

# Ventilator-Induced Barotrauma in Critically Ill patients with COVID-19: A Retrospective observational study

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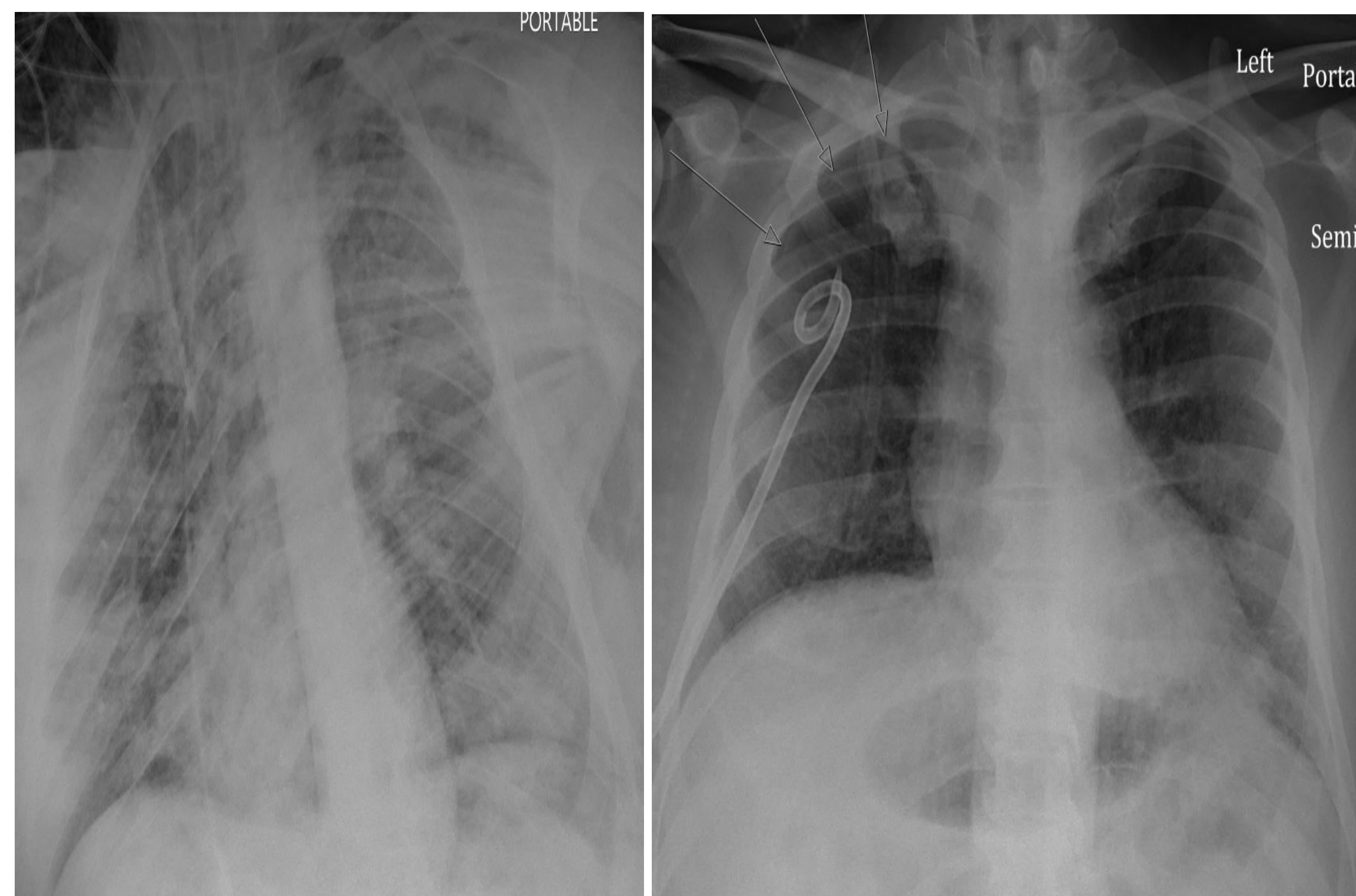
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## Background

Severe acute respiratory syndrome due to novel coronavirus (SARS-CoV-2) rapidly swept the entire world beginning in Wuhan, China at the turn of 2019 and spread globally. The disease, now named COVID-19, primarily affects the pulmonary system and causes acute respiratory syndrome in severe cases often requiring supplemental oxygenation with invasive mechanical ventilation in critically ill patients. There is plethora of literature that has established that higher positive end-expiratory pressure (PEEP) delivery via ventilation is a significant risk factor for incidence of barotrauma in patients with acute lung injury (1), as defined by formation of pneumothorax, subcutaneous emphysema or pneumomediastinum, it is still unclear how intubation affects patients with severe acute respiratory syndrome due to COVID-19



(L) Portable CXR showing diffuse subcutaneous emphysema  
(R) Portable CXR showing left apical pneumothorax with pigtail catheter in place.

## Methods and Materials

Retrospective study done in a Community Hospital ICU in New Jersey early in the pandemic beginning in April through June of 2020 included all patients positive for SARS-CoV-2 infection who were ventilator-dependent for respiratory failure and severe acute respiratory syndrome. Patients on non-invasive mechanical ventilation including CPAP or BiPAP at any time during their hospital stay were excluded. However, patients who received other forms of supplemental oxygen such as via Nasal Cannula, Non-Rebreather Mask and High-Flow therapy were included.

Incidence of barotrauma was defined by presence of subcutaneous emphysema, pneumothorax or pneumomediastinum in all intubated patients. Incidence of barotrauma was identified based on radiographic findings alone, either chest X-rays or CT scans. Total time in days on the ventilator was also documented, and end time was defined by either the day of tracheostomy tube placement, extubation or death

## Results

19 out of the 100 included patients developed barotrauma. The average BMI of patients with barotrauma was 32.06 kg/m<sup>2</sup> with average age of 56.84 years and 9 patients being classified as obese (BMI ≥30 kg/m<sup>2</sup>). 14 out of 19 patients (73%) with barotrauma were intubated for 10 or more days with median of 16.52 days. The overall mortality rate was noted to be 92% amongst intubated patients and 100% in patients with ventilator-induced barotrauma.

## Conclusion

Rate of barotrauma in COVID-19 intubated patients was noted to be 19% in our study, which is higher than that of the general population with ARDS. Patients who developed barotrauma were also noted to be intubated for a significantly longer duration (16.52 days) as compared to their non-barotrauma counterparts. These findings suggest that prolonged intubation is a risk factor for barotrauma. In addition, patient who did develop ventilator-induced barotrauma have a higher mortality rate in COVID-19.

## References

1. Eisner MD, Thompson BT, Schoenfeld D, Anzueto A, Matthay MA. Airway Pressures and Early Barotrauma in Patients with Acute Lung Injury and Acute Respiratory Distress Syndrome. *Am J Respir Crit Care Med.* 2002;165(7).



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