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Enteral Nutrition During Noninvasive Ventilation: We Should Go Deeper in the Investigation—Reply

In reply:

We thank Stefano Bambi and colleagues for highlighting these common concerns regarding the introduction of enteral nutrition during noninvasive ventilation (NIV) for acute respiratory failure. In our protocol, we use a nasogastric tube 8–12 French in diameter. Nasogastric tubes were inserted only in the enteral nutrition group. According to the guidelines,[1] we use prokinetic agents for patients at high risk for aspiration, including those who have had an episode of vomiting or a high gastric volume, although we could not confirm the details of this point retrospectively.

As Bambi et al[2] have mentioned, the recent enteral nutrition guideline by the American Society for Parenteral and Enteral Nutrition no longer recommends using gastric residual volume as a routine care criterion for withholding enteral nutrition inappropriately. However, there is a trial suggesting an association between vomiting and a gastric residual volume of > 250 mL.[3] We also need to emphasize that the enteral nutrition protocol we use for ventilated subjects was mainly intended for those receiving invasive ventilation. Vomiting is much more critical for patients with NIV than for those with invasive ventilation, so we routinely assessed gastric residual volume and selected 250 mL as the tolerability threshold.

We use morphine or fentanyl to relieve patient dyspnea. In our protocol, we started morphine at 0.02 mg/kg/h and fentanyl at 0.05–0.1 μg/kg/h by continuous infusion and increased or decreased the rate depending on the subject's symptoms.[4] To treat acute changes in dyspnea, we also use bolus infusion at 1-h doses intermittently as tolerated. Although an emetic adverse effect is associated with opioids, one of the 2 subjects who vomited during enteral nutrition was not being administered opioids. Our study also showed no relationship between airway complications and opioid use in univariate analysis. For these reasons, we concluded that enteral nutrition was an independent risk factor of airway complications, although the number of vomiting events was too small to confirm the actual effect of opioids.

In our study, 67 of 107 subjects (63%) used bi-level NIV mode (spontaneous/timed) and the rate of spontaneous/timed mode to CPAP mode was not significantly different between the enteral nutrition and no-enteral nutrition group (63% vs 61%, $P = .86$). There was no difference in the rate of airway complications between spontaneous/timed mode and CPAP mode (49% vs 35%, $P = .15$).

As we showed in Table 1, the median (interquartile range) of inspiratory positive airway pressure was 10 (8–14) cm H_2O in the no-enteral nutrition group, and 10 (8–12) cm H_2O in the enteral nutrition group ($P = .93$).[5] Bambi and colleagues suggested the benefit of a helmet interface to reduce airway complications of NIV. The helmet pressurizes gas flow indirectly to the airway and allows patients to expectorate. It could improve clearance of sputum and reduce the risk of aspiration when patients vomit.[6] In fact, recent evidence suggested a lower intubation rate with a helmet than with a face mask among subjects with ARDS, where half of the included subjects had pneumonia or aspiration.[7] However, there have been only a limited number of trials, and large, randomized, controlled trials are still needed to provide more robust evidence.

In conclusion, we are confident about our scientific data on enteral nutrition and airway complications in subjects with NIV and our emphasis on the need for special concern. There is no validated strategy, including the helmet or nursing care suggested by Stefano Bambi, to reduce the critical complications of enteral nutrition among patients with NIV. We need more evidence about this topic.

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Noninvasive Respiratory Care Received by Individuals With Duchenne Muscular Dystrophy Since 1979

To the Editor:

The authors of a recent review of Duchenne muscular dystrophy (DMD) management[1] nicely pointed out that Dr Ishikawa's group reported survival for DMD subjects to a mean age of 39.6 y, but neither that 38 of them were dependent on continuous noninvasive ventilatory support nor that 8 had been extubated and 2 decannulated of tracheostomy tubes to continuous noninvasive ventilatory support despite having no ventilator-free breathing ability. None of the 17 who died did so from respiratory complications. There are currently > 80 who are continuous noninvasive ventilatory support-dependent. Before eliminating tracheotomies in 1995, Dr Ishikawa's trached patients died at a mean age of 29 y. Today, there are > 20 centers worldwide that manage DMD by continuous noninvasive ventilatory support and mechanical insufflation-exsufflation without ever resorting to tracheotomy for extubation failure, including the centers of the authors of this letter.[2-5] In considering centers in multiple states, the authors of this review[1] included no medical directors from them. The authors pointed out that Bach et al[6] reported successful first-attempt extubation for 95% of 149 subjects with neuromuscular disease, but they overlooked that 20 had been continuous noninvasive ventilatory support-dependent with DMD. Indeed, the one who failed an initial extubation attempt subsequently succeeded, and none underwent tracheotomy.

The authors also overlooked the RESPIRATORY CARE follow-up paper[7] on 96 more subjects successfully extubated to continuous noninvasive ventilatory support and mechanical insufflation-exsufflation as needed, including 12 more with DMD and no ventilator-free breathing ability. In 2013, a review of continuous noninvasive ventilatory support management by 6 of the > 20 centers that provide it reported 40 consecutive successful extubations on "unweanable" subjects with DMD.[8] Today, that figure is > 73. Despite this, rather than "organize a support system of comprehensive instruction, equipping, and training in noninvasive management,"[8] this review unfortunately continues to imply that tracheotomies must eventually become necessary for DMD, especially when conventional extubations fail. Indeed, they noted that 18 of 29 tracheostomies were performed due to acute respiratory illnesses and that 86% were performed before 21 y of age, so clearly the continuous noninvasive ventilatory support extubation protocol was not used, and the 11 who underwent elective tracheotomy did not benefit from continuous noninvasive ventilatory support and mechanical insufflation-exsufflation either. Their review cited noninvasive ventilation, which has become synonymous with low spans of bi-level or continuous positive airway pressure, and mechanical insufflation-exsufflation without giving settings for either. We use full noninvasive ventilatory support settings, not low bi-level spans, and mechanical insufflation-exsufflation at 50–70 cm H_2O pressures, as was originally described to be effective.[9]

Their review concludes that "there have been few changes in pulmonary clinical practice"[1] and perpetuates unnecessarily invasive care, although no DMD patients would prefer it over noninvasive care.[10] It is also important to point out that with optimal noninvasive management, many if not most DMD patients become continuous noninvasive ventilatory support-dependent not only without being intubated or trached, but also without being hospitalized.[8] Rather than evaluate and treat patients with DMD for sleep disordered breathing when, in reality, they have severe respiratory muscle dysfunction, should not a review of management include up to continuous noninvasive ventilatory support as well as vital mechanical insufflation-exsufflation, as cited in other consensuses?[8]

The following might also be pointed out: Although the review cited the need for cough flows and end-tidal CO_2 monitoring, these are not routinely performed by pulmonary function testing, so it is unclear why the latter should be recommended; noninvasive ventilation has not only been available since the late 1980s, continuous noninvasive ventilatory support for DMD was described by Alexander and Johnson in 1979,[11] by Bach et al in 1981,[12] and subsequently others. Finally, this letter is fully sanctioned by 28 medical director authors of publications cited in a recent consensus on noninvasive management.[8]

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