Original Research Article

Impact of COVID-19 infection on maternal near miss cases in tertiary care centre

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ABSTRACT

Background: The pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exposed vulnerable populations to a health crisis. Since the beginning of the severe acute respiratory syndrome (SARS-CoV-2) or COVID-19 outbreak, it has been argued whether pregnant women are at increased risk of severe infection.1 The objective of this study was to summarize the effect of COVID-19 on maternal near miss cases.

Methods: This single-centre prospective observational study, included all consecutive pregnant women with COVID-19 infection admitted to Lokmanya Tilak Municipal Medical College and General Hospital (Mumbai, India), a tertiary referral hospital, from 1 April 2020, to 20 December 2020. In this study, a total of 46 patients were included in near miss cases, who required ICU admission with severe morbidity. Of these, 8 patients were COVID-19 positive and remaining 38 patients were included in control group (COVID-19 negative). The course of each of their stay in ward was noted and findings were compared in both the groups.

Results: During their course in ICU it was found that 6 COVID-19 patients had maternal death representing 75% and 12 non-COVID-19 patients had maternal death representing 31.57%.

Conclusions: The mortality rate from the above results concludes that in this study mortality appeared to be higher in COVID-19 infection. Multi-centre retrospective analysis with larger population size is required in order for this to be statistically significant.

Keywords: COVID-19, Maternal Morbidity and Mortality, Pandemic, ARDS, Fever, Virus

INTRODUCTION

The pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exposed vulnerable populations to a health crisis. Since the beginning of the severe acute respiratory syndrome (SARS-CoV-2) or COVID-19 outbreak, it has been argued whether pregnant women are at increased risk of severe infection[1].

Based on the previous knowledge of two notable coronavirus outbreaks, the severe acute respiratory syndrome coronavirus (SARS-CoV) and the middle east respiratory syndrome coronavirus (MERS-CoV), it is suggested that pregnant women are particularly susceptible to adverse outcomes, including the need for endotracheal intubation, admission to an intensive care unit (ICU), acute respiratory distress syndrome (ARDS), multiple organ dysfunction syndrome (MODS) and even death.[2]

The knowledge gained from previous human coronavirus outbreaks suggests that pregnant women are particularly susceptible to poor outcomes. The objective of this study was to summarize the effect of COVID-19 on maternal near miss cases.

METHODS

Study type

This single-centre prospective observational study including all consecutive pregnant women with COVID-19 infection.

Study place

This study was conducted at Lokmanya Tilak Municipal Medical College and General Hospital (Mumbai, India), a tertiary care referral hospital and currently leading in management of COVID-19 pandemic.

Study period

The study period was from 1 April 2020 to 20 December 2020.

Selection criteria

Eligibility criteria included pregnant women with quantitative real-time polymerase chain reaction (PCR) or dual fluorescence PCR-confirmed SARS-CoV-2 infection visiting to the hospital in out-patient department undergoing admission and visiting emergency department.

Procedure

Data on impact of COVID-19 infection on maternal morbidity and outcomes were extracted and analysed. There were 496 women who tested COVID positive during this time period out of which 257 had lower segment caesarean section, 179 patients had full term normal delivery, and remaining 12 had check curettage for incomplete or missed abortions, 4 patients had exploratory laparotomy for ruptured ectopic pregnancy. There were 6 patients who were admitted for wound gapes after discharge from the hospital, 13 antenatal admissions and 25 admissions in the gynaecology ward. In this study, a total of 46 patients were included in near miss cases, who required ICU admission with severe morbidity. Of these, 8 patients were COVID-19 positive and remaining 38 patients were included in control group (COVID-19 negative). The course of each of their stay in ward was noted and findings were compared in both the groups.

Statistical analysis

All the parameters were studied and analysed on the basis of percentages. As this was a purely observational study, the maternal parameters were analysed using descriptive statistics i.e. percentages and proportions were calculated and no statistical test was applied.

RESULTS

Of the 38 non-COVID-19 near miss cases, 5 were patients who had disseminated intravascular coagulation as a result of intra uterine fetal death, 10 patients had eclampsia, 5 underwent obstetric hysterectomy, 4 patients had post-partum haemorrhage, 1 was a patient with seizure disorder, 9 patients had LSCS under general anaesthesia, 4 patients had ruptured tubal ectopic pregnancies.

Of the 8 COVID-19 positive patients, 2 were patients had disseminated intravascular coagulation as a result of intra uterine fetal death, 1 patient had eclampsia, 1 underwent obstetric hysterectomy, 3 patients had LSCS due to abruptio placentae, 2 had post-partum haemorrhage. During their course in ICU it was found that 6 COVID-19 patients had maternal death representing 75% and 12 non-COVID patients had maternal death representing 31.57%.
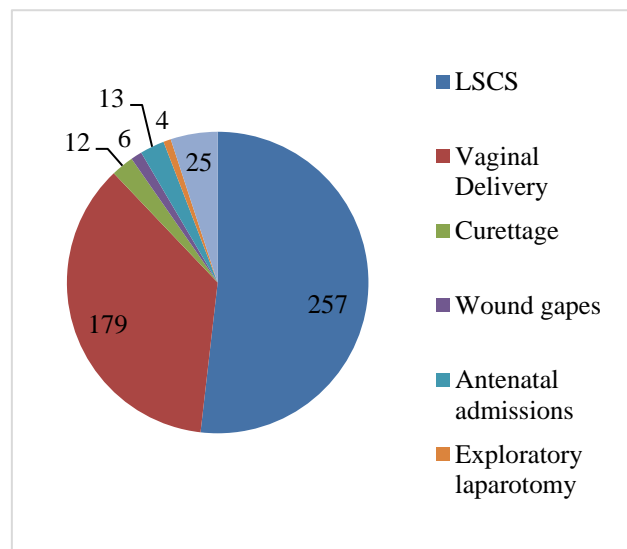

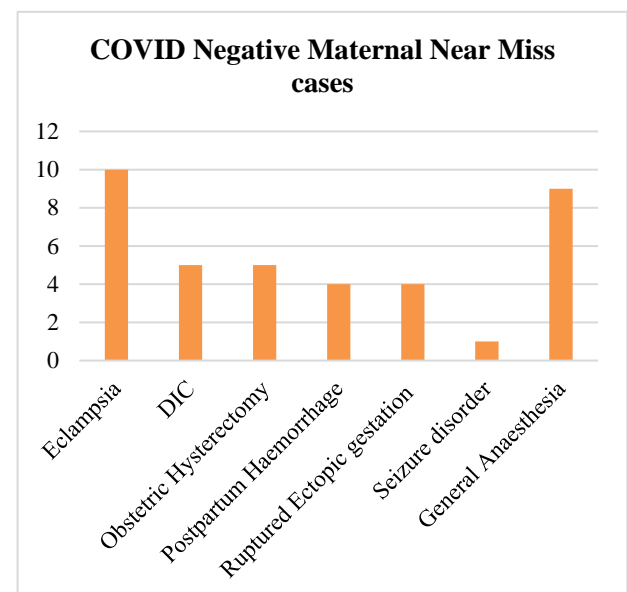**Figure 1: Percentage of different COVID-19 positive admissions.**

Figure 2: Percentages of different causes of COVID-19 negative maternal ICU admissions.
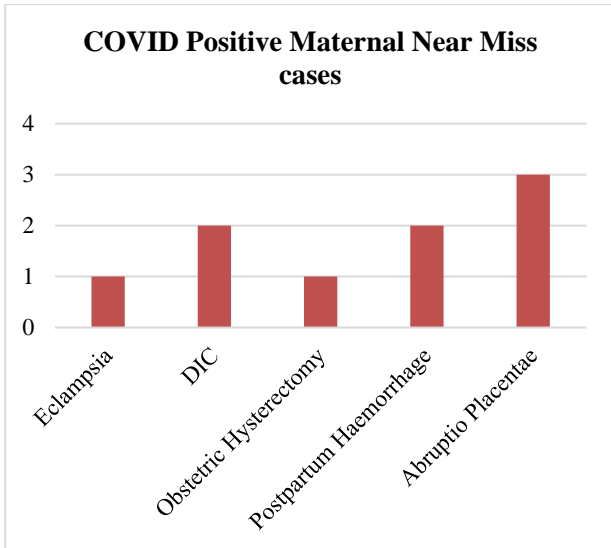
Figure 3: Percentages of different causes of COVID-19 positive maternal ICU admissions.
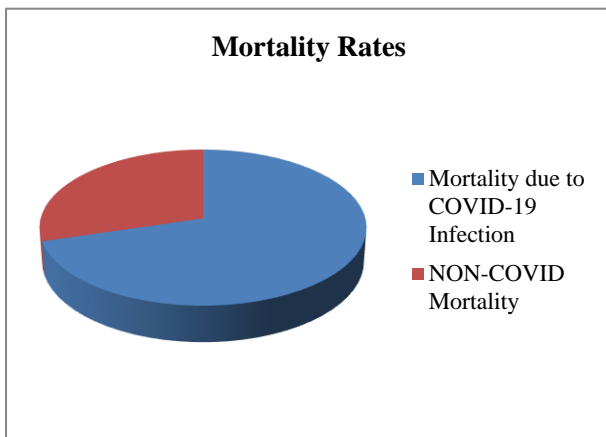

Figure 4: Comparison of maternal mortalities of both COVID-19 positive and COVID-19 negative cases.

DISCUSSION

Definition of maternal near miss case

The WHO defines a maternal near-miss case as "a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy."

Criteria of maternal near miss identification

According to the WHO, if a woman presents any of the conditions below during pregnancy, childbirth or within 42 days of termination of pregnancy and survives, she is considered as a maternal near miss case.[3]

Cardiovascular dysfunction

It includes (a) shock; (b) cardiac arrest; (c) severe hypoperfusion (lactate >5 mmol/l or >45 mg/dl); (d) severe acidosis (pH<7.1); (e) use of continuous vasoactive drugs; and (f) cardio-pulmonary resuscitation.

Respiratory dysfunction

It includes (a) acute cyanosis; (b) gasping; (c) severe tachypnoea (respiratory rate>40 breaths per minute); (d) severe bradypnea (respiratory rate <6 breaths per minute); (e) severe hypoxemia (O2 saturation <90% for ≥60 min or PAO2/FiO2<200); and (f) Intubation and ventilation not related to anaesthesia.

Renal dysfunction

It includes (a) Oliguria non-responsive to fluids or diuretics; (b) severe acute azotaemia (creatinine >300 µmol/ml or >3.5 mg/dl); and (c) dialysis for acute renal failure.

Coagulation dysfunction

It includes (a) failure to form clots; (b) severe acute thrombocytopenia (<50,000 platelets/ml); and (c) massive transfusion of blood or red cells (≥5 units).

Hepatic dysfunction

It includes (a) jaundice in the presence of pre-eclampsia; and (b) severe acute hyperbilirubinemia (bilirubin >100 µmol/l or >6.0 mg/dl).

Neurologic dysfunction

It includes (a) prolonged unconsciousness or coma (lasting >12 hours); (b) stroke; (c) uncontrollable fit/status epilepticus; and (d) global paralysis.

Uterine dysfunction

It includes hysterectomy due to uterine infection or haemorrhage.

Novel coronavirus (SARS-CoV-2) is a new strain of coronavirus causing COVID-19, first identified in Wuhan City, China towards the end of 2019.[4] Other human coronavirus (HCoV) infections include HCoV 229E, NL63, OC43 and HKU1, which usually cause mild to moderate upper-respiratory tract illnesses, like the common cold, MERS-CoV and SARS-CoV.[5]

Most global cases of COVID-19 have evidence of human-to-human transmission. This virus can be secluded from respiratory secretions, faeces and fomites. Transmission of SARS-CoV occurs through close contact with an infected person or contaminated surfaces within 2 m.

Pregnant women do not appear more likely to contract the infection than the general population.[6,7] Pregnancy can occasionally cause more severe symptoms as pregnancy

itself changes patient's immune system and reaction to viral infections.

This may be the same for COVID-19 but there is currently no evidence that pregnant women are more likely to be severely unwell needing admission to intensive care or die from the illness than non-pregnant adults. [8]

Evidence now suggests possibility of vertical transmission, i.e.; transmission from mother to baby during pregnancy.[9] There are, however, serious limitations to the available evidence.[10] Two reports have published evidence of IgM for SARS-CoV-2 in neonatal serum at birth.[11,12] Assuming that IgM does not cross the placenta, this would suggest a neonatal immune response to in utero infection. It is uncertain in these cases whether the IgM levels resulted from cross reactivity as there was no evidence of SARS-CoV-2 in the infant's nasopharyngeal swabs or in the mother's vaginal secretions or breastmilk on PCR testing.[10,13] Moreover, the proportion of pregnancies affected and the significance to a neonate has yet to be determined. In the interim report from the UK Obstetric Surveillance System (UKOSS), 2.5% of babies (N=6) had a positive nasopharyngeal swab within 12 hours of birth.[14]

Effect of COVID-19 on pregnant women

It is known that, whilst pregnant women are not necessarily more susceptible to viral illness, physiological pregnancy related changes to their immune system in pregnancy can be associated with more severe symptoms.[15,16] This is particularly true in the third trimester. Most pregnant females with COVID-19 infection are encountered with mild to moderate flu like symptoms. Cough, fever, shortness of breath, headache, anosmia and loss of taste are other relevant symptoms.[17] More severe symptoms which suggest pneumonia and marked hypoxia are widely described with COVID-19 in older people, the immunosuppressed and those with chronic conditions such as diabetes, cancer or chronic lung disease.[17] The symptoms of severe infection were seen no different in pregnant women.

CONCLUSION

Although the majority of mothers who were COVID-19 positive were discharged without any major complications, severe maternal morbidity as a result of COVID-19 were reported. Also, the mortality rate from the above results concludes that in this study mortality appeared to be higher in COVID-19 infection. Multi-centre retrospective analysis with larger population size is required in order for this to be statistically significant.

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