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COVID-19 Related Potential Multisystem Inflammatory Syndrome in a Neonate (MIS - N)

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Abstract: ***A 28 weeks preterm, male baby, 1.050 kg of birth weight born to COVID positive mother presented with cardiogenic shock and respiratory distress with clinical and laboratory features of multisystem inflammatory syndrome in neonate. Baby was anti - SARS cov - 2 IgG positive with negative COVID-19 RTPCR. Vertical transmission of SARS - Coronavirus - 2 (SARS - CoV - 2) to the newborn has been noted in the current SARS - CoV - 2 pandemic. A meta - analysis of 176 papers documenting confirmed neonatal SARS - CoV - 2 infections reported that 30% were due to vertical transmission and that 55% of infected neonates developed COVID-19 symptoms [1]. Case reports and series have described transplacental transfer of maternal IgG antibodies, possibly with a protective effect [2, 3, 4, 5]. We report a potential case of multisystem inflammatory syndrome in childhood from tertiary care center - Anand children hospital, Surat, Gujarat, India in a neonate initially presenting with features of cardiogenic shock.***

Keywords: neonatal MIS - C, neonates, COVID-19

1. Case Report

The 2nd of twin, 28 weeks, male baby, 1.050kg, born to primi gravida, covid positive mother via Emergency LSCS at a Private hospital, Surat on 18/4/21 at 7pm, because of worsening condition of mother due to SARS COVID-19, who was tested positive 5 day before the date of delivery. Baby at birth required bag & tube ventilation & later shifted to NICU of Tertiary care Center in Surat for further management. On Admission, baby was kept on invasive of ventilation, started on primary treatment with other supportive care. X ray was s/o respiratory distress syndrome - grade 3, hence Surfactant was given and ventilation was continued. By 4 hours of life baby was having abnormal body movements hence anticonvulsant was started.

Baby was having poor perfusion with shock like state, requiring fluid boluses and was started with two inotropes. (inj dobutamine & inj Noradrenaline).2d Echo done was s/o severe Left ventricle dysfunction (LVEF 30%). Cardiac markers like Pro BNP was significantly raised with positive CRP (Pro BNP - 11433pg/ml, CRP - 12.5mg/L). RTPCR for Covid SARS and COVID Antibody Covid antibody titers were sent, which was positive - 10.2 AU/ml (Normal < 1.0), baby was started with high dose steroid and IvIG. Baby responded well to above management & gradually general condition improved. Repeat echo done on DOL - 5 s/o improving LVEF 65% with good left ventricular function. Gradually inotropic supports were weaned off.

Baby remained hemodynamically stable and by dol 7, baby was extubated to nasal CPAP and steroid was tapered and stopped. USG brain done s/o bilateral germinal matrix hemorrhage.

On dol 9, baby was dull looking with poor perfusion and poor respiratory efforts. Hence Fluid resuscitation along with respiratory support was started, along with Inotrope support. Investigations sent s/o PCT of 28.61ng/ml, hence suspecting sepsis, blood culture was taken and higher antibiotics were started. Septic screen was repeated after 24 hours was s/o rising CRP - 41mg/L and reducing platelets at 58, 000/cmm.

On, dol 11 – repeat septic screen was s/o severe thrombocytopenia (25, 000/cmm) with deranged coagulation profile, require 3 units of FFP, 3 units of PC and 1 unit of PCV was transfused.

Baby was started with high doses of steroid and inj IvIG, to which baby responded well & gradually clinical and laboratory markers showed improvement.

Blood cultures came to be sterile; hence antibiotics were stopped after 7 days. Presently baby is 40th DOL. hemodynamically stable, tolerating feeds with gaining weight, and VP shunt placement has been done for post haemorrhagic hydrocephalus.

2. Discussion

The diagnosis of MIS - C is based on criteria: persistence of fever, presence of laboratory markers of inflammation, manifestation of signs or symptoms of organ dysfunction, lack of an alternative diagnosis, and a temporal relation to COVID-19 infection or exposure [6]. MIS - C typically has presentation at 3–4 weeks after acute SARS - CoV - 2 infection; many affected children have positive antibodies to SARS - CoV - 2, but negative PCR at the time of evaluation for MIS - C [6]. The presentation in the infant described may be a case of MIS - C in a neonate without direct evidence of SARS - CoV - 2 infection but whose mother had evidence of SARS - CoV - 2 infection 5 days before delivery and subsequent transplacental transfer of maternal SARS - CoV - 2 IgG antibodies. The pyrexial response in neonates is usually poorly developed, and the criteria suggested for diagnosing MIS - C in children may not be entirely applicable to the neonates.

Transplacental transfer of specific SARS - CoV - 2 IgG antibodies when measured in infants were similar to that of the mother and is thought to confer the neonate with passive immunity [2, 3, 4, 5]. Analysis of EBM from 14 mothers following recovery from SARS - CoV - 2 infection detected both IgM and IgG antibodies to SARS - CoV - 2, confirming passive transfer of antibodies. [7]

Although harm has not been demonstrated due to the transfer of maternal IgG antibodies to SARS - CoV - 2 infection, [3, 4, 5] from anecdotal experience in older children, antibody dependent enhancement responses have been implicated in induced immune injury where low - titre neutralizing antibodies may accentuate viral triggered immune responses causing the cascade of inflammatory cytokines [8, 9, 10].

In our case, the transfer of maternal antibodies transplacentally may have led to a hyperinflammatory state with cytokine storm and may have been responsible for the MIS - N like presentation. This baby being preterm showed and exaggerated response to antibody. On the contrary, 1st twin showed no such signs & symptoms, was hemodynamically stable with negative COVID antibody report.

There is need for further research into neonatal MIS - C to develop criteria specific to neonates and guidance on management.

3. Conclusions

Thus it can be said that Neonatal Multisystemic inflammatory Syndrome should be taken into consideration whenever baby born to SARS COVID positive mother in last month of pregnancy, presents with shock like state.

Lessons Learnt:

1) The criteria suggested for diagnosing MIS - C in children may not be entirely applicable in neonates.
2) Neonate born to SARS – Covid 19 positive mother in last month of pregnancy, presenting with shock like state, MIS - N should be suspected.

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