

## SHORT REPORT

# Early elective surgery in children with mild COVID-19 does not increase pulmonary complications: A retrospective cohort study

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Email: [line1@chop.edu](mailto:line1@chop.edu)**Section Editor:** Britta S. von Ungern-Sternberg

COVID-19 has affected surgery worldwide and there is debate about when to proceed with elective surgery after infection. Adults with SARS-CoV-2 infection have higher risk of pulmonary complications and mortality after surgery,<sup>1</sup> leading many consensus groups to recommend delaying elective surgery in adults for 7 weeks after infection.<sup>2</sup> A pediatric study demonstrated increased risk of perioperative pulmonary complications with active COVID-19 infection, but no mortality difference.<sup>3</sup> There is little data on timing elective surgery in pediatrics after SARS-CoV-2 infection and no current consensus guidelines for children.

SARS-CoV-2 infection generally runs milder courses in children compared with adults; however, even mild upper respiratory infections increase perioperative complications, and the standard recommendation is to wait at least 4 weeks after upper respiratory infection for elective pediatric surgery.<sup>4</sup> As hospitals relax COVID-19 precautions, policies regarding elective surgery scheduling are being reevaluated. Our institution recently decreased the waiting period for elective pediatric surgery from 28 to 14 days after onset of SARS-CoV-2 infection. Our study aimed to determine if complication rates increase when proceeding with elective surgery in children with mild COVID-19 as early as 14 days after diagnosis by assessing anesthetic complications, postoperative complications, postsurgical disposition, or readmissions in pediatric patients undergoing elective surgery 14–27 days versus 28–90 days after SARS-CoV-2 infection.

This was a retrospective cohort study of patients aged <18 years who underwent surgery within 90 days of COVID-19 diagnosis at a single quaternary pediatric hospital between January 27 and February 23, 2022. The IRB reviewed and granted exemption for this study and for informed consent (IRB 22-019639). Our hospital

requires universal SARS-CoV-2 testing within 3 days of surgery, unless a patient has documented COVID-19 infection within the prior 90 days. Patients that were asymptomatic or had mild symptoms were rescheduled based on surgeon and patient availability as early as 14 days after onset of COVID-19. Patients with moderate or severe symptoms (persistent upper respiratory infection symptoms and/or fever or symptoms requiring escalation of care such as hospitalization or a steroid course) were rescheduled after a waiting period of at least 28 days after COVID-19 infection. Patients were designated “early” or “late” recovered based on an interval of 14–27 or 28–90 days from date of COVID-19 diagnosis to surgery date. Demographics and clinical variables including surgical procedure type, ASA classification, comorbidities, COVID-19 symptoms, and management, as well as intraoperative and postoperative outcomes such as rescue medication and supplemental oxygen requirements, vitals, and postoperative course were collected from the medical record. *p*-values were calculated using *t*-tests for tests of means and chi-square or Fisher's exact tests for tests of proportion. Statistical analysis was performed using Stata 14.0.

285 subjects were included in this study, with 62 “early” and 223 “late” COVID-19 recovered. There were no significant differences between groups for all demographic and clinical variables assessed. The most common surgical type in both groups was otolaryngology (41.9% vs. 42.6%) and a majority were classified as ASA class 2 (50.0% vs. 51.1%). Over 95% of patients had mild COVID-19 that did not require urgent care, emergency room (ER), or hospitalization (Table 1).

There were no significant differences between groups for outcomes including intraoperative and postoperative rescue medication

requirements, postoperative fever or oxygen requirement, postanesthesia care unit length of stay, change in postoperative disposition, or ER visit or readmission within 7 days (Table 1).

Our study aimed to determine if complication rates increase when proceeding with elective surgery in children early (14–27 days) after

diagnosis of COVID-19. We found no difference in intraoperative, immediately postoperative, or postadmission complications between the “early” and “late” groups.

There are several limitations to our study. Only 12 of 285 subjects required urgent care, ER, or inpatient care for their COVID-19

TABLE 1 Comparison of characteristics between “Early” and “Late” COVID-19 recovered subjects

	“Early” COVID recovered (14–27 days postdiagnosis), N = 62 (22%)	“Late” COVID recovered (28–90 days postdiagnosis), N = 223 (78%)	p-value
Age mean ( $\pm$ SD), years	5.6 $\pm$ 5.5	6.8 $\pm$ 5.6	.13
Gender			
Male N (%)	30 (48)	130 (58)	.16
Race <sup>a</sup> N			
White	46	150	.58
Black	7	34	
Other	8	30	
ASA physical status classification system N (%)			
1	14 (22.6)	69 (30.9)	.26
2	31 (50.0)	114 (51.1)	
3	16 (25.8)	38 (17.0)	
4	1 (1.6)	2 (0.90)	
5	0 (0)	0 (0)	
ASA emergent N (%)	0 (0)	0 (0)	1.0
Underlying comorbidities N (%)			
Cardiac	6 (9.7)	19 (8.5)	.80
Pulmonary	8 (12.9)	36 (16.1)	.69
Immunocompromised	2 (3.2)	11 (4.9)	.74
Diabetes	0 (0)	1 (0.4)	1.0
Obesity	1 (1.6)	13 (5.8)	.32
COVID symptoms N (%)			
Fever	18 (29.0)	46 (20.6)	.32
URI symptoms (cough, rhinorrhea)	27 (43.5)	89 (39.9)	.85
GI	3 (4.8)	14 (6.3)	.77
Asymptomatic	18 (29.0)	73 (32.7)	.27
Required urgent care/ER/hospitalization for COVID-19 N (%)	5 (8.1)	7 (3.1)	.35
Intraoperative succinylcholine N	0	2	1.0
Intraoperative epinephrine N	0	2	1.0
Intraoperative albuterol N	1	1	0.39
Postoperative succinylcholine N	0	0	1.0
Postoperative epinephrine N	0	0	1.0
Postoperative albuterol N	0	0	1.0
Prolonged O <sub>2</sub> requirement >30 min N	1	9	.70
Postoperative fever >38.3 C N	0	3	1.0
PACU length of stay ( $\pm$ SD), minutes	37.8 $\pm$ 20.2	35.6 $\pm$ 22.0	.52
Change in postoperative disposition from planned N	0	2	1.0
ER visit within 7 days N	1	4	1.0

<sup>a</sup>Some subjects did not report race, so numbers do not add up to 100%.

infection, with 91 of 285 subjects being asymptomatic. With the overwhelming majority of subjects having mild or asymptomatic COVID, these results may not be generalizable to children with more severe COVID-19. In our region, the Omicron BA.1 variant was the predominant circulating virus during the study period. Although more contagious, BA.1 had milder symptoms than previous variants, and our study findings may not be generalizable for other variants, as different strains may have different risk profiles. We also only evaluated patients that proceeded with surgery, excluding those canceled for any reason, which introduces selection bias. Finally, with 285 subjects, our study would not capture extremely rare complications.

Based on our cohort, proceeding with elective surgery in children after as few as 14 days after mild SARS-CoV-2 infection does not increase complication rates as compared to waiting at least 28 days. This data may help guide policies regarding scheduling of elective pediatric surgery to minimize unnecessary delay of surgery. However, clinical judgment of each individual patient, in the setting of regional COVID-19 viral characteristics, remains vital, and further research is required as COVID-19 continues to evolve.

#### AUTHOR CONTRIBUTIONS

Drs. Lee and Banik conceptualized and designed the study, designed the data collection instruments, collected data, drafted the initial manuscript, and reviewed and revised the manuscript. Drs. Giordano and Kazahaya conceptualized and designed the study, designed the data collection instruments, collected data, and reviewed and revised the manuscript. Dr. Lin conceptualized and designed the study, designed the data collection instruments, collected data, carried out the analyses, and reviewed and revised the manuscript.

#### FUNDING INFORMATION

No funding was secured for this study.

#### CONFLICT OF INTEREST

The authors have no conflicts of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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**How to cite this article:** Lee DR, Banik GL, Giordano T, Kazahaya K, Lin EE. Early elective surgery in children with mild COVID-19 does not increase pulmonary complications: A retrospective cohort study. *Pediatr Anesth*. 2022;00:1-3. doi: [10.1111/pan.14528](https://doi.org/10.1111/pan.14528)