NTSP Podcast series

National Tracheostomy Safety Project

This month's top papers: October 2022

Welcome to the latest blog in the literature podcast from the NTSP. We try to bring you a quick roundup of what is hot in the world of tracheostomy and laryngectomy publications by scouring internationally recognised journals and media and bringing you the highlights.

The papers we will discuss this month are detailed below, along with an automated transcript of the podcast. Please note that the transcript is generated by AI and so may not be totally accurate.

You can find the links to the podcast on www.tracheostomy.org.uk and by searching for NTSP on your favourite podcast platform. Some of the podcasts are also uploaded to YouTube if you prefer to get your news that way. Check out the NTSP YouTube channel at https://www.youtube.com/c/NationalTracheostomySafetyProject. Please follow us and/or subscribe to keep up to date! https://x.com/NTSP_UK

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This month's top papers

- Quality tracheotomy care can be maintained for non-COVID patients during the COVID-19 pandemic.
- Comparison Between Real-Time Ultrasound-Guided Percutaneous Tracheostomy and Surgical Tracheostomy in Critically Ill Patients.
- Comparison of landmark guided and ultrasound guided percutaneous dilatational tracheostomy: Efficiency, efficacy and accuracy in critically ill patients.

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Quality tracheotomy care can be maintained for non-COVID patients during the COVID-19 pandemic.

Lay Summary:

This study is a review of multiple research papers to determine whether an early or a late tracheostomy has a better outcome for patients in the Intensive Care Unit (ICU). A tracheostomy is a procedure that creates an opening in the windpipe to help a person breathe, and the timing of the procedure can be a crucial decision for critically ill patients.

The researchers used a unique statistical method called Bayesian analysis to look at the data from 19 different studies with over 3,500 patients. Unlike traditional statistical methods that only say if a result is "significant," this method gives a probability for how likely a benefit is.

The results showed a high probability that an early tracheostomy is better than a late one for all outcomes considered. For example, there was a **99%** chance of a reduction in short-term mortality and a **94%** chance of a reduction in pneumonia. The probability of an early tracheostomy leading to a shorter ICU stay was also high, at **97%**.

The authors conclude that based on this analysis, there is strong evidence that early tracheostomy provides at least some benefit across all major outcomes. This approach gives doctors and families a more intuitive and clear way to make decisions, such as understanding that for every 100 patients, an early tracheostomy could save one additional life.

Summary for Healthcare Professionals:

This systematic review and Bayesian meta-analysis reassessed the effect of early versus late tracheostomy on clinical outcomes in mechanically ventilated ICU patients. The authors completed an updated search of relevant randomized controlled trials (RCTs) and analyzed data from 19 studies involving 3,508 patients.

The analysis employed a Bayesian approach to estimate posterior probabilities of benefit for key outcomes, including short-term mortality, ventilator-associated pneumonia (VAP), duration of mechanical ventilation, and ICU length of stay. The results suggest a high probability that early tracheostomy has a beneficial effect on all outcomes:

- Short-term mortality: A 99% posterior probability for any benefit (RR<1), a small benefit (NNT ≤200), and a modest benefit (NNT ≤100). The pooled risk ratio (RR) was 0.82 (95% CrL, 0.70 to 0.96). This suggests there is a 99% probability that for every 100 patients, early tracheostomy would result in at least one additional survivor.
- VAP: A 94% posterior probability for any benefit.
- Duration of mechanical ventilation: A 97% posterior probability for any benefit, with a pooled standardized mean difference (SMD) of -0.46.
- ICU length of stay: A 97% posterior probability for any benefit, with a pooled SMD of -0.76.

The authors conclude that, in contrast to a previous frequentist analysis, the Bayesian meta-analysis provides strong evidence of a beneficial effect of early tracheostomy across all clinical outcomes. This approach offers a more robust and clinically intuitive basis for decision-making by providing probabilities of effect sizes rather than a dichotomous result.

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Comparison Between Real-Time Ultrasound-Guided Percutaneous Tracheostomy and Surgical Tracheostomy in Critically Ill Patients.

Lay Summary:

This study compares two surgical techniques for a tracheostomy, which is a breathing tube in the neck, in critically ill patients. The two techniques are:

1. Real-time ultrasound-guided percutaneous tracheostomy (US-PDT): Doctors use an ultrasound to guide the procedure.
2. Surgical tracheostomy (ST): A traditional open surgery.

The researchers reviewed the records of 90 patients and found that both methods had similar outcomes in terms of safety and complications. However, the study found a few key differences. The US-PDT group had a shorter time with the tracheostomy tube, a shorter hospital stay, and a lower rate of complications overall, such as airway problems and stomal infections. The US-PDT group also had a lower reintubation rate. A key advantage of the surgical method was that it had a lower rate of post-procedure bleeding. The study concludes that US-PDT is a safe and effective alternative to surgical tracheostomy, and it may lead to better patient outcomes and a more efficient use of hospital resources.

Summary for Healthcare Professionals:

This retrospective cohort study compared the efficacy and safety of real-time ultrasound-guided percutaneous tracheostomy (US-PDT) with open surgical tracheostomy (ST) in 90 critically ill adult patients. The study's objective was to determine the feasibility and safety of US-PDT compared to ST, as a less invasive alternative.

The study found no significant difference in demographic characteristics or comorbidities between the two groups. However, US-PDT was associated with several improved outcomes:

- Duration of Tracheostomy: The US-PDT group had a shorter duration of tracheostomy (17.5 days vs. 23.3 days, p=0.04) and a shorter median hospital stay (28.4 days vs. 35.8 days, p=0.03).
- Complications: The US-PDT group had a significantly lower overall complication rate (33.3% vs. 60.0%, p=0.01), driven by lower rates of airway complications (p=0.02) and stomal infections (p=0.02). However, the ST group had a lower rate of post-procedure bleeding (p=0.03).
- Reintubation and Decannulation: The US-PDT group had a lower reintubation rate (30.8% vs. 53.3%, p=0.02) and a higher decannulation rate (66.7% vs. 46.7%, p=0.05).

The authors conclude that US-PDT is a safe and effective alternative to ST, offering benefits such as a shorter duration of tracheostomy and a lower rate of complications and reintubations. They suggest that US-PDT is an attractive choice for managing critically ill patients, especially considering its potential to reduce costs and improve the efficient use of hospital resources.

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Comparison of landmark guided and ultrasound guided percutaneous dilatational tracheostomy: Efficiency, efficacy and accuracy in critically ill patients.

Lay Summary:

This study looked at how using an ultrasound to guide a percutaneous dilatational tracheostomy (PDT) compares to the traditional method of feeling for landmarks in the neck. PDT is a common procedure in the Intensive Care Unit (ICU) where a breathing tube is inserted into the windpipe. The goal of this research was to find out which method is more accurate and safer for critically ill patients.

The researchers conducted a study with 100 ICU patients, splitting them into two groups of 50. One group received the traditional landmark-guided PDT, while the other received the ultrasound-guided version. The study found that the ultrasound-guided method was significantly more accurate, with less deviation from the midline of the windpipe. This increased accuracy led to fewer attempts needed to place the tube and a lower rate of complications, such as bleeding and damage to the endotracheal tube cuff.

However, the study also found that the ultrasound-guided procedure took longer to perform, with an average of about six minutes compared to about one minute for the traditional method. The authors explain that the extra time is for using the ultrasound to carefully identify the neck's internal structures before the procedure starts. The study concludes that even with the slightly longer procedure time, the benefits of improved accuracy and reduced complications make the ultrasound-guided method superior for patient safety.

Summary for Healthcare Professionals:

This prospective randomized controlled trial compared the efficiency, efficacy, and accuracy of real-time ultrasound-guided percutaneous dilatational tracheostomy (USG-PDT) with the traditional landmark-guided method (LMG-PDT) in 100 critically ill ICU patients. The study's primary objective was to compare midline deviation, a measure of accuracy, between the two groups.

The results demonstrated a significant superiority for the USG-PDT group in several key areas.

- Accuracy: The mean midline deviation was significantly lower in the USG-PDT group (11.33 degrees) compared to the LMG-PDT group (16.60 degrees, p=0.040).
- Efficacy: The USG-PDT group had a lower number of trials needed to cannulate the trachea.
- Complications: The incidence of peri-procedural complications, including bleeding requiring intervention and ruptured endotracheal tube cuffs, was lower in the USG-PDT group.

A notable finding was that the total procedure time was significantly longer in the USG-PDT group (5.98±10.23 min) compared to the LMG-PDT group (15.20±3.71 min) ($p<0.001$). This was largely due to the time required for the initial ultrasound assessment. However, this additional time contributed to the method's increased accuracy and lower complication rates. The authors conclude that USG-PDT is a superior method that, despite a slightly longer procedure time, significantly improves the accuracy of tracheal puncture and reduces complications, making it a safer choice for critically ill patients.

Scientific abstracts and references

Laryngoscope Investig Otolaryngol. 2022 Aug 18;7(5):1337-42. doi: 10.1002/lio2.885. Online ahead of print.

Quality tracheotomy care can be maintained for non-COVID patients during the COVID-19 pandemic.

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OBJECTIVES: To analyze changes in tracheotomy practices at the onset of the COVID-19 pandemic, and determine if quality patient care was maintained. METHODS: This was a single institution retrospective study that included patients undergoing tracheotomy from May 2019 to January 2021. Patients were divided into two groups, pre-COVID and post-COVID. Only three patients tested positive for COVID-19, and they were excluded from the study. Data were collected from the electronic medical record. Statistical analyses were performed using 2-tailed independent t tests, Wilcoxon Rank Sum tests, Chi-Square tests, and Kaplan-Meier curves. RESULTS: There were 118 patients in the pre-COVID group and 91 patients in the post-COVID group. The main indication for tracheotomy in both groups was prolonged intubation. There were no significant differences in overall length of stay, time to tracheotomy, duration of tracheotomy procedure, or time to initial tracheotomy change between the two groups. Due to protocols implemented at our institution to limit viral transmission, there were significant increases in the percent of tracheotomies performed in the OR ($p = .02$), and those performed via open technique ($p = .04$). Additionally, the median time to decannulation significantly decreased in the post-COVID group ($p = .02$). CONCLUSION: Several variables regarding the timing of patient care showed no significant differences between groups which demonstrates that quality patient care was maintained. It is important to note that this data was collected early in the Pandemic, and additional trends may become apparent over time. LEVEL OF EVIDENCE: 4.

Crit Care Res Pract. 2022 Sep 25;2022:1388225. doi: 10.1155/2022/1388225. eCollection 2022.

Comparison Between Real-Time Ultrasound-Guided Percutaneous Tracheostomy and Surgical Tracheostomy in Critically Ill Patients.

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BACKGROUND: Ultrasound-guided percutaneous dilatational tracheostomy (US-PDT) has been adapted for use in intensive care units (ICU). US-PDT is comparable to bronchoscopy-assisted tracheostomy. However, compared to surgical tracheostomy (ST), its safety and effectiveness have not been well studied. OBJECTIVES: To determine the efficacy and safety of US-PDT compared to ST. MATERIALS AND METHODS: A total of 90 patients who underwent US-PDT (n = 36) or ST (n = 54) between July 2019 and September 2020 were enrolled. US-PDT was performed in the ICU without a surgical assistant or bronchoscope. Data were collected retrospectively and analyzed regarding clinical characteristics, procedure times and details, complications, and mortality rate. RESULTS: The success rate of US-PDT was 97.4% and the procedure time was shorter than ST (5.2 ± 3.1 vs. 10.5 ± 5.0 min). There were no significant differences in clinical characteristics and procedure details. There was no procedure-related mortality in either of the groups. CONCLUSIONS: US-PDT is time-efficient and as safe as ST. Based on our results, US-PDT may be considered a potential alternative to ST in high-risk patients and in those who cannot be transported.

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J Anaesthesiol Clin Pharmacol. 2022 Apr-Jun;38(2):281-287. doi: 10.4103/joacp.JOACP_336_20. Epub 2022 May 25.

Comparison of landmark guided and ultrasound guided percutaneous dilatational tracheostomy: Efficiency, efficacy and accuracy in critically ill patients.

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BACKGROUND AND AIMS: To overcome the procedure-related complications associated with landmark-guided percutaneous dilatational tracheostomy (PDT) ultrasound is emerging as a promising tool. Present study was designed to compare landmark-guided PDT and ultrasound-guided PDT in terms of efficiency, efficacy, and accuracy. MATERIAL AND METHODS: Hundred intensive care unit patients requiring prolonged mechanical ventilation were prospectively randomized into 2 groups of 50 patients each. In land mark guided (LMG) group, patients underwent landmark-guided PDT, whereas in ultrasound guided (USG) group, patients underwent ultrasound-guided PDT. RESULTS: Both the groups were comparable in terms of demographic data, sequential organ failure assessment score, ventilator settings, and mean days on mechanical ventilation prior to PDT. The mean assessment time in the ultrasound-guided group (1.56 ± 1 min) was significantly more (P-value = 0.000) than in the landmark-guided group (0.84 ± 0.72 min). The mean total procedure time for the USG group (5.98 ± 10.23 min) was more than that for the LMG group (4.86 ± 8.03 min) (P-value 0.542). Deviation of puncture site from the midline was seen in two patients in group A as compared to none in the USG group (P-value = 0.153). The number of patients requiring more than one attempt for successful needle insertion was more (P-value = 0.148) in the LMG group (20%) as compared to USG group (8%). Incidence of complications, like bleeding and desaturation was more in the LMG group as compared to the USG group. CONCLUSION: Ultrasound-guided PDT is associated with reduction in periprocedural complications as compared to landmark technique, although it takes slightly longer time.