic while the remaining 83.9% remained asymptomatic. Khoury et al reported that 61% of women presenting to the labour and delivery unit were initially asymptomatic while only 26% had mild symptoms.[11]

Among the symptomatic group, 2 patients developed pneumonia with acute respiratory distress syndrome. The others continued to show mild symptoms: 14 had fever, 5 had cough and 2 patients had sinus bradycardia.

SARS-CoV-2 infection appears to induce a transient sinus bradycardia, most likely multifactorial in origin as a result of severe hypoxia, damage to cardiac pacemaker cells from inflammatory cytokines, and exaggerated response to medications.

The two patients who developed bradycardia, did not have any pre-existing cardiac ailments. Their heart rates were in the range of 48-54 bpm and developed bradycardia on days 6 and 7, respectively, of their illnesses. Their inflammatory markers: C-reactive protein, D-dimer, LDH, and IL-6 were elevated throughout the bradycardic episodes. This might suggest possible immunological damage leading to initial bradycardia. Cardiac biomarkers such as troponins and CPKMB were normal.

It was observed that 5 (3.47%) patients from the COVID positive group and 2 (0.25%) patients from the COVID negative group needed ventilatory support or ICCU admission. The difference between the two is statistically significant, with a p value of $3.9^{e-10}<<0.05$.

Four COVID positive patients needed ICCU care or ventilatory support due to COVID related complications, with one requiring ICCU admission due to the obstetric complication of postpartum haemorrhage. Two had severe ARDS with MODS, of which, one patient succumbed to the infection leading to a maternal mortality.

There was one maternal mortality recorded in both COVID positive and negative groups. 1 of the 142 COVID positive patients, was a severely symptomatic patient with ARDS and MODS with eclampsia; while 1 of 787 negative patients suffered from severe anaemia with MODS. The difference between the two is not significant. (p value=0.17>0.05) (Table 4).

In a study by Karasu et al, the mortality rate was 1.6% (1/61) among parturients with COVID-19 undergoing caesarean section.[6]

4.23% (6 of 132) COVID positive patients had stillbirths compared to 8.38% (32 of 727) of negative patients. However, the difference between these two groups is of no statistical relevance (p value=0.93>0.05).

Our policy of testing the babies of COVID positive mothers helped us identify 9 COVID positive babies out of 142 (6.34%). The babies were tested using RTPCR, 48-72 hours following birth once the COVID positive status of their mothers was known. It is difficult to ascertain whether the infection was acquired as a result of vertical transmission or exposure following delivery, since we did not check for SARS-CoV-2 particles in the amniotic fluid or the placenta.

The mothers whose babies tested negative also continued to breastfeed with safety precautions like washing hands and wearing a mask. Chen et al tested for SARS-CoV-2 in breast milk samples from 6 infected patients, and all samples tested negative for the virus.[6] Therefore, while this suggests that human milk does not act as a vehicle for COVID-19, further studies with larger sample sizes are recommended.

There were no deaths amongst the COVID positive neonates.

During the second wave of the pandemic, our institute saw a greater number of female admissions in all departments, but a lower COVID positivity rate among women. Despite this, female case fatality rate (CFR) was higher than that of men during the same period. The maternal mortality ratio (MMR) has not increased during the period of the pandemic. This might have been due to newer strains of the SARS-CoV-2 virus and clinically significant genotypes. While these data will require further scrutiny and detailed analysis, they have implications for the management of COVID-19 and will aid our understanding of the current pandemic and future public health interventions.[12]

This study was conducted during the period of the first wave of COVID-19 in Mumbai, India. We have analysed only data from a single centre and larger studies with data from different hospitals serving diverse populations in different cities would provide a more complete epidemiological and clinical insight into this topic. Furthermore, we were only limited to data gathered during the first wave and a more comprehensive analysis including data from the second and third waves is warranted to provide a cohesive understanding of the effects of COVID-19 due to the many variants of the SARS-CoV-2 virus on pregnancy and peripartum practices.

CONCLUSION

In the first wave, we followed scientific practices and found comparable LSCS rates and outcomes in COVID positive women undergoing LSCS. However, the need

for ICU care and ventilatory support was much higher in COVID positive patients undergoing operative delivery.

We recommend further studies on this topic to better understand the variations in obstetric and intrapartum care offered to COVID-19 positive women in other centres, and to further a complete global understanding how COVID affects expectant mothers and neonates.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497-506.
2. Wani R, Mevada SA, Bhatt M, Wani V, Biase ZD. Maternal Mortality Ratio and COVID Pandemic Impact: A Retrospective Analytic study in a tertiary care institute. IJMSIR. 2021;6(4):321-6.
3. Advisory on Strategy for COVID-19 Testing in India, Indian Council of Medical Research, Department of Health Research, Ministry of Health and Family Welfare, Government of India. 2020. Available at: https://www.mohfw.gov.in/pdf/AdvisoryonstrategyforCOVID19TestinginIndia.pdf. Accessed on 13 January 2022.
4. Dabrowska D, Lock GJ. Staying ahead of the curve: modified approach to emergency caesarean section under general anaesthesia in COVID-19 pandemic. Turk J Anaesthesiol Reanim. 2020;48:174- 9.
5. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Can J Anesth. 2020;67(5):568-76.
6. Karasu D, Kilicarslan N, Ozgunay SE, Gurbuz H. Our anesthesia experiences in COVID-19 positive patients delivering by cesarean section: A retrospective single-center cohort study. J Obstet Gynaecol Res. 2021;47(8):2659-65.
7. Chen R, Zhang Y, Huang L, Cheng BH, Xia ZY, Meng QT. Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing cesarean delivery: a case series of 17 patients. Can J Anesth. 2020;67:655-63.
8. Landau R. COVID-19 pandemic and obstetric anaesthesia. Anaesth Crit Care Pain Med. 2020;39:327-8.
9. Breslin N, Baptiste C, Gyamfi-Bannerman C, Miller R, Martinez R, Bernstein K, et al. COVID-19 infection among asymptomatic and symptomatic pregnant women: two weeks of confirmed presentations to an affiliated pair of New York City hospitals. Am J Obstet Gynecol MFM. 2020;2:100118.
10. Sutton D, Fuchs K, D'Alton M, Goffman D. Universal screening for SARS-CoV-2 in women admitted for delivery. N Engl J Med. 2020;382:2163-4.
11. Khoury R, Bernstein PS, Debolt C, Stone J, Sutton DM, Simpson L, et al. Characteristics and outcomes of 241 births to women with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection at five New York City medical centers. Obstet Gynecol. 2020;136(2):273-82.
12. Wani R, Mevada S, Bhatt M, Wani P, Wani V. The Y Factor: Is It A Risk For Increased Mortality In Covid-19? Indian J Appl Res. 2021;11(9).

Cite this article as: Wani RJ, Doshi KP, Ansari SS, Bhatt MC. Perioperative concerns and outcomes in obstetric patients undergoing lower segment caesarean section in the wake of the COVID-19 pandemic: a retrospective analysis. Int J Reprod Contracept Obstet Gynecol 2022;11:1477-82.