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Editorial

SARS-CoV-2 airway reactivity in children: more of the same?

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``*Has the whole world gone crazy?*´´ (*Big Lebowski*).

That was certainly the impression most of us had two years ago when faced with the challenges of the COVID-19 pandemic. The initial burden and human costs in ICUs were, in some areas, so high that some of us, even with an exclusive paediatric full-time background, were transferred to work in new additional adult COVID-19 ICUs. From that experience, it quickly became apparent that SARS-CoV-2 infection was associated with certain unfamiliar features. The initial sense when working in these environments was one of confusion mixed with personal discomfort. Not only did the actual care of these patients require an unusually fast response to emerging evidence, but there was also a very present potential personal threat for the healthcare providers. Thus, in parallel with the challenges of disease-specific patient care, personal protection strategies aimed at maintaining the safety of the care provider had to be developed.

At the height of the pandemic, scientific progress was extremely fast (some critical care protocols such as anticoagulation strategies could even change during a work shift), demonstrating how near impossible it is to establish evidence-based guidelines for an exponential process. COVID-19 turned out to be an unusually multifaceted disease with special features that all warranted specific investigations within a very short time. Naturally, airway and respiratory management of this new emerging respiratory virus became a focus in clinical anaesthesia. For paediatric anaesthetists, this was not completely new, as the specialty of paediatric anaesthesia has always been highly exposed to children of all ages with acute and chronic viral upper respiratory tract infections (URTI). Otherwise, healthy children commonly present with recurrent URTI for ENT procedures throughout the year or display a seasonal variation related to school or nursery attendance. Adverse events have been shown to be substantially higher in children presenting with symptoms of URTI compared with non-symptomatic patients and several institutional and national guidelines exist to guide the practitioner for best practice. Between one quarter and one third of all symptomatic children experience critical adverse peri-operative respiratory events [1], ranging from mild temporary peri-operative hypoxaemia due to increased secretions and subsequent laryngo- and bronchospasm to ongoing, prolonged oxygen requirements following elective and non-elective procedures.

Apart from postponing purely elective surgery, the incidence and severity of such critical adverse peri-operative respiratory events may be mitigated by the choice of airway management device (facemask vs. supraglottic airway vs. tracheal tube) as well as effective pre-emptive antisialagogue and bronchodilator treatment. Assuming the short-term hypoxaemic episodes are prevented or overcome in children with an active URTI, no long-term sequelae are usually expected [2, 3]. A progression to viral lower respiratory tract infection (LRTI) is uncommon in healthy children and the risk of transmitting viruses from the upper respiratory tract and hence producing a viral

pneumonia is likely further reduced by the `antiviral´ properties of halogenated volatile anaesthetic agents [4, 5].

COVID-19

Very few specific viruses have been studied for their individual airway risk properties or ranked against each other (e.g. is an adenovirus riskier than a rhinovirus infection when anaesthetising children?). Viral URTIs are usually reported as one big family and collectively investigated for their association with airway complications in anaesthesia. But, could SARS-CoV-2 infection be different in children, as initial reports suggested a primarily lung parenchymal (LRTI) rather than an URTI picture in adults? Given the apparently large incidence of airway-related events in association with anaesthesia in an uncontrolled pandemic with a new virus, it would appear logical to investigate if SARS-CoV-2 infection adds a specific risk to anaesthetic airway management in children at that time of the pandemic. Few could have foreseen the change of subsequent variants to predominantly affecting the upper and larger airway epithelium [6].

To answer this question at the time, members of the International Paediatric Difficult Intubation Collaborative network conducted a prospective multicentre study based on data collected via the paediatric airway complications during COVID-19 (PAWS-COVID-19) collaboration registry. The resulting article [7], is a good example of an attempt to quickly collect as reliable data as possible to produce clinically useful results in the middle of a chaotic pandemic. The authors should be applauded for their efforts. Data from more than 14,000 patients from 78 sites in 16 countries were collected, with the primary aim to investigate the incidence of hypoxemia during airway management of children infected with confirmed or suspected COVID-19. Perhaps unsurprisingly, the occurrence of complications was higher in children with COVID-19 (12% vs. 3%, respectively). The authors also reported a higher incidence of hypoxaemia (18%) during airway management in children symptomatic with COVID-19. In addition, the overall incidence of complications was higher (25%) in children with current symptomatic URTI (confirmed or suspected COVID-19). The reported odds ratios were 3.7 for both with wide 95%CIs. Although the incidences are increased, the results are strikingly similar to the incidence (19%) of a much larger recent study of peri-operative respiratory adverse events in children with unspecified acute URTI [8]. The results also compare favourably with a not too dissimilar prospective big data collection and the reported relative risk (2.2; 1.9-2.6) for anaesthesia-related airway complications in non-SARS-CoV-2 URTI [9]. While these findings are very reassuring with regard to the risk posed by SARS-CoV-2 URTI, vigilance and meticulous clinical practice remain critical in prevention and treatment of adverse respiratory events [1–3, 10].

Other viruses

The results of the current study also raise another important question: is the incidence of airway complications related to COVID-19 different from the ones associated with other airway viruses´? Since the COVID-19 group of 329 patients included both confirmed and suspected cases, it may be challenging to answer this question with absolute accuracy. Despite this uncertainty, the results indicate that the risk of suffering adverse peri-operative respiratory events is very similar compared with other paediatric viral URTIs. There appears to be no relevant difference in the relative risk for clinical consequences in a child with an acute symptomatic URTI, COVID-19 or other virus. SARS-CoV-2 should, therefore, now be welcomed into the paediatric `URTI virus family´ with regard to risk for peri-operative airway complications. Indeed, any finding indicating that a specific airway virus, such as SARS-CoV-2, would be associated with particularly high risk of airway-related complications would have been surprising and inevitably have triggered an urgent investigation to map the different viruses hiding behind the `paediatric viral URTI´ label. Consequently, we believe that a child unwell with a SARS-CoV-2 URTI should be treated identically to a child acutely unwell with any other viral URTI. This clinical decision should be taken by the attending anaesthetist. Likewise, with ongoing routine pre-operative SARS-CoV-2 testing still commonplace in some institutions and countries, children may be discovered to be an incidental carrier and completely asymptomatic. There should be no increased risk of an adverse peri-operative respiratory event; after all they could also be asymptomatic carriers of other viruses not screened for. Such a finding should, therefore, not result in an `anaesthetic´ cancellation of the procedure per se but may lead to other infectious disease measures within the hospital aimed at reducing spreading the virus to other vulnerable persons and protecting healthcare workers and visitors alike. There is currently no evidence that an asymptomatic child with an incidental finding that they are a SARS-CoV-2 carrier will currently have an increased risk of adverse peri-operative respiratory events or should be treated differently to any other asymptomatic, well child. This may change again for SARS-CoV-2 in the future with new variants (unlikely) and vigilance, but no panic is required. Without a crystal ball we are unable to predict the next pandemic but should surely retain the lessons learned from the past two years [11].

One of the strengths of large multicentre studies is also one of the potential weaknesses: how does one ensure standardised data collection when processing information from such a large and diverse group of institutions? To minimise data collection errors, Peterson et al. [7] created a robust research collaboration and database structure. Other, `fruitful´ national and international success stories in paediatric anaesthesia have been reported over the past decade and continue to thrive (e.g. anaesthesia practice in children observational trial (APRICOT) and neonate and children audit of anaesthesia practice in Europe (NECTARINE)). It remains to be seen if such an enthusiastic, worldwide response can be replicated in the future. Such projects are critical to maintain collegial collaboration and exchange of ideas as well as informing paediatric anaesthetic practices.

History suggests that we may forget a pandemic sooner than we think. This is natural and probably healthy in the long term. For future pandemics this study may, however, help us remember that in the absence of data or experience, we should trust previous evidence and established practices for similar situations or conditions. Meanwhile, the time has come to move beyond data collection for COVID-19 in children undergoing anaesthesia and airway management and provide the same previous care and judicious clinical principles as with other viral URTIs in children. We can also paraphrase the Big Lebowski: ``*I can't be worried about that anymore. Life goes on, man!*´´

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