


# Timing and clinical outcomes of tracheostomy in patients with COVID-19

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Dear Editor

Most tracheostomy guidelines for patients with COVID-19 infection recommend that tracheostomy be performed 21 days after intubation and with a negative test result to reduce the risk of tracheostomy-related COVID-19 transmission to healthcare workers<sup>1–5</sup>. However, the practical feasibility of this recommendation regarding tracheostomy timing is questionable because positive test results can persist for several weeks. There is also a lack of comprehensive understanding about the clinical course of patients with COVID-19 who undergo tracheostomy, based on sufficient follow-up.

South Korea recorded its first case of COVID-19 on 20 January 2020; the initial outbreak occurred in Daegu city. The total number of confirmed cases in Daegu was 6945 at 11 August 2020, representing 47.4 per cent of total cases. From 17 February to 2 July 2020, 501 patients with a moderate to severe COVID-19 infection were treated in four tertiary referral hospitals in Daegu. Among these, 27 (5.4 per cent) had a tracheostomy, 19 men and 8 women of mean age 68.8 (range 26–85) years. The mean time from the onset of signs or symptoms to COVID-19 diagnosis was 3 (range 0–13) days, and the time from diagnosis to intubation was 6 (0–32) days.

The mean time from intubation to tracheostomy was 15.8 (range 6–42) days, and only 5 of the 27 patients underwent tracheostomy more than 21 days after intubation. COVID-19 tests before tracheostomy were positive in 26 patients. Open surgical tracheostomy (ST) and percutaneous dilatation tracheostomy (PDT) were performed in 20 and 7 patients respectively. Post-tracheostomy bleeding occurred in two patients who underwent PDT, and required open surgical intervention. No other major complications occurred. There was no tracheostomy-related COVID-19 transmission to healthcare workers (Table 1).

During a mean follow-up of 105.9 (range 25–166) days, negative conversion of COVID-19 occurred in 19 patients. The mean time to negative conversion was 43.1 (18–82) days. Eleven patients died from COVID-19 infection, and the time to death

from diagnosis was 51.5 (25–110) days. Ventilator use was weaned in 11 patients; decannulation was possible in seven of these patients, and time to decannulation was 48.2 (20–92) days. In risk analyses, PDT was associated only with an increased risk of in-hospital death (univariable analysis: odds ratio (OR) 18.00, 95 per cent c.i. 1.72 to 188.08,  $P=0.016$ ; multivariable analysis: OR 26.52, 1.49 to 471.66,  $P=0.026$ ).

The results of this study demonstrated that it is not practically feasible to wait for 21 days after intubation. Moreover, this delay was helpful neither for appropriate management of acute respiratory distress nor to prevent possible tracheal stenosis resulting from prolonged intubation. Furthermore, as it took more than 6 weeks (43.1 days) to obtain a negative COVID-19 test result and there was no tracheostomy-related transmission of COVID-19, current guidelines would have provided little benefit in reducing the risk of tracheostomy-related transmission. Therefore, we believe that tracheostomy can be performed whenever indicated, regardless of time from intubation or COVID-19 test results.

Unlike ST, PDT does not involve meticulous surgical dissection of anatomical structures located between the skin and the trachea, but instead penetrates those structures with a large-bore guiding needle. Therefore, this procedure may injure the anterior jugular vein, strap muscle and thyroid gland. As critically ill patients with COVID-19 commonly require anticoagulation therapy, the risk of major bleeding after tracheostomy would be higher than in usual tracheostomy cases. Furthermore, risk analysis of this study demonstrated that the use of PDT was significantly associated with in-hospital death. Therefore, we suggest ST as a preferable technique for tracheostomy in patients with COVID-19 infection.

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Table 1 Tracheostomy results and outcomes in patients who had a tracheostomy

	No. of patients (n = 27)
<b>Time to tracheostomy (days)</b>	
From intubation*	15.8 (6–42)
>21 days after intubation	5
Positive COVID-19 test result before tracheostomy	26
Technique of tracheostomy	
Open surgical	20
Percutaneous dilatation	7
Complications	
Bleeding requiring intervention	2
Wound infection	0
Emphysema requiring intervention	0
Tracheostomy-related COVID-19 transmission to healthcare workers	0
Negative conversion of COVID-19	19
Time to negative conversion (days)*	43.1 (18–82)
≤21 days from intubation	3
In-hospital death	11
Time to death from diagnosis (days)*	51.5 (25–110)
Weaning	11
Decannulation	7
Time to decannulation (days)*	48.2 (20–92)

\*Values are mean (range).

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