

Is percutaneous dilatational tracheostomy with bronchoscopic guidance better than without?

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Dear Editor:

Percutaneous dilatational tracheostomy (PDT) is a rapid, simple, and cost-effective procedure that is widely performed in intensive care units (ICUs). The use of bronchoscopic guidance may reduce the complication rates of PDT and may be very useful in the treatment of periprocedural complications. Moreover, PDT may be easier to perform through bronchoscopic visualization of the trachea, which could make the overall procedure safer and reduce the risk of complications [1]. However, bronchoscopy requires time to master, and the necessary equipment for its conduct may not be widely available. Moreover, at least two trained doctors must be involved when performing a PDT with bronchoscopic guidance. This study sought to compare the efficacy and safety of PDT performed with and without bronchoscopic guidance.

This was a retrospective chart review that employed the electronic medical records of patients who underwent PDT between March 2013 and November 2016 at Chonnam National University Hospital. All of the included patients were older than 18 years of age and underwent PDT in the ICU. To compare the efficacy and safety of PDT with bronchoscopic guidance and PDT without bronchoscopic guidance, we analyzed the success rate and the incidence rates of peri- and postprocedural complications. We collected patients' demographic and laboratory data as well as information about their procedure, including whether it was successful or unsuccessful and whether any complications occurred. We noted all complications that developed up to 24 hours after the procedure. Major bleeding was defined as bleeding that required surgical treatment, necessitated blood transfusion, or posed a life-threatening risk to the patients.

PDT was performed using the Ciaglia Blue Rhino (Cook Medical Inc., Bloomington, IN, USA) tracheostomy kit. Although the decision about whether PDT was performed with or without bronchoscopic guidance was made by the attending physician, as a general rule, PDT with bronchoscopic guidance was performed by pulmonologists, and PDT without bronchoscopic guidance was performed by thoracic surgeons, doctors in the emergency department, or otorhinolaryngologists.

This study was approved by the Institutional Review Board of Chonnam National University Hospital (IRB No. CNUH 2020-084) and the requirement for informed consent was waived because of the retrospective nature of this study.

Of the 121 patients who underwent PDT, the median age was 72.0 years (interquartile range, 61.5–78.0 years) and 80 (66.1%) were male (Table 1). The numbers of PDT procedures per-

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Table 1. Demographic characteristics, outcomes, and complications of patients who underwent PDT

Characteristics	Total (n=121)	With FOB guidance (n=44)	Without FOB guidance (n=77)	P-value
Age (yr)	72.0 (61.5–78.0)	78.0 (67.5–79.0)	68.0 (55.0–76.0)	0.000
Male sex	80 (66.1)	32 (72.7)	48 (62.3)	0.245
Height (cm)	164.0 (157.5–170.0)	165.5 (158.0–170.0)	162.0 (157.0–170.0)	0.382
Body weight (kg)	59.5 (50.0–68.0)	55.0 (48.0–62.0)	60.0 (50.0–68.0)	0.139
Platelet (10 ³ /μl)	179 (107–245)	203 (147–249)	169 (95–235)	0.131
PT (INR)	1.21 (1.10–1.33)	1.19 (1.09–1.31)	1.22 (1.11–1.37)	0.404
aPTT (sec)	44.2 (38.6–56.3)	43.6 (38.6–53.4)	44.4 (38.7–56.9)	0.354
Underlying disease				
Diabetes mellitus	40 (33.1)	18 (40.9)	22 (28.6)	0.165
Hypertension	48 (39.7)	20 (45.5)	28 (36.4)	0.325
Chronic liver disease	8 (6.6)	4 (9.1)	4 (5.2)	0.407
Chronic cardiac disease	40 (33.1)	12 (27.3)	28 (36.4)	0.307
Chronic respiratory disease	18 (14.9)	11 (25.0)	7 (9.1)	0.018
Cerebrovascular disease	31 (25.6)	22 (50.0)	9 (11.7)	0.000
Chronic kidney disease	20 (16.5)	7 (15.9)	13 (16.9)	0.890
Malignancy	13 (10.7)	8 (18.2)	5 (6.5)	0.046
Outcome				
Success	120 (99.1)	43 (97.7)	77 (100)	0.364
Failure	1 (0.9)	1 (2.3)	0	
Complication				
Bleeding	15 (12.4)	3 (7.0)	12 (15.6)	0.251
Site				
Inside of the trachea	8 (53.3)	2 (66.7)	6 (50)	0.554
External bleeding	7 (46.7)	1 (33.3)	6 (50)	
Severity				
Minor bleeding	13 (86.7)	3 (100)	10 (83.3)	0.629
Major bleeding	2 (13.3)	0	2 (16.7)	

Values are presented as median (interquartile range) or number (%).

PDT: percutaneous dilatational tracheostomy; FOB: fiberoptic bronchoscopy; PT: prothrombin time; INR: international normalized ratio; aPTT: activated partial thromboplastin time.

formed with and without bronchoscopic guidance, respectively, were 44 (36.4%) and 77 (63.6%). Patients who underwent PDT with bronchoscopic guidance were typically older and had more comorbidities (e.g., chronic respiratory disease, cerebrovascular disease, malignancy) than those who underwent PDT without bronchoscopic guidance. Overall, 120 patients (99.2%) underwent successful PDT procedures. However, PDT with bronchoscopic guidance was unsuccessful in one patient because of a short neck, obesity, and palpable arterial pulse at the right side of the trachea. The only PDT-related complication (peri- or postprocedural) observed in this study was bleeding. Bleeding was more common in the PDT

without bronchoscopic guidance group than in the PDT with bronchoscopic guidance group, although the difference was not statistically significant (12 [15.6%] vs. 3 [7.0%] patients; $P=0.251$). In all patients who experienced minor bleeding, the phenomenon was controlled by compression or electrocoagulation. Meanwhile, two patients who underwent PDT without bronchoscopic guidance experienced major bleeding, although the difference between the two groups in this regard also was not significant (2 [16.7%] vs. 0 patients; $P=0.629$). Of these two patients, one required blood transfusions and the other required cardiopulmonary resuscitation because of airway obstruction.

PDT may be easier to perform and provoke fewer complications relative to surgical tracheostomy. A previous systematic review showed that PDT reduced the total number of peri- and postoperative complications and the rates of wound infection and unfavorable scarring compared to surgical tracheostomy [2]. Bleeding is the most frequent complication of PDT. In our study, 12.5% of all patients experienced this complication. This complication rate was consistent with those reported in previous studies including a systematic review (8.7%) and a study conducted in Korea (10%) [2,3]. However, the necessity of bronchoscopic guidance during PDT remains a controversial issue. Some studies showed that PDT with bronchoscopic guidance led to lower complication rates and less frequent serious complications than PDT without bronchoscopic guidance [4]. Similarly, in our study, lower total and serious complication rates were noted in the PDT with bronchoscopic guidance group compared to the PDT without bronchoscopic guidance group, although these differences were not statistically significant. However, one study involving trauma patients reported that the complication rate was not different between the PDT with bronchoscopic guidance group and the PDT without bronchoscopic guidance group (8% vs. 7%) [5]. Therefore, more studies are needed to clarify this issue.

This study has several limitations. First, owing to the retrospective nature of our investigation, the two types of procedures mentioned were not performed randomly. Thus, there could be a selection bias. Further, PDT with bronchoscopic guidance was performed by pulmonologists, and PDT without bronchoscopic guidance was performed by emergency medicine doctors and surgeons, also potentially causing bias. Second, there were imbalances between the two groups among baseline characteristics. It would be interesting to better evaluate the factors associated with procedure failure or bleeding. However, it is impossible to conduct multivariate analysis using such few events. Third, we only analyzed complications that developed up to 24 hours after the procedure; as we did not analyze the late complications, we were unable to determine if the incidence of late complications differed between the two types of procedures.

In conclusion, PDT achieves a high success rate and low rate of complications regardless of the use of bronchoscopic guidance. However, the use of bronchoscopic guidance dur-

ing PDT may reduce periprocedural bleeding.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Conceptualization: JC, TOK, YIK, SCL. Data curation: JC, TOK. Formal analysis: HJS. Project administration: TOK. Visualization: SCL. Writing—original draft: JC. Writing—review & editing: TOK, YSK.

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