

## Tracheostomy, swallowing disorders and rehabilitation: it is never too late

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Tracheostomy is one of the most common procedures carried out in critically ill patients. It decreases the work of breathing, reduces laryngeal injury and improves patient comfort when compared to an endotracheal tube.<sup>1</sup> Among the theoretical advantages of tracheostomy over translaryngeal intubation there is the possibility to restart oral feeding. Although tracheostomy does not imply dysphagia per se, many tracheotomized patients are dysphagic (from 50% up to 83%)<sup>2</sup> leading to the conclusion that this procedure can interfere in the already complicated sequence of coordinated movements of the swallowing process. Usually, tracheal tube cuff is left inflated to impede the downward dripping of food within the trachea, but this "protective" mechanism sometimes fails due to leakages around the cuff, so that some patients may experience complications and silent inhalation during meals that consecutively may cause severe pneumonia.<sup>3</sup> However even if the care giver does not aspirate food remnants from the cannula, it does not mean that the patient is not dysphagic, because food could have penetrated through the glottis but not dripped down the trachea due to the inflated cuff. So a tracheotomized patient can be dysphagic even if food is not aspirated from the tracheal tube. As a matter of fact, resumption of oral feeding in tracheotomized patients should be investigated by bed-side fiberoptic endoscopic evaluation

(FEES) or by videofluoroscopy (VF) that represent the standard diagnostic test.<sup>4-6</sup> Normal swallowing is a complex physiologic event which includes simultaneous and sequential contractions of several muscles of the oral-facial region, pharynx, larynx and esophagus.<sup>6, 7</sup> Proper coordination between respiration and swallowing requires perfect integration of the pharyngolaryngeal muscles and reflex mechanisms.<sup>8</sup> Little is known about the mechanism underlying dysphagia after tracheostomy and its reversibility.

In the present issue of *Minerva Anestesiologica*, Ceriana *et al.*<sup>9</sup> report an interesting prospective, observational, single-center study enrolling patients with tracheostomy admitted to a rehabilitation center over a period of 36 months. The aim of this study was to analyse the cause and severity of swallowing dysfunction, the reversibility of these changes after a period of rehabilitation as well as the possible influence of the underlying disease. The main feature of this study is that it focuses only on patients with tracheostomy and dysphagia, and not on all tracheotomized patients. Incomplete backward epiglottis folding, pharyngeal retention, penetration and aspiration were the most common swallowing dysfunctions observed at the first VF evaluation in patients discharged from ICU with tracheostomy. Other possible causes of swallowing impairment after tracheostomy described are reduced laryngeal elevation,<sup>10</sup> especially with the cuff left inflated,<sup>11</sup> and loss of subglottic pressure which physiologically provides airway pro-

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tection and favors the coordination between respiration and swallowing.<sup>12</sup> Interestingly, patients with chronic respiratory disease (affected by exacerbated chronic obstructive pulmonary disease-COPD or restrictive thoracic disorders) demonstrated to have a worse baseline VF scores than neurological patients affected by ischemic cerebrovascular accident, head trauma or cerebral hemorrhage. In addition, this patient population also globally showed a worse improvement in all phases of swallowing and a less evident degree of reversibility. An explanation for this phenomenon may be found in the baseline respiratory disease and in the breathing-swallowing interaction problems already reported during acute exacerbation and also in stable chronic obstructive pulmonary disease (COPD) patients.<sup>13-15</sup> Most of the deglutition process is coupled to the expiratory phase of breathing, before and after swallowing. Gross *et al.*<sup>13</sup> demonstrated that COPD patients swallowed at a lower tidal volume compared to the healthy control group. The timing of swallowing pattern with lower lung volumes may reflect the situation in which it is more difficult to generate a subglottic pressure (DPsub) during the process of swallowing. An additional evidence linking chronic pulmonary disease with disruptions in breathing and swallowing coordination can be also found in the duration of deglutitive apnea (DDA). In fact, the prolongation of DDA value that has been observed in COPD patients provides more time for recoil forces to generate higher DPsub. This finding seems to suggest that, whenever needed, the ventilatory drive can have a priority over deglutition. Another main cause of swallowing impairment has been reported to be a reduced laryngeal elevation, especially with an inflated cuff.<sup>16, 17</sup> This study also found a prevalence of incomplete backward epiglottis folding, with a mechanism not clearly explained by VF data as well pharyngeal retention due to possible deficiency in tongue propulsion. But since the dysphagic patient is often the "chronic critical patient" with acquired muscle weakness, it does not surprise that laryngeal muscular weakness can play a key role in dysphagia.<sup>18</sup> As a matter of fact critical illness polyneuropathy can cause weakness and stiffness of all striated mus-

cles, including laryngeal and pharyngeal ones. Therefore it can be difficult in these patients to partition the relative contribution to dysphagia due to tracheotomy cannula and muscle weakness. Beyond the limitations of the study stated by authors as the lower number of patients who performed the second VF test and the lack of control group of tracheostomized patients without dysphagia the study did not address the difference in swallowing between percutaneous and surgical tracheostomy. Although the role of surgical tracheostomy is limited in intensive care unit some patients (*i.e.* some neuromuscular patient who are going to be switched from noninvasive to invasive ventilation) still undergo the surgical procedure.<sup>19</sup> Another possible limitation is that the authors did not address the role of the feeding tube. It is likely that the prolonged contact of nasogastric tube on the epiglottis can have detrimental effects on the proper epiglottis movement and function. ICU staff should consider shorter duration of nasogastric tube placement and widen the indication to percutaneous gastrostomy when artificial enteral feeding is prolonged beyond 30-40 days. This study also highlighted that most of these swallowing disorders are to some extent reversible with time and the reversibility appears to be facilitated by a rehabilitation program carried out by physicians, dieticians and speech therapists. In conclusion, in clinical practice in tracheostomized patients a multidisciplinary approach should be considered with dysphagia and at risk for aspiration. This allows, on one hand, to carry out an appropriate evaluation of any swallowing disorder and, on the other hand, to prevent the complication of tracheostomized patients. The rehabilitation program should always be tailored according to patient clinical conditions and baseline disease, and targeted to reverse the main causes of disability. It is never too late.

## References

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