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LETTER TO THE EDITOR

How long elective surgery should be delayed from COVID-19 infection in pediatric patients?

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To the Editor:

We read with great interest the article "Postoperative outcomes of pediatric patients with perioperative COVID-19 infection: a systematic review and meta-analysis of observational studies" by Gong et al. [1]. The authors conducted a systematic review (SR) with pairwise meta-analysis (MA) of observational studies to quantify the risk of adverse postoperative outcomes in pediatric patients diagnosed with coronavirus disease 2019 (COVID-19) infection. The result of SR with MA derived from 9 eligible studies with a total of 23,031 pediatric patients showed that compared with pediatric patients without COVID-19, pediatric patients with COVID-19 had an increased risk of postoperative pulmonary complications (PPCs) (Risk Ratio (RR) = 4.24; 95% Confidence Intervals (CI) 2.08–8.64). No difference was detected in the primary outcome of postoperative early mortality (RR = 0.84; 95%CI 0.34–2.06) and secondary outcomes of postoperative ICU admission (RR = 0.80: 95%CI 0.39–1.68) and length of hospital stay (Mean Difference = 0.35; 95%CI − 1.81–2.51) between pediatric patients with and without COVID-19.

COVID-19 has affected anesthetic care and perioperative care worldwide. Especially anesthesiologists are at high risk of exposure to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) since airway management causes widespread aerosolization of the virus [2, 3]. Hence, anesthesiologists must care for highly infectious patients while protecting themselves from a lethal disease. At the same time, clinicians need to prevent the spread of the disease in hospitals perioperatively. In the early phase of the COVID-19 pandemic, most pediatric hospitals in North America canceled or delayed elective surgeries to preserve medical resources and prevent the spread of the disease in hospitals [2, 4]. However, prolonged delays in elective surgery could negatively impact the patient's outcomes. Therefore, how long elective surgery should be delayed from COVID-19 infection in pediatric patients has been of great clinical interest.

The current study is the first SR with MA investigating postoperative outcomes of pediatric patients with perioperative COVID-19 infection [1]. So, the current study could provide insights to answer the following clinical question "how long elective surgery should be delayed from COVID-19 infection in pediatric patients?". We basically agree with the authors' implications in the discussion that pediatric patients with COVID-19 should be delayed at least two weeks, which is similar to recommendations for pediatric patients with symptomatic upper respiratory infection for anesthesia and elective surgery, given that the risk of PPCs was high for at least two weeks subsequent to the time when they become asymptomatic. Since the result of COVID-19-positive pediatric patients with preoperative symptoms showed a higher rate of PPCs compared to that of asymptomatic patients (RR = 2.86; 95%CI 1.23–6.62),

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we better discuss patients with symptoms individually. In addition, when pediatric patients infected with COVID-19 require urgent or emergent surgery, individual assessment is necessary.

Several risk factors associated with severe COVID-19 in children have been reported, such as chronic lung disease, neurologic disorders, cardiovascular disease, prematurity, airway abnormality, feeding tube dependence, diabetes mellitus, and obesity [5]. Due to the heterogeneity of the included studies of the current SR with MA, the result may not generalize to these high-risk patients. Surgery timing for these high-risk children with COVID-19 remains controversial and should be discussed individually, considering risk and benefit. In addition, the authors excluded children who underwent organ transplant and cardiac surgery. Generally, organ transplants and cardiac surgery, which need post-operative immunosuppression and cardiopulmonary bypass, respectively, are types of surgery with a high risk of post-operative complications. Also, congenital heart disease is a risk of worse hospital outcomes with longer stay, higher mortality rates, and higher healthcare costs for children with COVID-19 [6]. Also, the impact of COVID-19 on solid organ transplant recipients is enormous in terms of donations and perioperative management [7]. Future studies, which focus on outcomes of high-risk children and surgery, are warranted.

Some children with COVID-19 could present with neurological symptoms [8], and some could suffer from persistent symptoms that affect various organs and systems, known as long-COVID [9]. The safety of anesthesia and surgery for these children with neurological manifestations and long-COVID remain unclear. Also, children with COVID-19 could deteriorate several weeks after COVID-19 infection, known as Multisystem Inflammatory Syndrome in Children (MIS-C), a postinfectious complication. Even previously healthy children with COVID-19 could suffer from MIS-C, although the incidence is low at 2 per 100,000 children [10, 11]. Typically, MIS-C develops two to four weeks after COVID-19 infection [10, 12], which could be included in the perioperative period when surgery is planned two weeks after COVID-19 infection once a patient becomes asymptomatic. Patients with MIS-C could involve multiple organ systems, which include gastrointestinal (92%), cardiovascular (80%), hematologic (62%), mucocutaneous (74%), and respiratory (72%) systems [10]. As a result, most patients with MIS-C could require ICU admission (80%) [10]. In addition, MIS-C is a risk factor for thrombotic events (TEs), and hospital mortality is high at 28% in children with MIS-C who develop TEs [13]. Hence, a perioperative thromboprophylaxis strategy could be important for those patients with an increased risk of TEs. As for treatment, although optimal treatment for MIS-C is unclear, the suggested treatment of PPCs is mainly supportive therapy, such as oxygen supplementation and respiratory support. On the other hand, recommended treatments for MIS-C include steroids and intravenous immune globulin, which are unique compared to PPCs [14]. Thus, perioperative differential diagnosis should encompass MIS-C since diagnosis without the knowledge of the disease could be difficult. Lastly, as the authors mentioned as a limitation, emergence of new, more toxic variants to pediatric patients could outbreak in the future. Whether the result of the current SR with MA could apply for these new variants should carefully be interrupted.

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Declarations

Conflict of interest The authors declare that they have no competing interest related to this publication.

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