Case Report

Complicated COVID-19 pneumonia in an infant: A rare entity

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ABSTRACT

In the era of the COVID-19 pandemic, children are spared from severe disease, accounting for 0.39–12.3%. According to a study in Wuhan China, only 2.7% of children are developed severe pneumonia. There are few cases reported with COVID-19 pneumonia in infants. We report the case of a 45-day-old infant who presented with respiratory distress with COVID-19 pneumonia required mechanical ventilation with an intercostal drainage tube for pyopneumothorax. The child was treated with intravenous antibiotics with supportive oxygen therapy. The fluid report of the pyopneumothorax was showing MRSA growth, so antibiotics were modified according to the sensitivity report. In this case report, COVID-19 pneumonia presented with complications in the form of pyopneumothorax with secondary bacterial infection and was successfully treated with a vigilant approach.

Key words: COVID-19 pneumonia, Infant, Intercostal drainage tube, MRSA infection, Pyopneumothorax

In the era of the COVID-19 pandemic, children are spared from severe disease, accounting for 0.39–12.3 % [1]. According to a study in Wuhan, China, only 2.7% of children have developed severe pneumonia [2]. There are very few cases reported with COVID-19 pneumonia in infants. Pyopneumothorax is a collection of air and pus in the pleural cavity. It is one of the complications of pneumonia.

Here, we report the case of a 45-day-old male infant with COVID-19 pneumonia who developed secondary bacterial infection with methicillin-resistant *Staphylococcus aureus* (MRSA) along with pyopneumothorax which was successfully treated.

CASE REPORT

A 45-day-old male infant, second by birth order, born of non-consanguineous marriage presented with a complaint of fever for 7 days which was of moderate grade, on and off along with complaints of irritability and refusal to feed for 1 day, four episodes of vomiting in the last 24 h, and difficulty in breathing for the last 12 h. The infant was referred to our COVID-19 dedicated hospital in view of COVID-19 positive status (Fig. 1a).

The child was developmentally normal, unimmunized for age and was on formula feed. The child had a weight of 3.7 kg (between −3SD and −2SD) and a length of 55 cm (between −2SD to mean). The head circumference (HC) was 37 cm (between 3rd to 50th centile) and the chest circumference was 34 cm (3 cm less than HC: normal for age). The child was conscious, irritable, and febrile (Temperature 38.2°C) with a heart rate of 200 beats/min (80–160 beats/min), and tachypneic with a respiratory rate of 68/min (40–60/min) with a severe grunt and respiratory distress. On auscultation, breath sounds were decreased bilaterally and more on the left side than the right side. Other systemic examinations were unremarkable. The child had a saturation of 70% on room air, required oxygen therapy despite of 100% FiO_2. The child could not maintain the saturation above 80% and had impending respiratory failure, so required mechanical ventilation. On mechanical ventilation with the maximum settings, there was no improvement (with 100% FiO_2, SpO_2 of 90%).

Post-intubation chest radiograph revealed a left-sided pneumothorax which required intercostal drainage (ICD) (Fig. 1b). An 80 ml of seropurulent fluid with air (suggestive of pyopneumothorax) was drained. The child was started on intravenous fluids, injection Piperacillin and Tazobactam (100 mg/kg/dose TDS) along with injection Amikacin (15 mg/kg/dose OD).

Post-ICD, the chest radiograph showed expansion of the left lung with evidence of consolidation in the left mid and lower zones and a left-sided pyopneumothorax. Clinical improvement was seen in the child. Investigations revealed hemoglobin of 10.2 gm/dL and total leukocyte count was 15.2×10^9 cells/L and platelet count of 1.15×10^{11} cells/L suggestive of thrombocytopenia

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with anemia (Table 1). A high-resolution computed tomography (HRCT) thorax showed the left lower lobe atelectasis and lung volume loss with thick and enhancing pleural membrane suggestive of empyema (Fig. 2).

Repeat COVID-19 reverse-transcription polymerase chain reaction (RTPCR) swab of day eight of illness came negative. Antibiotics were escalated to injection Meropenem (40 mg/kg/dose 3 times a day) and injection Vancomycin (15 mg/kg/dose 3 times a day) continued as per the sensitivity report and packed cell volume (PCV) transfusion in view of anemia. Culture pleural fluid grew MRSA which was sensitive to gentamicin, erythromycin, vancomycin, and linezolid. The pleural fluid cytology and culture/sensitivity findings are shown in Table 2.

The child required mechanical ventilation for 3 days, then O_2 by continuous positive airway pressure (CPAP) for 3 days followed by humidified O2 by nasal prongs for 11 days, and started on Ryles tube feeds with supplements. ICD removal was done after 11 days when drain output was nil for 24 hours with absent column movement in well-positioned ICD. The child received intravenous antibiotics for 14 days and then switched over to oral linezolid (10mg/kg/dose TDS) for 2 weeks. The child was stable, feeding well, hence discharged.

DISCUSSION

COVID-19 infection in infants and pediatric age group is usually mild to moderate with the vast majority percentage are asymptomatic carriers [1]. The younger population has more severe COVID-19 pneumonia with secondary bacterial infection than aged children. According to a study in Wuhan, China, only 2.7% of children developed severe pneumonia [2]. In the meta-analysis of 24 studies, 3338 patients with COVID-19 were evaluated for acute bacterial infection. In those cases, bacterial co-infection (estimated on presentation) was identified only in 3.5% of patients and secondary bacterial infection in 14.3% of adult patients [3]. No such studies are available in the pediatric population.

In an infant with COVID-19 pneumonia, chances of bacterial co-infection cannot be ignored. In our case, the patient developed COVID-19 pneumonia with bacterial co-infection with MRSA which got further complicated to pyopneumothorax. Pyopneumothorax is a collection of pus and air in the pleural

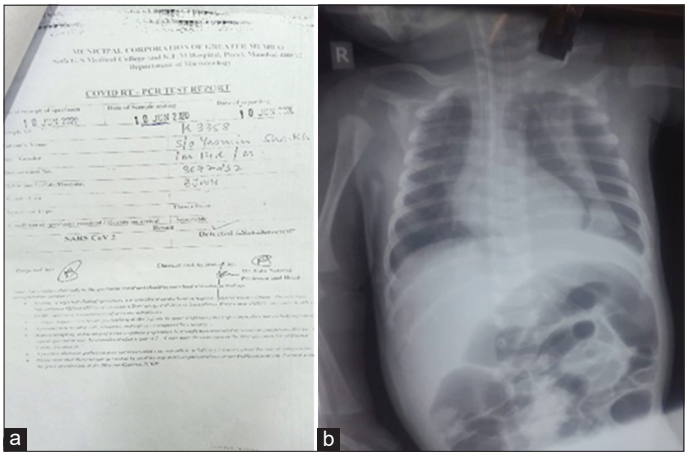

Figure 1: (a) RT-PCR report and (b) chest X-ray of the patient

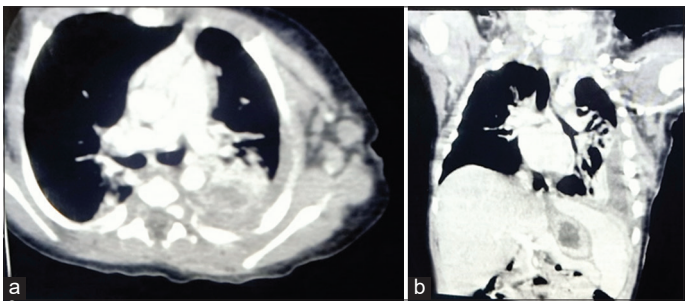

Figure 2: HRCT thorax showing the left lower lobe atelectasis and lung volume loss with thick and enhancing pleural membrane suggestive of empyema

Table 1: Hematological investigations of the patient

Day of illness	Day 2	Day 4	Day 6	Day 8	Day 12
Hemoglobin (10.5–14 g/dL)	10.2	9.2	8.1	11.8	11.5
Total Leukocyte Count (6–14 × 10^9 cells/L)	15390	5300	3300	12000	11500
Platelet (1.5–4 × 10^{11} cells/L)	115000	37000	77000	41000	1,44000
BUN (8–20 mg/dL) /Creatinine (0.5–1 mg/dL)	9/0.23	9/0.4	7/0.4	8/0.3	07/0.4
Na^+(135–145 mmol/L)/ K^+ (3.5–5 mmol/dL)/ Cl^-(95–105 mmol/dL)	136/5.7/103	140/4.5/100	142/4.2/103	140/4.4/99	138/4.0/100
SGOT(8–40 U/L)/SGPT(8–40 U/L)	90/17	27/11	30/12	40/18	28/12
Ca^{2+}(8.5–10.2 mg/dL)/PO^{4-} (4.5–6.5 mg/dL)	9.3/5.6	-	-	8.9/5.5	8.8/5.2
Total Protein (6–7 g/dL)/ Albumin (3.5–5 g/dL)	4.7/3.1	3.2/2	4.2/2.2	-	4/2.3
Alkaline Phosphatase (40–129U/L)	229	147	-	-	342
C Reactive Protein - 5 mg/L)	100	247	104	-	-

BUN: Blood urea nitrogen; SGOT: Serum glutamic-oxaloacetic transaminase; SGPT: Serum glutamic-pyruvic transaminase

Table 2: Pleural fluid cytology and culture/sensitivity

Pleural fluid and routine microscopy	450 cells /ml, 67% polymorph, and 33% lymphocyte with degenerated WBC with plenty of degenerated RBC in background
Pleural fluid culture and sensitivity	MRSA sensitive to Gentamicin, Erythromycin, Vancomycin, and Linezolid. Resistant to Ciprofloxacin, Penicillin, and Cotrimoxazole.

cavity [4,5]. Acute pyopneumothorax is a known complication of staphylococcal infection in adults but very few cases were reported in the infantile age group with confirmatory microbiological evidence [6].

Various mechanisms were put forward in case of COVID-19 pneumonia with secondary bacterial infections. Some of these include respiratory epithelial damage making it more susceptible to secondary bacterial infection. Other possibilities of pyopneumothorax can be the iatrogenic cause, secondary to positive pressure ventilation. A very few case reports are documented and proven of pyopneumothorax in infants which are successfully treated [6-8]. Complicated COVID 19 pneumonia is seen in adults with an incidence of 0.91% but no incidence as such is given in the pediatric population [9]. A case report of a 4-year-old child with similar complaints of pyopneumothorax on diagnosis was managed similarly with an intercostal drainage tube and intravenous antibiotics [10]. To the best of our knowledge, this is the first case report with COVID-19 pneumonia with bacterial co-infection with MRSA with pyopneumothorax.

CONCLUSION

Even though the majority of COVID-19 infections are mild to moderate in infants, we should be vigilant about the progression to severe pneumonia. Even the rarest complication should be kept in mind while treating. In case of severe pneumonia, broad-spectrum antibiotics are warranted at first which can be further de-escalated according to microbiological culture and sensitivity report.

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