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Prevention is better than the cure, but the cure cannot be worse than the disease: fibreoptic tracheal intubation in COVID-19 patients

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Editor—We would like to comment on the paper by Wu and colleagues[1] in light of the protocols and clinical recommendations[2] produced during the coronavirus disease 2019 (COVID-19) outbreak in Italy. COVID19-related hypoxaemia and desaturation patterns are atypical, and might not be comparable with typical respiratory failure or acute respiratory distress syndrome (ARDS). Patients exhibit a low $Pa_{O_2}/F_{I_{O_2}}$ (*P*/*F*) ratio with (initially) preserved high pulmonary compliance and shunt fractions, the so-called silent hypoxia,[3] which has implications for airway management. In this respect, we note the following concerns with the study by Wu and colleagues[1]:

(i) The power analysis was calculated using 23% desaturation estimated on the basis of ICU patients, whereas COVID-19 patients desaturate further and faster. In their study, with initial mean (inter-quartile range [IQR]) *P*/*F* ratios of 139.5 (118.3–162.3) and 128.5 (121.5–136.3), the authors report mean saturations of 94% and 91%, respectively, with a range of 86–95.8%.[1] In daily practice, with an intubation trigger around *P*/*F*=150 mm Hg, COVID-19 patients quickly reach much lower Sp_{O_2} values upon apnoea.[2]

(ii) 'Rapid-sequence fibreoptic bronchoscopic tracheal intubation'[1] appears an oxymoron: fibreoptic intubation requires skill and is time consuming (72–420 s time range for awake intubation[4]). Wu and colleagues[1] report mean (IQR) values of 68.5 s (62.2–74.0 s) and 76.0 (68.0–90.5 s) for fibreoptic intubation in anaesthetised patients, probably reflecting the skill of the intubating team and the impact of anaesthesia. For a fast procedure, it is still too long not to result in significant desaturation, particularly considering that no oxygen was administered in the control group (in an *obvious* study comparing oxygen *vs* non-oxygen), and that, 'There was no significant difference in the proportion of patients with minimum Sp_{O_2} >95% during intubation, in the incidence of Sp_{O_2} <80% during intubation'.[1] In other words, this might mean that, in a 30+30 COVID-19 patient sample, either extra oxygen is not useful or that high-flow nasal oxygen (HFNO) does not work.

(iii) We do not believe that 'HFNO shortened the duration of intubation. […] but one possibility is that interruption of attempts at tracheal intubation to carry out rescue face-mask ventilation was less frequently required in the HFNO group'. High-flow nasal oxygen probably reduced the number of attempts at rescue face-mask ventilation, and not the time for fibreoptic intubation, keeping in mind that the control group was not given oxygen.

Fibreoptic intubation is considered the gold standard for predicted difficult intubation, the underlying concept being that maintenance of spontaneous breathing preserves oxygenation.[5] Nevertheless, use of a technique requiring longer times for intubation, with higher likelihood of desaturation and need for rescue face-mask ventilation (1+8 cases in the series of Wu and colleagues[1]) cannot be recommended in COVID-19 patients made apnoeic by neuromuscular blocking agents.

(iv) The authors report that, 'During attempts at tracheal intubation, HFNO was maintained for the HFNO group',[1] but they did not clarify if intubation was performed by the nasal or oral route. In the first case, either the 4.5 mm fibrescope was inserted in the nostril together with the HFNO prong (thus, resulting in a difficult scope movement), or in place of the HFNO prongs. Fibreoptic intubation is known to be more challenging via the oral route in anaesthetised patients because of airway collapse, especially if a dedicated airway is not used.[6] If the nasal route was chosen, removing the HFNO prongs to allow passage of the bronchoscope would have reduced the benefit of apnoeic HFNO and increased aerosolisation risk.[2,7–9]

(v) Despite being superior in preventing hypoxaemia during rapid sequence induction and intubation, HFNO is not recommended in COVID-19 patients[2,8,9] as (awake) fibreoptic intubation is considered an aerosol-generating procedure. It is then paradoxical to state that, 'Rapid-sequence fibreoptic bronchoscopic tracheal intubation in patients with COVID-19 pneumonia may reduce the risk of viral spread',[1] especially if the declared advantage is, 'an increase of the distance between anaesthesiologist and patient's airway'.[1] Bronchoscopes with an average length of 65 cm do not allow the 1 m distance considered safe for airborne spreading.[2,7–9]

A videolaryngoscope (especially with external screen) works with similar distance, but has been shown to be faster and to require lower skills[4] and to have simpler options for

rescue intervention.[1,2] The same message comes from Chinese experience[6] and from worldwide recommendations.[2,8,9] To maximise first-pass success, we recommend a preloaded bougie or stylet, rapid sequence induction with full-dose neuromuscular blockade, preoxygenation by continuation of ongoing noninvasive ventilation, and apnoeic low-flow (1–3 L min^{-1}) oxygen through standard nasal prongs (nasal oxygen during efforts securing a tube [NODESAT]).[2] After two failed laryngoscopies, we recommend rescue use of fibreoptic intubation only through a second-generation intubating supraglottic airway device, which allows ventilation with limited environmental contamination.[2]

Airway management is complex in COVID-19 patients (infection risk, use of personal protective equipment (PPE), difficult communication, rapidly deteriorating patients, and shunt–hypoxaemia). Given the duration, complexity, and aerosolisation potential of fibreoptic intubation and the potential low-efficacy/high contamination profile of HFNO, we strongly discourage the use of the technique proposed by Wu and colleagues[1] in paralysed COVID-19 patients. Awake fibreoptic intubation remains the gold standard for predicted intubation/ventilation difficulty to be used in very selected cases in COVID-19 patients.[2,8,9] Oxygenation, independently of disease, remains the main target of any airway management strategy,[5] and although difficult at times, science and good sense should always prevail.

Declarations of interest

MS has received paid consultancy from Teleflex Medical, Verathon Medical, and DEAS Italia; is a patent co-owner (no royalties; DEAS Italia); and has received lecture grants and travel reimbursements (MSD Italia and MSD USA). IDG has received lecture grants and travel reimbursements from MSD Italia. There are no other competing interests declared.

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"Water, water, everywhere": a challenge to ventilators in the COVID-19 pandemic

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Editor—With the spread of coronavirus disease 2019 (COVID-19), intensive care facilities have been rapidly overwhelmed across the UK and elsewhere.[1] In general, the UK has fewer doctors and fewer ICU beds per capita than most of Europe.[2] Many hospitals have spread into the recovery unit of theatres and are using anaesthetic machines to