

# Retrospective Evaluation of Frequency and Factors Affecting Development of Tracheomalacia in Critically ill Patients with Prolonged Intubation

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**Cite this article as:** Ozer Simsek Z, Elay G, Temel S, Sungur M, Gundogan K. Retrospective Evaluation of Frequency and Factors Affecting Development of Tracheomalacia in Critically ill Patients with Prolonged Intubation. J Crit Intensive Care

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**Received:** Sep 07, 2021

**Accepted:** Sep 08, 2021

**Available online:** Sep 30, 2021

## Introduction

There are two types of tracheomalacia (TM) as acquired and congenital. Acquired TM which is more common is the collapse of airway after expiration due to weakness of tracheal wall (1). Most common causes of acquired TM include prolonged intubation, tracheostomy, and smoking (2). Bronchoscopic visualization of dynamic airway collapse is considered by many experts the diagnostic gold standard. Historically, TM was diagnosed if there was >50 percent decrease in airway lumen size, but data from healthy volunteers has shown that this threshold was met in up to 78 percent (3). During the expiration phase, <70% constriction of initial airway diameter is normal, 70-80% constriction is "mild", 80-90% constriction is "moderate" and >90% constriction or anterior and posterior walls touch is "severe" (3). Possible risk factors include recurrent intubation, prolonged intubation, concurrent high-dose steroid therapy, and cuff pressures >25 cm H<sub>2</sub>O. The mechanism is uncertain but may include pressure necrosis, impaired blood flow, recurrent infections, mucosal friction, or mucosal inflammation (4). In patients with TM respiratory distress occur after extubation and usually these patients are re-intubated (5). A study reported TM prevalence as 12.7% (6). This study aims to identify development frequency of and factors affecting TM in critically ill patients with prolonged intubation.

## Material and Methods

The study included patients who were ≥18 years old and had a bronchoscopy video record on the first day of intubation and at least one bronchoscopy video record in the period between seventh day of intubation and extubation.

Written informed consent was obtained from the patient and/or relatives. Development of TM and its duration were recorded (Olympus CV-170 Video Endoscopy System, Tokyo, Japan). Age, gender, body mass index (BMI), APACHE II and SOFA score, co-morbidities, date of intubation and duration of intubation was recorded.

## Results

The study included 40 patients. 29 of patients were male (72.5%). Mean age of the patients was 60±13 years. Mean BMI were 30± 7 kg/m<sup>2</sup> and 26±5kg/m<sup>2</sup> in TM and non-TM groups separately (P>0.05). TM was identified in 4 patients (%10) (Figure 1). Two patients with TM had COPD. Weaning failure and re-intubation were identified in patients with TM. Median APACHE II score was 18 (17-22) in patients with TM and 18 (9-35) in patients without TM (p>0.05).



## Discussion

In this study, we identified TM development in 4 patients. In a study of Ikeda et al. TM prevalence was reported as 12.7% (6). This ratio was 10% in our study. This difference can be explained by the smaller number of patients and the fewer patients with a diagnosis of COPD. Similar to literature, all patients with TM had weaning failure and requirement of re-intubation (5). Small patient population and few patients with history of COPD and smoking are among limitations of this study.

### AUTHOR CONTRIBUTIONS:

**Concept:** ZOS, MS; **Design:** ZOS, KG; **Supervision:** ZOS, GE; **Fundings:** MS, KG; **Materials:** ZOS, ST; **Data Collection and/or Processing:** ZOS, GE, ST; **Analysis and/or Interpretation:** ZOS, ST, KG; **Literature Search:** ZOS, GE, ST, MS, KG; **Writing Manuscript:** x; **Critical Review:** ZOS, GE, ST, MS, KG.

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## Conclusions

TM is an important clinical condition that might result prolonged length of stay in intensive care unit, increase in mortality and health costs. Intensive care workers should be aware of this situation.

**Informed Consent:** Written informed consent was obtained from the patient and/or relatives.

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** Authors have no conflicts of interest to declare.

**Financial Disclosure:** The authors declared that this study has received no financial support.

**Presented:** 14<sup>th</sup> National Turkish Internal and Surgical Sciences Intensive Care Congress, October 2017

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