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# Safety of percutaneous dilational tracheostomy in patients ventilated with high positive end-expiratory pressure (PEEP) and high FiO<sub>2</sub>

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### ABSTRACT

Case report of bronchoscopically guided percutaneous dilational tracheostomy in-patient with acute respiratory distress syndrome ventilated with high positive end-expiratory pressure (PEEP) and high FiO<sub>2</sub>.

**Keywords:** Acute respiratory distress syndrome, high PEEP, percutaneous tracheostomy, bronchoscopy, high FiO<sub>2</sub>

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**Introduction:**

Percutaneous dilational tracheostomy has become a frequent procedure due to its simplicity, low complication rate, less time and cost effectiveness when compared to surgical tracheostomy.

Many physicians are reluctant to perform percutaneous tracheostomy in patients with severe respiratory failure and exclude those ventilated with high positive end-expiratory pressure and high FiO<sub>2</sub>.

Certainly, loss of high PEEP during percutaneous tracheostomy could jeopardize oxygenation and result in alveolar collapse, which is more difficult to reverse in patients with severe respiratory failure.

On the other hand, these patients are likely to be ventilated mechanically for a long period and therefore may particularly benefit from early tracheostomy.

**Case Report:**

The patient was 34-year-old male admitted with history of chemical ingestion of floor cleaning agent. Patient admitted 45 minutes after ingestion of the corrosive liquid. He presented with abdominal pain, altered mental status, vomiting and confusion.

In the emergency department he was intubated for drop in Glasgow Coma Scale to 6/15, CT scan brain done showing normal study

Upper gastro-intestinal endoscopy done on admission showing Gastric Caustic Injury Grade 1 and Duodenal Caustic Injury Grade 2 A.

Patient was transferred to Medical ICU for hemodynamic and respiratory management. The patient started deterioration after 5 days of admission. The patient developed multiple broad complex arrhythmias with hemodynamic instability. This episode was followed by cardiac arrest and revived successfully. Continuous renal replacement therapy was initiated for acute kidney injury.

Ten days after admission, the patient developed bilateral pneumonia followed by severe ARDS.

There was no improvement in respiratory condition and the patient was on SIMV mode of ventilation with PEEP of 16 and FiO<sub>2</sub> requirement of 70 %. Multiple attempts done to wean from ventilator but failed. So decided to go for bedside percutaneous tracheostomy. Bedside percutaneous dilational tracheostomy done with bronchoscope guidance on day 18 of mechanical ventilator. The patient was fully sedated at the time of procedure because of high ventilator settings.

Post tracheostomy from day 2, the patient started showing improvement in PEEP level and FiO<sub>2</sub> requirement. On day 12 post-tracheostomy patient successfully weaned off from the mechanical ventilator without much difficulty and mobilized out of bed.

The patient transferred out of ICU on tracheal mask and followed in the general ward and was successfully decanulated on day 19-post tracheostomy.

**Discussion:**

In this case early determination of patient needs, tracheostomy was conducted. Patient with severe ARDS, fully sedated, on inotropes, on high ventilator requirements PEEP of 16, FiO<sub>2</sub> 70 % with refractory hypoxemia, and peak airway pressure was 41.

**Benefits of early determination of need for tracheostomy:**

- Preserving the integrity of his upper airway.
- Ability to ventilate patient by bypassing upper airway.
- Easily weaning from mechanical ventilation.
- Less possibility of ventilator associated pneumonia.
- Decreasing in incidence of artificial airway obstruction.
- Continuation of appropriate ventilation while patient is on the way to healing.

We were able to shorten his mechanical ventilation days and less days in ICU. Close

follow up and assessment resulted early decanulation of tracheostomy tube.

### Conclusion:

In our case, percutaneous tracheostomy was done on high ventilator settings, as PEEP was 16 and FiO<sub>2</sub> of 70 %. Such ventilator settings are considered as contraindication in view of risk of complications such as pneumothorax, subcutaneous emphysema, and derecruitment of lung leading to hypoxia.

However, delaying of tracheostomy in turn leads to complications such as laryngeal stenosis, tracheal wall necrosis, plus there is increase in incidence of ventilator associated pneumonia. In addition resulting in difficulty in weaning of the sedation, which may lead as well to long-term ventilation.

Tracheostomy facilitates weaning from mechanical ventilator, ease out tracheobronchial toileting and increases the patient comfort.

However, as experience with this technique has increased, most of the described contraindications appear to be relative rather than absolute, provided the procedure is performed by an experienced practitioner.

Accordingly, even severe respiratory failure requiring high PEEP should not delay the decision to perform a percutaneous tracheostomy by experienced physicians so as to minimize long term airway complications.

### Conflict of Interest:

No conflict of interest.

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