



Percutaneous Tracheostomy in the ICU

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Tracheostomy in the ICU

Tracheostomy is a procedure — either temporary or permanent — that creates an opening in the anterior wall of the trachea to facilitate airway access and ventilation



Tracheostomy in the ICU

10% of mechanically ventilated patients undergo tracheostomy.

Tracheostomy in the ICU

The first known depiction of tracheostomy is from **3600 BC**, on Egyptian tablets. According to legend, **Alexander the Great** used his sword to open the airway of a soldier choking from a bone lodged in his throat.

Respir Care 2005;50(4):473–475.



Tracheostomy in the ICU

The first **scientific** reliable description of successful tracheostomy by the surgeon who performed it was by **Antonio Musa Brasavola in 1546**, for relief of airway obstruction from enlarged tonsils.

Proc R Soc Med 1934;27(5):525–534.



Tracheostomy in the ICU

Tracheostomy was subsequently used extensively during the polio epidemic.

Tracheostomy in the ICU



Tracheostomy in the ICU



Why?

Tracheostomy in the ICU

- Reduced **sedation** requirements.
- Easier buccopharyngeal **hygiene**.
- Improved patient **comfort** with easier **communication**.

Tracheostomy in the ICU

- Reduction in pharyngolaryngeal lesions.
- Lower risk of sinusitis.
- Maintenance of swallowing.

Tracheostomy in the ICU

- Simpler **reinsertion** in cases of accidental decannulation.
- Easier **weaning** from mechanical ventilation

Tracheostomy in the ICU

- Improved **mobility** and, therefore, ability to participate in **physical therapy**
- Improved **secretion clearance**

Tracheostomy in the ICU

- Ability to manage patients **outside the intensive care unit (ICU)**

Tracheostomy in the ICU

- Reduced **work of breathing**

 - reduce airway resistance

 - reduce peak inspiratory pressures

 - reduce Autopeep

Tracheostomy in the ICU

As a result, standard **weaning parameters** such as the **rapid shallow breathing index** improve in **difficult-to-wean** patients

Tracheostomy in the ICU



Who?

Indications for Tracheostomy in ICU

indications for tracheostomy

- Failure of extubation

indications for tracheostomy

- Failure of extubation
- Airway protection

indications for tracheostomy

- Failure of extubation
- Airway protection
- Airway access for secretion removal

indications for tracheostomy

- Failure of extubation
- Airway protection
- Airway access for secretion removal
- Prolonged mechanical ventilation

indications for tracheostomy

- Failure of extubation
- Airway protection
- Airway access for secretion removal
- Prolonged mechanical ventilation
- **Upper airway obstruction**

indications for tracheostomy

- Failure of extubation
- Airway protection
- Airway access for secretion removal
- Prolonged mechanical ventilation
- Upper airway obstruction
- **Difficult airway**

Tracheostomy in the ICU



When?

Timing of Tracheostomy

Despite advantages of tracheostomy in the setting of prolonged mechanical ventilation, **optimal timing for tracheostomy** has remained **controversial**.

Timing of Tracheostomy

Articles

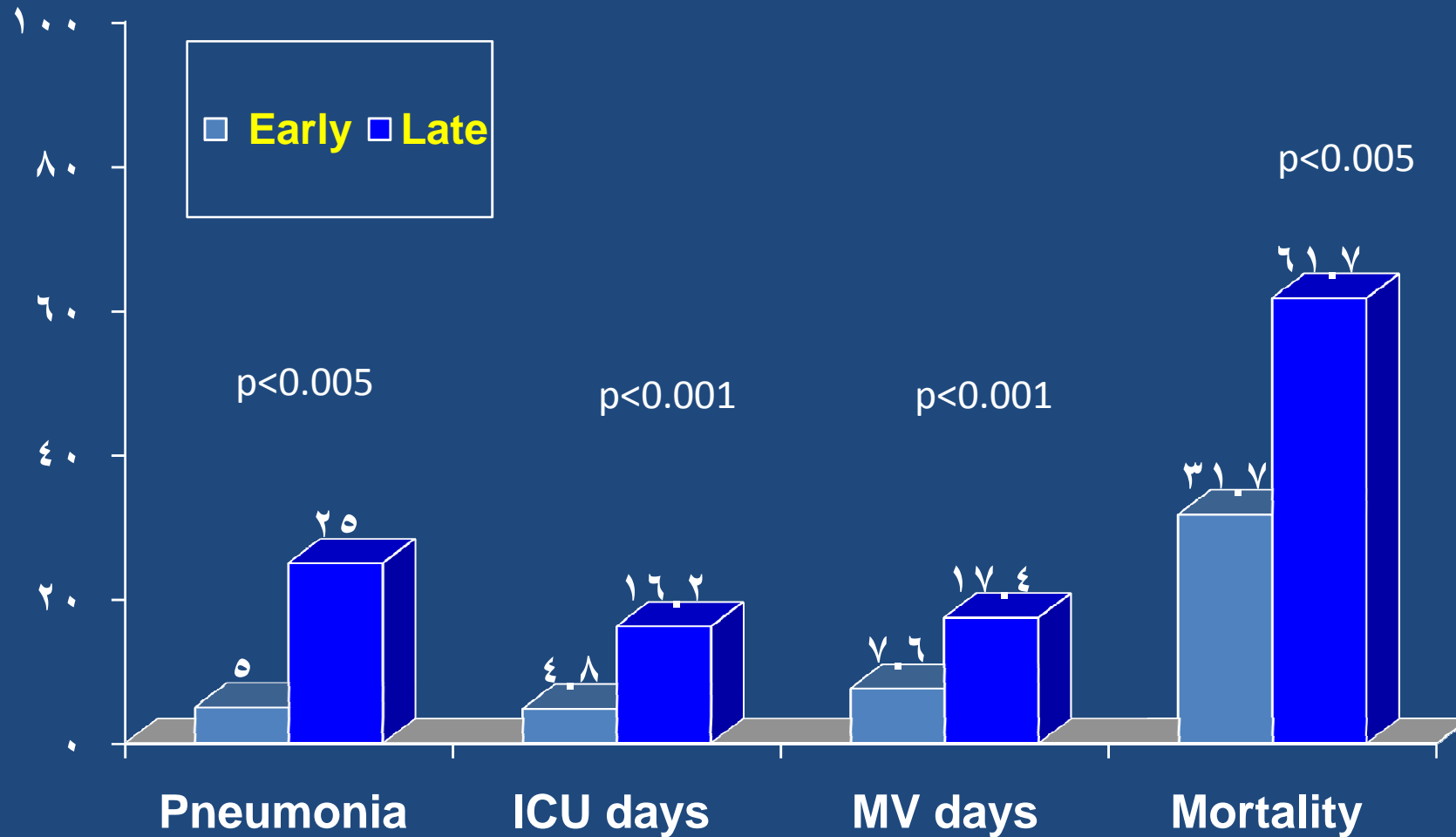


Timing of Tracheostomy

Rumbak et al. studied 120 patients in a prospective, randomized trial comparing **early (within 48 h)** vs. **delayed tracheostomy (14–16 days)**.

Crit Care Med. 2004;32:1689–1694.

Early versus late tracheostomy



Effect of early versus late or no tracheostomy on mortality and pneumonia of critically ill patients receiving mechanical ventilation: a systematic review and meta-analysis.

[Siempos IJ](#), [Ntaidou TK](#), [Filippidis FT](#), [Choi AMK](#).

[Lancet Respir Med](#). 2015 Feb;3(2):150-158. doi: 10.1016/S2213-2600(15)00007-7

CONCLUSION:

Early tracheostomy (within 7 days) is not associated with lower mortality in the intensive-care unit than late or no tracheostomy.

CONCLUSION:

Early, compared with late or no, tracheostomy might be associated with a **lower incidence of pneumonia.**

Timing of Tracheostomy in Intensive Care Unit Patients.

[Int Arch Otorhinolaryngol.](#) 2018 Oct;22(4):437-442. doi:
10.1055/s-0038-1654710. Epub 2018 Aug 9

Conclusion

Early tracheostomy (within 10 days) had a notable benefit in shortening the duration of the MV.

Conclusion

Early tracheostomy is lessening the sedation time and minimizing the risks of weaning failure.

Conclusion

Early tracheostomy had **no significant impact** on both the overall **duration of ICU stay** and **VAP incidence**.

Early vs late tracheostomy in critically ill patients: a systematic review and meta-analysis.

[Meng L](#), [Wang C](#), [Li J](#), [Zhang J](#).

[Clin Respir J](#). 2016 Nov;10(6):684-692. doi: 10.1111/crj.12286. Epub 2015 Apr 6

CONCLUSIONS:

Early Tracheostomy (within 10 days) might be able to reduce the duration of sedation.

CONCLUSIONS:

Early Tracheostomy did **not** significantly alter the **mortality, incidence of VAP, duration of MV and length of ICU stay.**

Timing of Tracheostomy

For most patients on mechanical ventilation, we suggest **tracheostomy** be performed between **7 and 21 days (Grade 2C)**.

Timing of Tracheostomy

Based on the evidence to date, it is reasonable to **wait at least 10 d** to be certain that a patient has an ongoing need for mechanical ventilation or assistance with pulmonary toilet **before consideration of tracheostomy.**

Timing of Tracheostomy

COVID 19

Tracheostomy is considered to be an **aerosol-generating procedure**.

Timing of Tracheostomy

Although the optimal timing of tracheostomy in patients with Coronavirus disease 2019 (COVID-19) **is unknown**

Later tracheostomy placement may be reasonable in patients with COVID-19

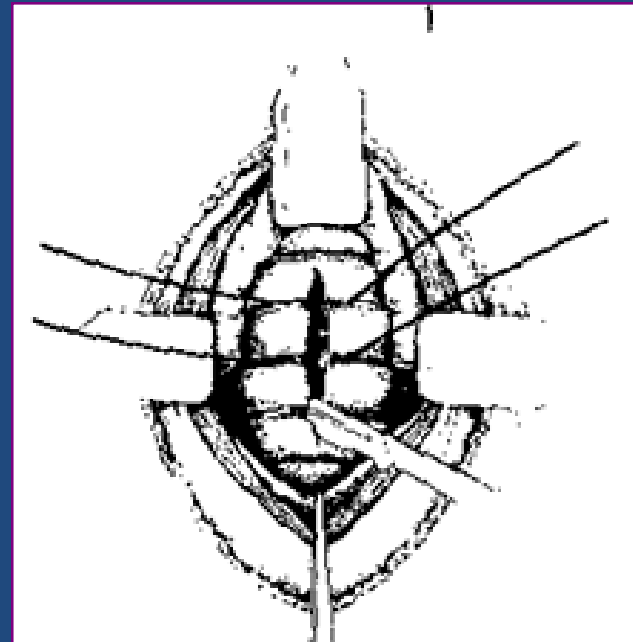
Timing of Tracheostomy

When ventilation is expected to last longer than 2 - 3 weeks, early tracheostomy, compared to prolonged translaryngeal intubation, is to be preferred.

Timing of Tracheostomy

Tracheostomy in intensive care should **not** be performed **before the fourth day** of mechanical ventilation.

What Is Better Percutaneous vs Surgical Tracheostomy ?



What Is Better Percutaneous vs Surgical Tracheostomy?

Percutaneous tracheotomy is the standard method in intensive care patients.

What Is Better Percutaneous vs Surgical Tracheostomy?

Percutaneous tracheostomy

- it requires **less time** to perform.
- it is **less expensive**.
- it is typically performed **sooner** (because an operating room doesn't have to be scheduled).

What Is Better Percutaneous vs Surgical Tracheostomy?

In overall **complications** may be **less frequent** with percutaneous tracheostomy than surgical tracheostomy

Tracheostomy Contraindication

Absolute*

- Cellulitis anterior neck
- Absence of cervical trachea
- Uncorrectable bleeding diathesis (eg, International Normalized Ratio >2.0, platelets <50,000 × 10⁹/L)

Relative*

- Hemodynamic instability
- Severe hypoxemia (eg, positive end-expiratory pressure [PEEP] >12 cm H₂O)

Relative contraindications for percutaneous tracheostomy[¶]

- Morbid obesity and/or short neck with inability to identify and palpate trachea
- Vascular structures such as a high-riding innominate or thyroid internal mammary artery (on palpation or ultrasound)
- Gross distortion of the neck from hematoma, tumor, thyromegaly, or scarring
- Severe tracheomalacia with cartilage destruction
- Inability to safely extend the neck (eg, cervical fusion, rheumatoid arthritis, or other causes of cervical spine instability)^Δ
- Prior complex tracheal surgery (eg, tracheoplasty, tracheal resection, and reconstruction; previous tracheostomy is not a contraindication)
- Children <15 years
- Patients requiring emergency airway[◇]

Percutaneous Tracheostomy Complications

Percutaneous Tracheostomy Complications

Bleeding

Bleeding is the **most common early complication** of tracheostomy , with an estimated incidence of **0.6–5.0%**.

Percutaneous Tracheostomy Complications

Pneumothorax and subcutaneous emphysema

Pneumothorax and subcutaneous emphysema are well described complications of PDT, with an estimated incidence of **0.8% and 1.4%**, respectively

Percutaneous Tracheostomy Complications

Tracheal wall perforation

Difficult insertions requiring increased amount of pressure to insert the tracheostomy tube have been associated with mechanical trauma and injury to the tracheal wall.

Percutaneous Tracheostomy Complications

Early tube displacement, accidental decannulation, and paratracheal insertion

The incidence of tracheostomy tube displacement is **1.5%**

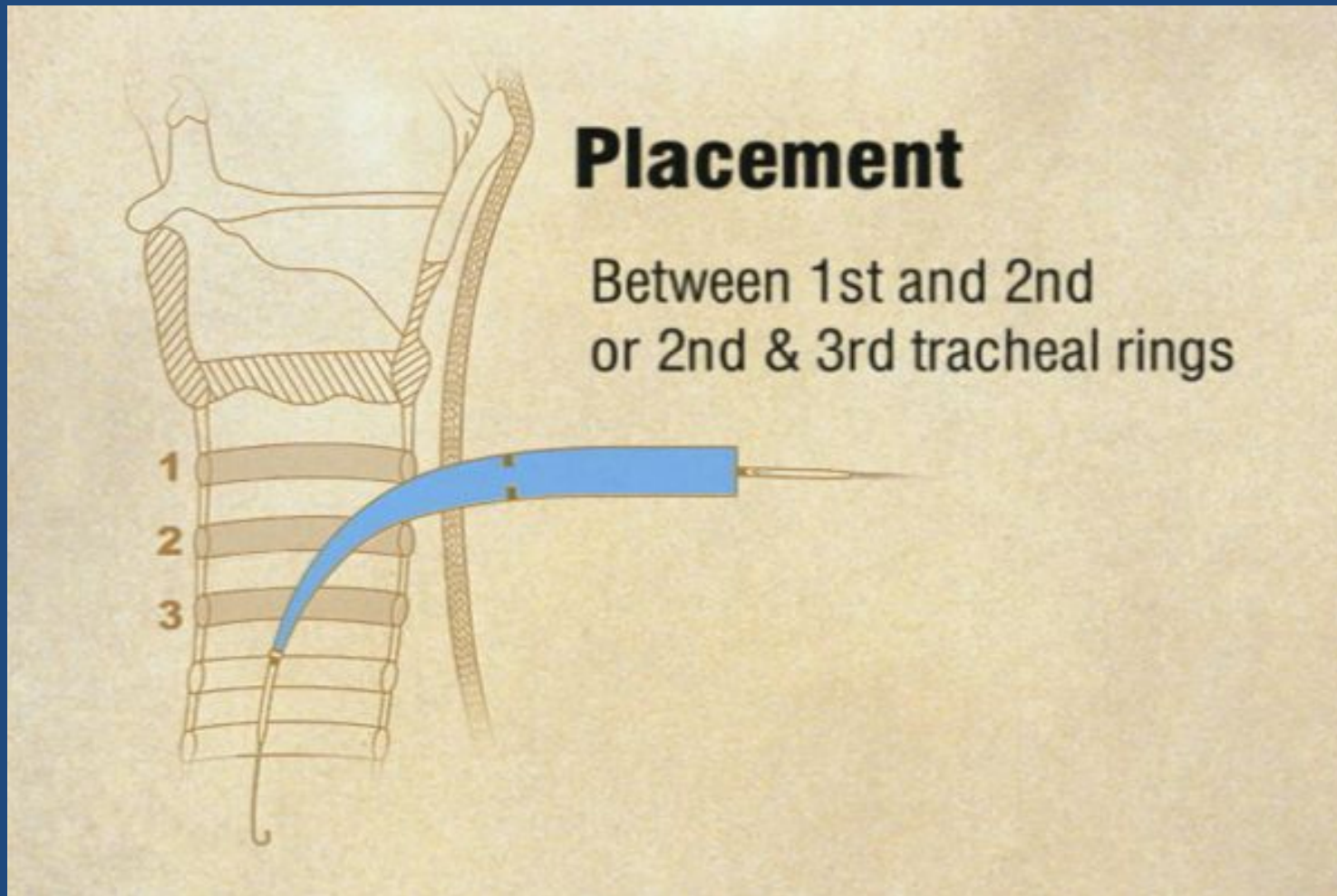
Percutaneous Tracheostomy Technique



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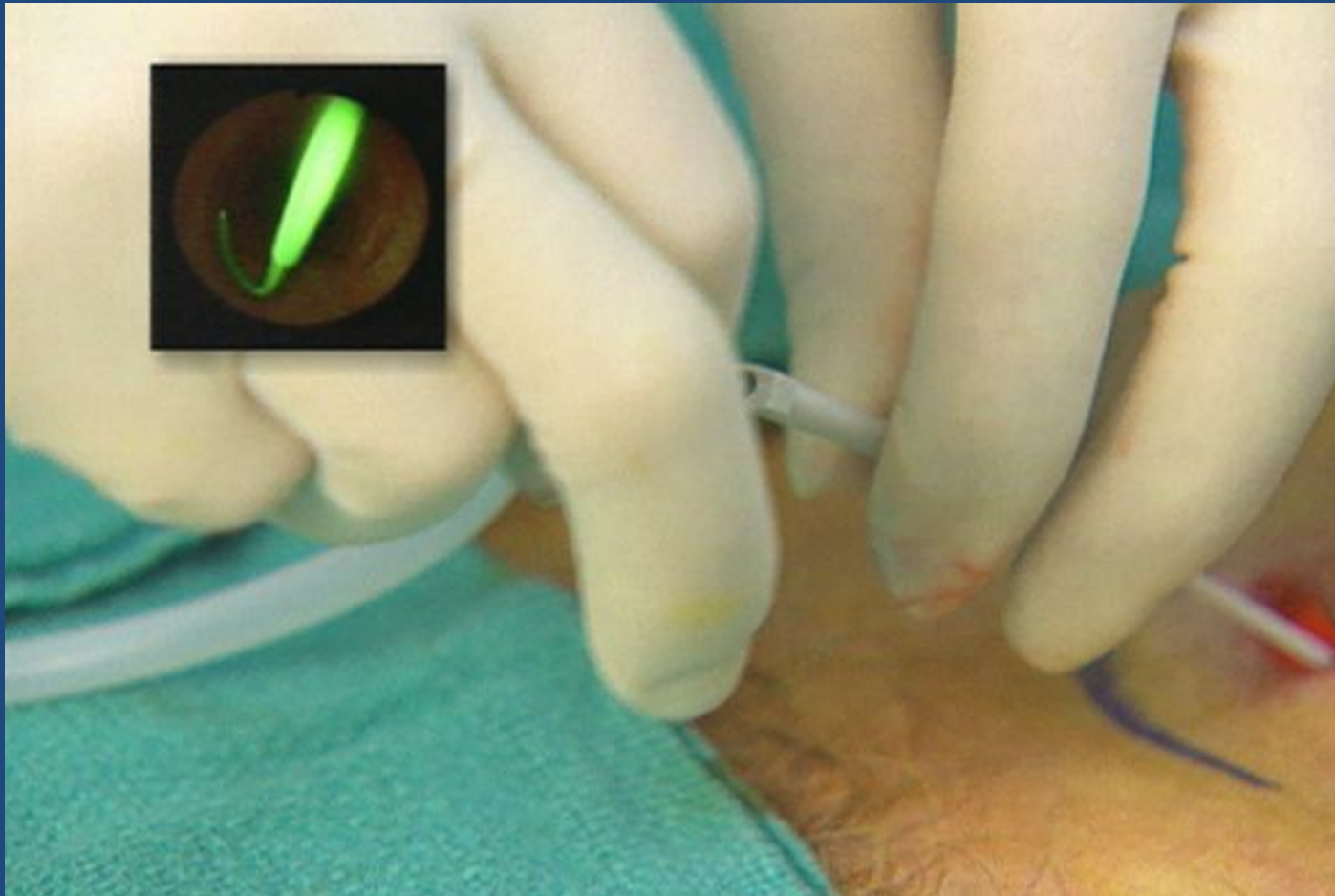
Percutaneous Tracheostomy Technique



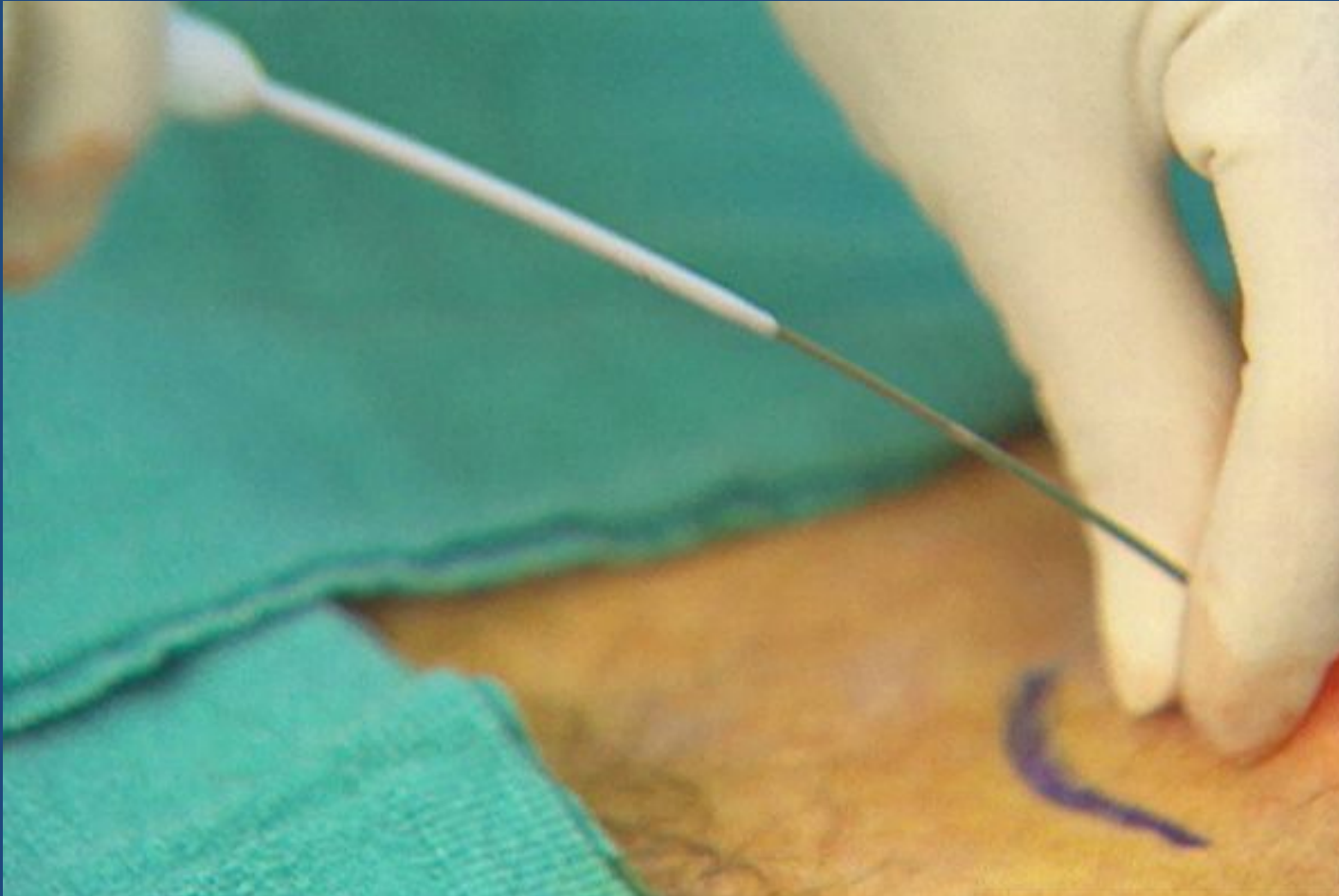
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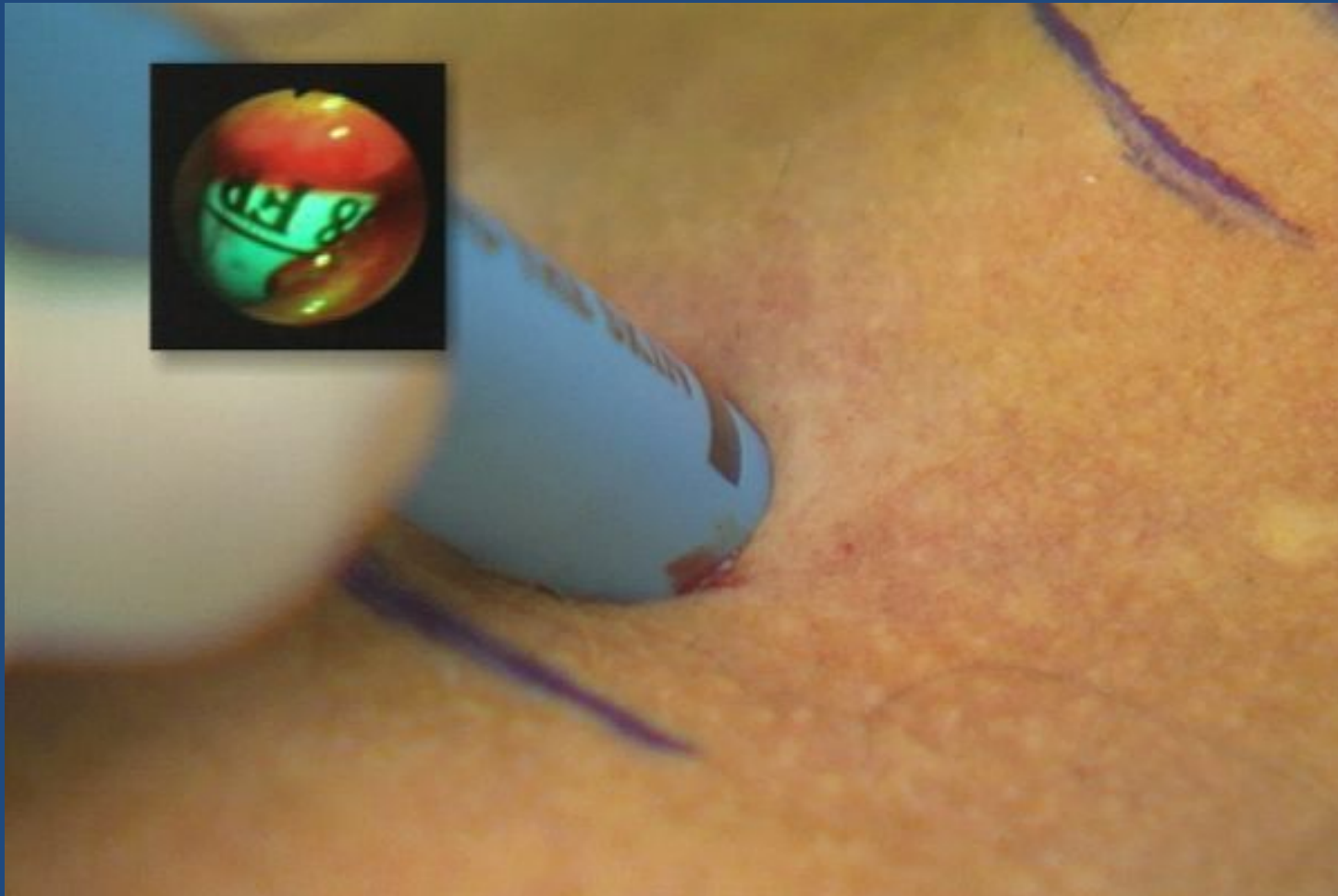
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Percutaneous Tracheostomy Technique



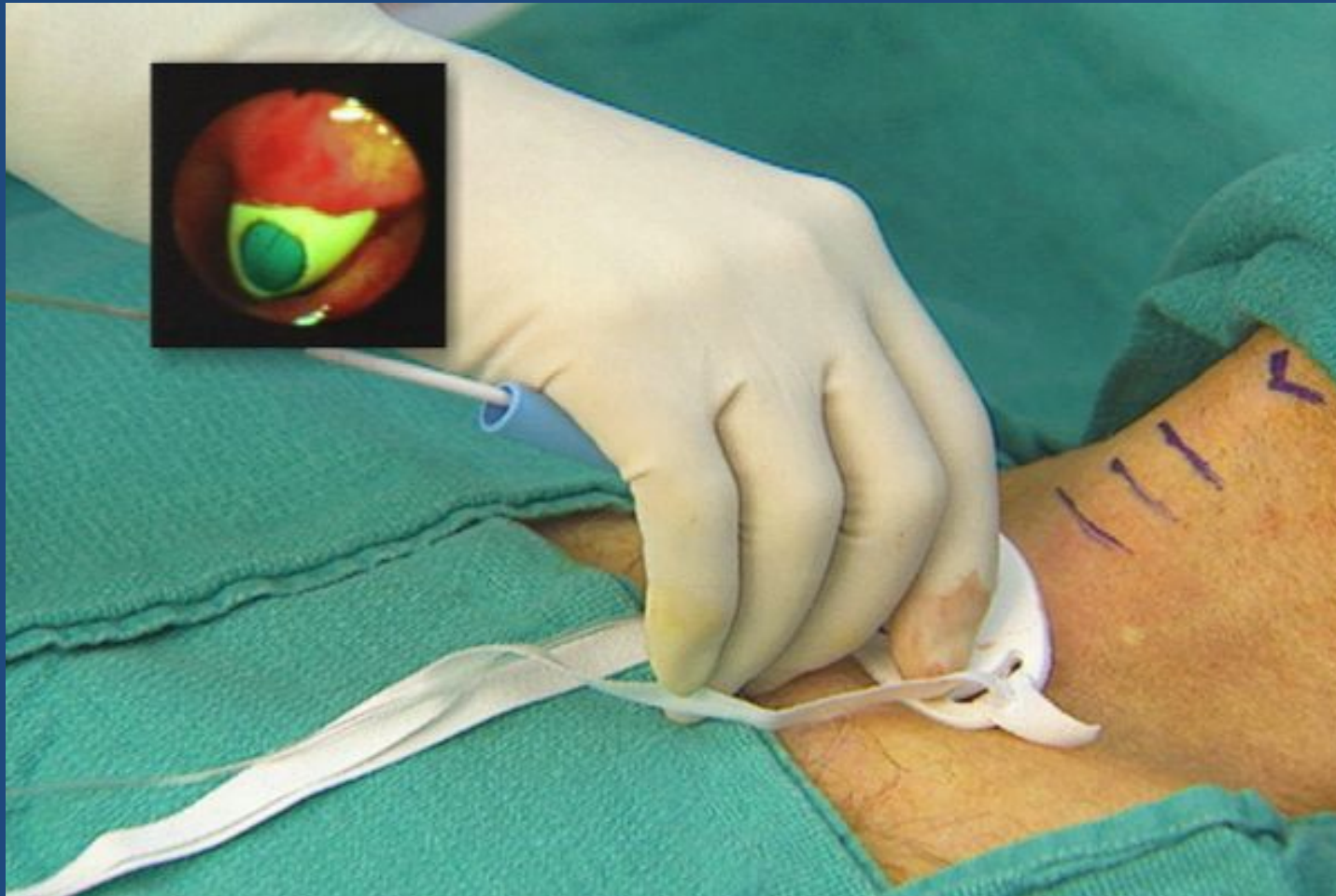
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Thank You