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CASE REPORT

Management outcome of a COVID-19 Positive Child with Multiple Contacts admitted in a General Intensive Care Unit-A Case Report

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ABSTRACT

COVID-19 infection in paediatric patients is relatively low in Nigeria. The low index of suspicion made healthcare providers to be at risk of contracting the disease from this age group making prevention and contact tracing difficult. We report the management of a 9-month-old male child who had palatoplasty following a prior negative polymerase chain reaction (PCR) screening. The patient underwent palatoplasty for isolated cleft palate under general anaesthesia and endotracheal intubation. The patient was found to be desaturating significantly on admission to the recovery room and was subsequently taken back to the theatre with multiple attempts at intubation. A repeat PCR done was positive and subsequently, he was admitted into the ICU for ventilatory support. A chest radiograph taken on admission revealed features of severe bronchopneumonia and COVID-19 pneumonic changes. He was ventilated for 14 days and thereafter, was discharged home on a tracheostomy in good clinical condition. The mother of the child and 20 members of staff (23.5%) out of the 85 personnel who had close contact with the child in the course of treatment tested PCR positive. Contact tracing was difficult among those infected. They all recovered from the disease without complications. The treatment outcome in this COVID-19-positive child was good and contact tracing was effective in reducing the transmission of SARS-CoV-2 and limiting the impact of the outbreak. We hereby recommend preventive measures against the infection, vaccination and establishment of dedicated paediatric ICU for infectious diseases.

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INTRODUCTION

COVID-19 originated in Wuhan, China in December 2019 and a case was defined as any individual testing positive by RT-PCR for SARS-CoV-2, whether the person is symptomatic or not.[1] On the 5th of May 2023, the World Health Organization (WHO) declared that COVID-19 is currently a persistent health issue and no longer qualifies as a public health emergency of international concern (PHEIC). [2] This statement was made over three years after the initial declaration of the novel coronavirus outbreak as a global health emergency by the WHO. However, it appears that the impact of COVID-19 may linger for a while because the pandemic occurs in waves globally and sometimes persists as long COVID. Also, different variants of concern continue to emerge across the globe. The predominant strain of COVID-19 in the United States is now HV.1, accounting for about representing close to 33% of cases across the country.[3]

Nigeria had experienced four waves of the pandemic. This undoubtedly increases the vulnerability of children to more deadly variants especially in resource-poor nations, although infection rates for SARS CoV 2 in the paediatric group in Nigeria appear to be low.[4] The low index of suspicion among children inexorably exposes healthcare providers to a high risk of contracting the disease from this age group thus making prevention and contact tracing difficult. Paediatric patients seem to have less severe manifestations than adults and may be more likely to be asymptomatic.[5] Despite this, the Intensive Care Unit (ICU) has played a major role in the management of severe COVID-19 as many patients including children needed cardio-respiratory monitoring and support as a result of pulmonary complications amongst others. For instance, Loomba et al. reported that 15.1% of those under 2 years of age were treated in Paediatric ICUs for COVID-19 in the United States of America.[6]

The poor practice of preventive measures outside hospitals and the presence of asymptomatic carriers in the hospitals are factors that can aid the spread of the virus in healthcare settings. At the peak of SARS CoV2 transmission, it was recommended that unvaccinated children ages 2 years and older should wear a mask in public spaces and around people they do not live with.[7] Compliance with this basic public health advisory has been abysmally low in Nigeria since the first wave of the pandemic. Besides, the number of Nigerian populations that have received COVID-19 vaccination is still low, only 2.6% of the Nigerian population were fully vaccinated as at the end of January 2022.[8] This general low rate of vaccination and particularly non-approval of available vaccines for children increases their vulnerability to the disease.

One of the challenges of managing paediatric patients with COVID in the General ICU is the possibility of the easy spread of the disease to other patients. There are very few reports on the

clinical outcome of ICU admissions for children with COVID 19. This report may also contribute to knowledge in the management of similar cases in the future.

Our study reports ICU management of a case of COVID-19 paediatric patient with multiple contacts in a low-resource setting and a multidisciplinary management outcome of the COVID-19-positive child with multiple contacts in a General Intensive Care Unit (GICU).

CASE REPORT

We are reporting the case of a 9-month-old male child who had a negative polymerase chain reaction (PCR) screening result before admission to the ICU. The sample was tested using a Mic PCR machine with LightCycler technology which provides efficient, high speed DNA analysis in a portable format, crucial for diverse molecular biology applications. Its fluorescence-based detection monitors DNA amplification during PCR cycles, enabling rapid quantification and genetic analysis. The patient was equally asymptomatic of COVID-19 pre-operatively. He had palatoplasty for isolated cleft palate under general anaesthesia and endotracheal intubation. There were airway challenges both during and immediately after the procedure which necessitated admission into the General ICU (GICU) for ventilatory support. The poor respiratory response following a series of extubation and reintubation postoperatively led to the suspicion of COVID-19 in this patient. Chest radiograph revealed features of severe bronchopneumonia, COVID-19 pneumonic changes and cardiomegaly (Figure 1). A repeat PCR done following radiological findings was positive after 5 days of the initial screening test. This prompted the screening of all known contacts including two other patients that were on GICU admission.

The child was treated with intravenous dexamethasone 1.5 mg every 6 hours for 5 days, intravenous ceftriaxone 35 mg every 12 hours for 14 days, and midazolam infusion 0.2 mg/hour for 14 days. Management of the child was done in GICU as there was no paediatric ICU. There were episodes of mild to moderate fever of 37.4 to 38.5^{o}C between the first and second week of ICU admission. Various specialists involved in his management included anaesthetists/intensivists, maxillo-facial surgeons, paediatricians, community physicians, ICU-trained nurses as well as Ear, Nose and Throat surgeons. He had ventilatory support for 14 days and a tracheostomy was performed on the child when another PCR was negative. A repeat chest radiograph showed normal lung fields after two weeks of ICU admission (Figure 2). The child was discharged home on tracheostomy in good clinical condition and he was followed up at the outpatient clinic.

A total of nine doctors that cut across specialties (2 consultants, 6 Resident doctors in Anaesthesia, one House Officer), eight ICU nurses, three hospital attendants and the child's mother tested

positive for SARS-CoV2. This constituted a total of 20 (23.5%) out of the 85 hospital staff who had close contact with the child in the course of treatment that had the infection. Of these, there was a case of re-infection among the affected staff which constituted 5%. The results of the other two GICU patients were COVID-19 negative. The turnaround time for testing was between two and five days because the laboratory was overwhelmed as this period coincided with the peak of the second wave of COVID-19 in Nigeria.

All persons who tested positive proceeded on self-isolation and they were treated with tabs ivermectin, a high dose of vitamin C, vitamin E and zinc sulphate with good outcomes. Contact tracing was difficult among those infected as there was already widespread community transmission in the country. All positive individuals recovered from the disease without any sequalae.

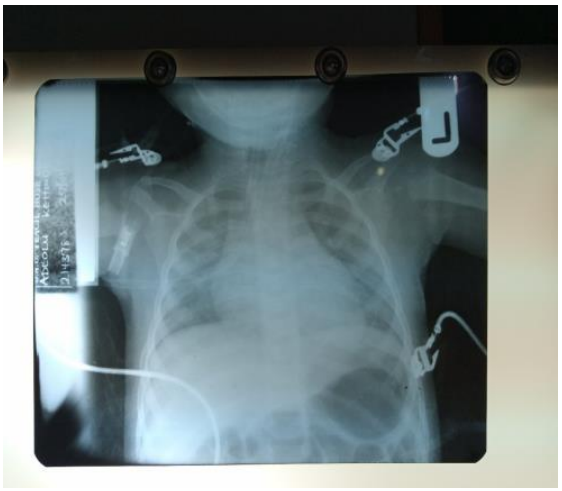

Figure 1: Child's chest radiograph showing cardiomegaly and bilateral patchy opacities seen in both lung fields 5th day on ICU admission.

DISCUSSION

Our case report is similar to study by Saheed et al.[9] who reported the case of a 10-year-old female child with COVID-19 admitted into an ICU with fever and bilateral patchy opacities in both lung fields. She was mechanically ventilated for 6 days and treated with an ionotropic agent and hydrocortisone. She tolerated oxygen via a non-rebreather face mask before being discharged from the paediatric ICU. Nonetheless, that patient was not a post-surgical case and had a shorter period of mechanical ventilation, unlike our patient who was mechanically ventilated for 14 days.

In contrast, a multisystem inflammatory syndrome temporally related to COVID-19 was reported in a 13-year-old child from Saudi Arabia resulting in death. The child had fever, gastrointestinal symptoms, and evidence of organ failure, borderline cardiomegaly and opacity of the lungs bilaterally on chest X-ray.[10]

Our patient showed similar symptoms except for organ failure and gastrointestinal symptoms which were seen in their patient. The survival of our patient was probably due to early detection and prompt intensive care management.

Ibrahim et al.[11] reported three siblings in another Nigerian study whose father was PCR positive. Two of the children had similar chest radiographs

as reported in our case study. They were treated with good outcomes even without ICU admission. This shows that it is possible for the index patient to have contracted the infection from a family member. It is debatable who the index case was in our report given that the caregivers and the mother were not tested before contact with the patient. It could be that the child was in the incubation period when he was initially tested; more so, the mother also tested positive.

It was noted that 23.5% of hospital staff involved in the management of the child in our study contracted COVID-19. This had implications for the healthcare workers and their families as a sizeable number had to proceed on self-isolation at home. Therefore, this would affect productivity amongst theatre staff and doctors as a result of cancellation or postponement of surgeries due to a shortage of manpower.

In a study by Ogundele and colleagues, it was found that 92% of the centres surveyed had suspended elective paediatric surgeries during the first wave of the COVID-19 pandemic possibly because of the inadequacy of personal protective equipment (PPE) as perceived by the responding paediatric surgeons.[12] Poor protective measures in addition to inadequate provision of PPE could have contributed to high infection rates and re-infection during the COVID-19 pandemic. It is likely that the re-infected staff in our study contracted the disease from this child a year after her first infection because of the primary role she played in the airway management of this patient in the ICU.

In a study by Hansen et al.[13] rate of protection against repeat infection was 80·5%. They reported that cases of re-infection were probably due to their engagement in high-risk activities without wearing masks or taking any precautionary measures with the assumption of having immunity.

Moreover, the ICU is a high-risk area because of closed ventilation and possible aerosol-generating procedures which occur frequently. Notwithstanding, the incidence of re-infection was low as only 1.1% of individuals with confirmed previous SARS-CoV-2 exposure became PCR-positive during the second outbreak.[13] This further highlights the importance of full vaccination to protect vulnerable populations as the United States Centre for Disease Control has recommended that everyone aged 5 years and above should get a COVID-19 vaccine to help protect against SARS-CoV2 infection.[7] Nevertheless, the COVID-I9 vaccination policy in Nigeria is yet to include children.

Contact tracing is a useful method to help in the prevention and spread of the COVID-19 virus with applicable guidelines varying from one country to the other. A definition of the term ‘contact person’ according to the European Centre for Disease Prevention and Control (ECDPC) is someone without symptoms who had

contact with the case within the timeframe ranging from 48 hours before the sample which led to confirmation up to 14 days after the sample was taken.[14] In our report, the index case was difficult to trace because he was asymptomatic before surgery and the routine COVID-19 screening for any airway procedure was PCR negative. This further underscores the need for universal safety precautions amongst health care providers; in addition, to prompt screening of contacts before the spread becomes uncontrollable. Recognizing the significance of public health awareness, we reiterate the importance of sustained campaigns. Public health education, particularly focusing on preventive measures like mask-wearing and vaccination, is deemed crucial during outbreaks of Covid-19 especially in regions with low vaccination rates.

The United States Centre for Disease Control and Prevention has documented that COVID-19 can be transmitted before symptoms occur or when no symptoms are present.[7] It has been recommended that case investigation and contact tracing activities must start without delay following the discovery of COVID-19-infected patients. Prompt PCR screening tests and immediate processing of results are necessary for such people to minimise the spread of the virus.

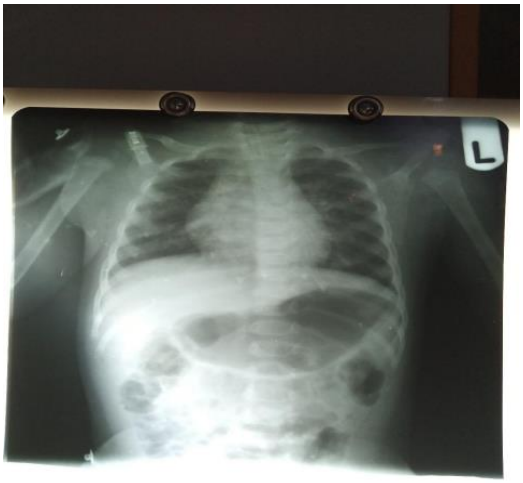

Figure 2: Chest radiograph showing normal lung fields after 14 days of ICU admission

CONCLUSION

The treatment outcome in this paediatric positive COVID-19 patient with multiple contacts was good. However, healthcare givers involved in the management of the child contracted the disease and it was difficult to trace the first contact amongst those infected. We recommend that infection, prevention and control measures should be optimised and sustained. It might be expedient to consider COVID-19 vaccination at least in phases for children as they may suffer severe complications like our patient who is presented in this case report and they may also transmit the infection even in health care settings. We also emphasize the formidable challenges encountered in managing paediatric COVID-19 cases in the absence of a dedicated paediatric ICU. Consequently, we recommend strategic resource allocation and infrastructure development to augment the capacity for

paediatric intensive care in healthcare facilities, addressing a critical gap identified in the study.

Conflict of Interest: There is no conflict of interest.

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