



## Management for patients with pediatric surgical disease during the COVID-19 epidemic

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Accepted: 7 April 2020 / Published online: 20 April 2020  
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The recent ongoing outbreak of coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), spreads around the world. By March 31, this global pandemic has infected about 700,000 cases in more than 203 countries/regions and 33,257 people have lost their lives. A recent study reported that only 2.16% (965/44,672) of infected patients were aged 19 years or younger [1]. Although children are supposed to be less susceptible to COVID-19, the true infected rate of children may be understated because some children with asymptomatic and mild infections are unlikely to be tested [2]. Besides, in addition to the COVID-19 itself, the relative shortage of medical resources caused by a surge in the number of coronavirus patients and accompanying economic downturn may also affect the diagnosis and management plan for children with surgical disease. Hence, the treatment plans for pediatric surgical disease during the COVID-19 outbreak deserve attention.

For confirmed/suspected SARS-CoV-2-infected children, although some of them may present as mild or even symptomless infections, the virus may “awaken” and the symptoms may worsen with the progression of SARS-CoV-2 infection. Besides, although it remains unclear whether infected children with cancer are associated with poor prognosis, it seems that the tumor itself and its corresponding treatment may weaken the immune response to

pathogenic microorganisms, and further make the COVID-19 worse. Hence, a priority of treating the COVID-19 and a short delay in surgical treatment (or oncotherapy) may be an optimal option for those infected children without presenting a surgical emergency. In a recent report about infected children from Wuhan, 18 of 20 children were cured with an average stay of 12.9 days (8–20 days) [3]. Hence, the delay may not seem long. The incubation period from exposure to symptoms for most patients with COVID-19 varies from 3 to 14 days [4], suspected infected children should be, therefore, quarantined for at least 14 days to ensure safety.

However, for those who developed a life-threatening emergency (such as the acute abdomen and severe hydrocephalus), although emergent operation may be a risky practice in children with concurrent SARS-CoV-2 infection, it may still be the only life-saving method when conservative treatment fails. It is recommended to simplify the surgical procedure and to minimize the trauma to children. The “radical surgery” should be chosen cautiously after a multidisciplinary assessment. In surgical treatment recommendations for confirmed/suspected adult, laparoscopic surgery is considered dangerous because it may carry the risk of aerosol transmission [5]. However, the balance between the real risk of cross-infection and the benefits of minimally invasive surgery should be carefully assessed [6]. Appropriately reducing the pneumoperitoneum pressure, preventing the gas leakage from the trocar sites, and slowly removing the “aerosol” via aspirator after pneumoperitoneum may be possible solutions to lower the risk of cross-infection.

Preventing SARS-CoV-2 infection and giving the necessary treatment should be the main treatment principles for treating children with pediatric surgical diseases but without COVID-19. Elective operations (such as cosmetic procedures) could be postponed modestly as invasive procedures as well as anesthesia may influence the children’s immunity, which increases their susceptibility. However, the outbreak may last for months, for urgent and some “time-sensitive” diseases, unduly delay in surgery may miss the “critical

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window” for intervention, which may compromise the children’s growth, development, and quality of life. For example, the optimal timing of orchiopexy for undescended testes is between the ages of 6–12 months since the risk for infertility is mitigated with a surgical correction before one year [7]. Besides, surgery is still the mainstay of treatment for children with cancer [8]; prolonged delay in cancer treatment may be associated with worse outcomes. We should not suspend the necessary pediatric surgical treatment indefinitely for fear of infection.

In China, although the medical resources are relatively insufficient at the height of its epidemic, some designated institutes including a children’s hospital are still reserved for only receiving non-COVID-19 patients during the epidemic. Besides, we have also assigned hospitals specially treated the COVID-19 patients with severe symptoms and makeshift hospitals specially treated the mild symptoms or no symptom patients. Separating the non-COVID-19 patients from infected patients is a very effective way to reduce the risk of cross-infection, and to make the treatment of non-COVID-19 children timely and safe.

During the outbreak, the impact of insufficient medical resources for pediatric surgical diseases may be greater than the infection itself. The detailed treatment plan should depend on the children’s infection status, their emergency presentation and developmental considerations. Once the treatment is available, children who really need surgical intervention should not be delayed.

**Funding** None.

### Compliance with ethical standards

**Conflict of interest** The authors have no conflict of interest to disclose.

**Ethical approval** This article does not contain any studies with human participants performed by any of the authors.

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