

Post-extubation Dysphagia—Early Detection by Serial Tongue Pressure Measurements: Is it Practical?

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Received on: 28 November 2022; Accepted on: 29 November 2022; Published on: 30 November 2022

Keywords: Aspiration pneumonia, Dysphagia, Mechanical ventilation.

Indian Journal of Critical Care Medicine (2022): 10.5005/jp-journals-10071-24374

Dysphagia or difficulty in swallowing is usually a geriatric syndrome affecting 10–33% of elderly people and is classified as oral, pharyngeal, or esophageal dysphagia. Oropharyngeal dysphagia is associated with stroke, neurodegenerative disorders like Alzheimer's, Parkinson, and dementia, whereas esophageal dysphagia is seen commonly with strictures, esophagitis and infectious etiologies.¹ Elderly patients with dysphagia are at a higher risk of developing other serious illness like pneumonia, malnutrition, and poor physical performance resulting in prolonged care need at post-acute care facilities, a higher mortality along with a higher financial burden.^{2,3}

Dysphagia occurring after mechanical ventilation is described as post-extubation dysphagia and ICU-acquired swallowing disorder.⁴ The risk factors include critically ill postoperative cardiovascular surgery patients and prolonged postoperative ventilation.⁵ Such patients are observed to have a higher severity of illness, longer duration of mechanical ventilation, and prolonged muscle weakness persisting even after upon ICU/hospital discharge with a negative effect on the quality of life.⁶ The oral intake in elderly with dysphagia is poor, and supportive parenteral nutrition therapy may be required for several months until their swallowing function recovers. Dysphagia occurring after cardiovascular surgery is associated with increased risk of aspiration and pneumonia, prolonged hospitalization, and higher in-hospital mortality.^{7–9}

Diagnostic methods in post-extubation dysphagia are not well-specified, with no definite objective or quantitative criteria. In routine patients with a clinical suspicion of dysphagia, video fluoroscopic swallow study and fiberoptic endoscopic evaluation of swallowing are done. These are cumbersome and not feasible for patients in ICU. Recently, tongue pressure measurement has been proposed as an objective screening tool for dysphagia. Low tongue pressure and dysphagia have been studied in patients with stroke, Parkinson's disease, postoperative esophageal, head and neck cancers, and in emergency patients.^{10–14} Significantly lower serial maximum tongue pressure was measured in patients with post-extubation aspiration pneumonia.

Current prospective observational study considered 132 adults patients with no prior history of dysphagia, who underwent cardiovascular surgery under general anesthesia. Sixty-eight patients were finally included who were mechanically ventilated in the postoperative period and extubated later following a successful spontaneous breathing trial.¹⁵ The airway and ventilator management were standardized in these patients. Serial tongue

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How to cite this article: Paul S, Pande RK. Post-extubation Dysphagia—Early Detection by Serial Tongue Pressure Measurements: Is it Practical? *Indian J Crit Care Med* 2022;26(12):1233–1234.

Source of support: Nil

Conflict of interest: None

pressure measurements were done preoperatively and at 6 hours, 3 days, and 7 days after extubation, using a JMS tongue pressure measurement device (TPM-01: JMS, Hiroshima, Japan). At each time interval, three tongue pressure readings were obtained and the highest value was used for analysis. Patients were classified into “dysphagia positive” (22.1%) or “dysphagia negative” (77.9%) groups based upon Functional Oral Intake Scale scores on day 7 after extubation. A score ≥ 6 was considered negative for dysphagia.¹⁶ Significant difference between the two groups included a history of diabetes mellitus, longer median duration of surgery and anesthesia, higher postoperative C-reactive protein level, increased duration of mechanical ventilation, and post-extubation to discharge days in the dysphagia group. There was no significant difference in maximum tongue pressure preoperatively, but these pressures significantly lower in patients with dysphagia on day 3 and day 7 after extubation. Receptor operator characteristic (ROC) curve identified 27.6 kPa as cut-off for maximum tongue pressure to predict dysphagia, with an area under the curve of 0.82 (sensitivity: 84.9%, specificity: 84.2%). In another study comparing tongue pressure between outpatients and critically ill patients who were extubated following ≥ 48 h of mechanical ventilation, the maximum tongue pressure remained low even at 2 weeks after extubation and gradually recovered over time in critically ill patients.¹⁷

Long-term mechanical ventilation following cardiovascular surgery results in ICU acquired weakness and is considered a risk factor for post-extubation dysphagia. In addition, sedation and tracheal intubation greatly inhibit tongue movement, resulting in disuse atrophy and hypofunction of the tongue. Dysphagia must therefore be detected quickly to prevent aspiration pneumonia. Nasogastric tube itself inhibits swallowing function, and enteral

nutrition by a nasogastric tube is reported to be a risk factor for dysphagia in patients after cardiovascular surgery. Long-term intubation also prevents patients from progressing with oral intake, resulting in diminished swallowing function, reduced maximum tongue pressure, and a risk for aspiration.^{3,6,18} Therefore, the present study proposes to monitor oropharyngeal phase of swallowing function using tongue pressure measurement, and patients with reduced tongue pressure on day 3 may be marked as dysphagic who must continue to perform swallowing exercises and undergo early rehabilitation. Also, day 3 post-extubation tongue pressure may be used as an indicator for early dysphagia intervention to prevent aspiration pneumonia.

Dysphagia, though being an independent poor prognostic indicator, remains to be a neglected or overlooked aspect among post-extubation critically ill patients. The present study, though an observational, single center study, highlights the scope for early diagnosis of dysphagia using simple bedside tools like tongue pressure measurement. However, limited availability of a standardized device may be an issue. Lastly, considering dysphagia to be a significant issue associated with long-term mechanical ventilation, further studies are required to understand the effectiveness of tongue pressure measurement for early diagnosis and rehabilitation therapy.

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