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INTRODUCTION

Children are less severely affected by acute respiratory syndrome coronavirus 2 (SARS-CoV-2) than adults.¹ The data available suggest that severe disease might be more common in infants and neonates than in older children.^{2,3} In a prospective UK population-based cohort study most babies were mildly affected, with cases of severe disease being very rare. Infection requiring admission to hospital following birth to a mother with perinatal SARS-CoV-2 infection was uncommon, with only 17 cases identified during the study period, and only two babies with possible vertical transmission were identified in the first peak of SARS-CoV-2 transmission.⁴ The SARS-CoV-2 virus was reported as one of the rare causes of foetal inflammatory response syndrome (FIRS)⁵ and is associated with multisystem inflammatory syndrome in children (MIS-C).⁶ This case report is an attempt to highlight the severe manifestations of COVID 19 in a neonate showing features of multisystem involvement predominantly acute kidney injury (AKI) requiring dialysis support.

COURSE IN HOSPITAL

A 7 days old male neonate (weight 2 kg) was referred to Surya Mother and Child Care Superspeciality Hospital (SMCC) with complaints of fever, breathing difficulty, no urine output and swelling all over the body. Patient was evaluated in the emergency room and a decision was taken to start ventilatory support. Laboratory tests revealed a creatinine of 3.61 mg/dL, urea 123 mg/dL, pH of 7.10 with proteinuria of 4+ and haematuria (RBCs 20 to 30 per HPF). Patient had signs of gross fluid overload and high FIO₂ requirement (70%) along with vasopressor support (noradrenaline, vasopressin and milrinone). As the patient was anuric, a decision was taken to start peritoneal dialysis (PD). The decision to prefer PD over hemodialysis (CRRT) was mainly based on factors like feasibility to do PD, cost effectiveness and longer expected time to recovery.

A tenckhoff PD catheter was placed despite unfavourable anatomy and anterior abdominal wall swelling. Manual exchanges started at 15 ml/kg fill volume of 1.7% dextrose solution to the dwell in order to achieve ultrafiltration. The cycle length (in time + out time + dwell time) was 90 minutes to begin with.

After 24 hours, creatinine came down to 3.28 mg/dL and urea to 102 mg/dL. Ultrafiltration over 24 hours was 296 ml which resulted in stopping vasopressor support. On day 3 of peritoneal dialysis, cycle length was increased to 150 minutes with dwell time of 120 minutes in an attempt to achieve higher solute removal. Patient had native kidney urine output (187 ml over 24 hours) with cumulative negative balance of 330 ml over 3 days. We stopped adding 25% dextrose to PD bags as adequate ultrafiltration was achieved that translated into better ventilator parameters (FIO₂ 25%). Acidosis and electrolyte imbalance were well under control.

We found significant urine protein excretion (urine protein excretion 4.3 gm per day; urine protein 4+) and started on glucocorticoid (prednisolone 2 mg/kg/day). Meanwhile, peritoneal dialysis was continued with cycle length of 4 hours and 30 minutes, dwell time 240 minutes. Patient was extubated on day 5 and with a creatinine of 1.76 mg/dL, peritoneal dialysis was also stopped. Patients autoimmune work up (ANA, C3, C4) was negative and SARS Cov2 antibody test was positive. Nasopharyngeal swab to detect COVID 19 with RT PCR was negative. Proteinuria was reduced to 2+, creatinine to 1.19 and that prompted us to remove the PD catheter on day 7. Patient was shifted out of isolation and was doing well.

On outpatient follow up, prednisolone was continued for 4 weeks in tapering doses and stopped. Patient attained nephrotic state remission and was being followed up closely for a relapse.

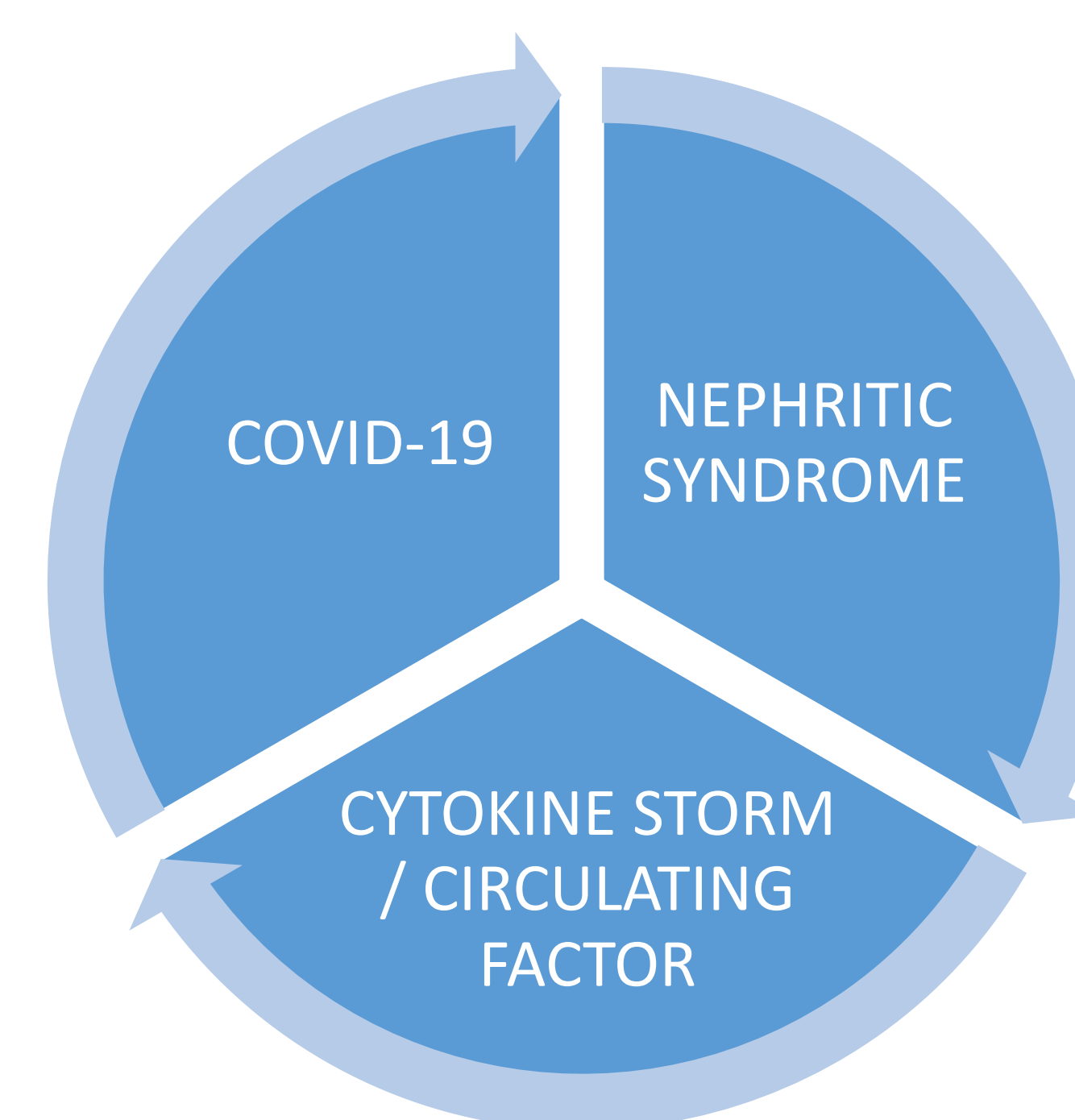
DISCUSSION

Based on data available in the literature, infants and children may be less vulnerable to SARS-CoV-2 infection and, when affected, symptoms are usually mild.⁷ Infection in the first 7 days after birth to a mother with perinatal SARS-CoV-2 infection was uncommon despite a national policy that promoted keeping mother and neonate together. There remains considerable uncertainty about vertical transmission of SARS-CoV-2. Raised IgM titres in neonatal umbilical blood samples⁸ and few case reports⁹ support possible vertical transmission of SARS-CoV-2, although no reports to date meet the criteria for confirmed vertical transmission proposed by Shah and colleagues.¹⁰

There are few case series suggesting that AKI may be a predominant manifestation of COVID 19 in children. In a retrospective study of 89 children included, 19 (21%) developed AKI (52.6%). A high renal angina index score and multisystem inflammatory syndrome in children (MIS-C) were increased in children with AKI compared to those with normal kidney function (15% vs 1.5%). AKI occurred in one-fifth of children with SARS-CoV-2 infection requiring hospital admission, with one-third of those requiring PICU.¹¹ This may highlight the need to look for kidney involvement in children with COVID 19. A retrospective cohort study of children 0–20 years old admitted to Morgan Stanley Children's Hospital (MSCH) between April 18th and September 23rd, 2020 was conducted.¹² Although children with MIS-C may develop AKI, this study suggested that most experience mild disease, swift resolution, and favourable outcomes. It highlighted the substantial differences in epidemiology and outcomes between AKI associated with paediatric MIS-C versus primary COVID-19 infection.

CONCLUSION

New-born babies can be affected by SARS-CoV-2 in a number of different ways. If a high index of suspicion is lacking, missing a diagnosis of MIS-C in SARS-CoV-2 infection is very much likely. Timely initiation of dialysis affects the outcomes in a favourable manner. SARS-CoV-2 infection presented with acute nephritis with nephrotic range proteinuria may be a unique example in the literature so far. Patient recovered well with glucocorticoids and still remains in remission.



CONTACT

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