

Highly fruitful nasal cannula: An innovative use of high flow nasal cannula (HFNC) and a lesson

Sir,

Recurrent respiratory papillomatosis (RRP) is a benign disease of viral origin that spreads throughout the respiratory tract and is notorious owing to its recalcitrant nature.^[1] Patients with RRP frequently present to the operation room (OR) for microlaryngoscopic excision, laser debulking, endoscopic stripping, or tracheostomy. We hereby came up with an innovative ventilatory management of a patient with RRP. Informed and written consent for publishing this case has been obtained from the patient's mother.

A 12-year-old boy suffering from RRP was scheduled for debridement to relieve him of the difficulty in breathing for the last 1 month. He was already tracheostomised since 3 years of age after an acute episode of stridor. Even after multiple debridements, his latest fiberoptic bronchoscopy and chest skiagram revealed diffuse involvement of the entire respiratory tree [Figure 1]. His room air oxygen saturation was 94-95%.

In the OR, tracheostomy tube was replaced with an appropriately sized cuffed flexo-metallic tube (FMT) succeeding inhalational induction, and total intravenous anaesthesia was administered after securing an intravenous line. The surgeons planned a tracheoscopic debridement of the airway tract using coblator below the tracheostoma to be followed by debridement of the papilloma above it.

After ventilating the lungs with 100% oxygen (O_2), on attaining expiratory $O_2 > 90\%$, surgeons were allowed to remove the FMT and proceed. But the saturation started to drop within 50-60 seconds, and we had to interrupt the surgery thrice, when the peripheral oxygen saturation (SpO_2) reached 85% within 90 seconds. On being requested for a longer apnoeic time, we explored the available alternatives and decided to attach a high-flow nasal cannula (HFNC) after confirming that the laser will not be used by the surgeons. A fractional inspired oxygen concentration (FiO_2) of 85-90% was provided by the HFNC at 45 L/min flow and the mouth was closed using a micropore tape [Figure 2]. Subsequently, the time taken for the SpO_2 to drop to 85% was dramatically improved to 160-180 seconds, allowing both the anaesthetists and the surgeons to complete the surgery with much greater comfort and lesser stress.

Airway management in RRP patients can be potentially challenging. The airway obstruction, pulmonary hypertension related cardiopulmonary compromise, shared airway between anaesthetists and surgeons poses a wide array of challenges. Maintaining spontaneous ventilation, mechanical ventilation, jet ventilation, even cardiopulmonary bypass has proven to be some successfully used strategies.^[2] While a patient with stridor is considerably difficult to manage, our patient being already tracheostomised made the initial airway management much easier for us. As the surgeons requested for a longer apnoeic period, a supraglottic airway was not feasible as it would restrict the freedom of movement of the tracheoscope. Also, an oral approach was required to debride the papilloma above the tracheostoma. Low-flow devices would not be beneficial with a narrowed airway.



Figure 1: Chest X-ray showing diffuse fluffy opacities due to recurrent respiratory papillomatosis involving bilateral lung fields



Figure 2: High flow nasal cannula (HFNC) applied with the flexometallic tube inserted through the tracheostoma, in-situ

Since its introduction as an alternative to continuous positive airway pressure in preterm infants suffering from acute viral bronchiolitis, HFNC has become increasingly popular among anaesthesiologists. Its utility has extended much beyond the boundaries of the intensive care unit in different settings. The coronavirus disease-19 outbreak has allowed HFNC to become indispensable and made all healthcare providers far more familiar with this mode of ventilation.^[3] It has been successfully used to maintain oxygenation in adults undergoing laryngeal microsurgery and is found to be non-inferior to tracheal intubation very recently.^[4] HFNC efficiently allows some amount of gas exchange and thus improves oxygenation by washing out the nasopharyngeal dead space, maintaining positive end

expiratory pressure (PEEP) and decreasing the work of breathing even in small children.^[5-7] In our case, closing the mouth allowed the HFNC to generate PEEP and augment the apnoeic time. This case underlines the utility of HFNC in prolonging the apnoeic time beyond the induction of anaesthesia in a compromised paediatric airway where the risk of desaturation is much higher. Although HFNC has been used for quite a while, further research is still needed to ascertain the optimal and safe flow rate, FiO₂ in paediatric patients, along with the safety and efficacy of HFNC in paediatric anaesthesia.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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Submitted: 14-Nov-2021

Revised: 01-Feb-2022

Accepted: 16-Feb-2022

Published: 24-Mar-2022

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Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.ija_994_21

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How to cite this article: Chowdhury SR, Kumar R, Shanmugam N, Kumar R. Highly fruitful nasal cannula: An innovative use of high flow nasal cannula (HFNC) and a lesson. Indian J Anaesth 2022;66:239-41.

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