NTSP Podcast series

National Tracheostomy Safety Project

This month's top papers: February 2023

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

- Benefits and options for voice restoration in mechanically ventilated intensive care unit patients with a tracheostomy.
- Modified Technique of Percutaneous Tracheostomy Using Borescope Camera: A Case Series
- Retrograde Percutaneous Tracheostomy. Early Experience With a Cadaveric Case Report.
- Early postoperative complications following tracheotomy: Does suturing technique influence outcomes?

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Benefits and options for voice restoration in mechanically ventilated intensive care unit patients with a tracheostomy.

Lay Summary:

This article by UK experts addresses the significant challenge of communication for critically ill patients in the Intensive Care Unit (ICU) who have a tracheostomy tube and require a breathing machine. The loss of a patient's voice due to the breathing tube and mechanical ventilation is a profound problem, often leading to severe anxiety, difficulty engaging in recovery, and feelings of isolation. Restoring the ability to speak is essential for a patient's psychological well-being, ability to connect with family and staff, and overall participation in their rehabilitation.

The article explores several options available to give patients their voice back. The preferred method is typically using a one-way speaking valve, which allows air to pass through the larynx after the tube's protective cuff is deflated. This method is safe and directly helps restore the natural functions of the voice box, which are also vital for swallowing. When a patient cannot tolerate cuff deflation—perhaps due to high ventilation needs—an alternative is Above Cuff Vocalisation (ACV). ACV works by gently sending air up through a port on the tube, over the inflated cuff, and out through the mouth, allowing the patient to speak. This process is important because it re-establishes airflow, which is crucial for swallowing function.

Other options exist for patients, such as communication boards or electrolarynx devices. The authors strongly recommend that a specialized, multi-disciplinary team, including Speech and Language Therapists (SLTs), must be actively involved from the start to assess the patient, choose the best communication method, and overcome any barriers to restoring their voice as early as possible. This commitment is key to improving both safety and quality of life for this vulnerable population.

Summary for Healthcare Professionals:

This special article, authored by critical care Speech and Language Therapy (SLT) experts, provides a focused overview of the options and clinical rationale for restoring verbal communication in mechanically ventilated Intensive Care Unit (ICU) patients with a tracheostomy. The deprivation of voice is identified as a major source of psychological distress, correlating with increased anxiety, depression, and reduced engagement in rehabilitation, underscoring the necessity of communication restoration as a patient-centered outcome.

The article details the various methods of restoring translaryngeal airflow. The preferred approach involves cuff deflation combined with the application of a One-Way Speaking Valve (OWV), which facilitates physiological airflow restoration and positively impacts cough effectiveness, swallowing, and laryngeal function. For patients with high ventilatory demands or those who do not tolerate cuff deflation, Above Cuff Vocalisation (ACV) is presented as a valuable alternative. ACV utilizes controlled external airflow delivered via the subglottic port to bypass the inflated cuff, thereby enabling phonation and re-establishing laryngeal sensation, which is critical for airway protection and swallowing function. The COVID-19 pandemic introduced new complexities, such as infection control concerns regarding aerosol generation during speaking valve trials and ACV.

The authors emphasize the critical role of the multidisciplinary team (MDT), with SLTs providing specialist assessment and intervention. Early intervention is strongly advocated to overcome barriers, ensure patient safety, and maximize the likelihood of regaining functional communication. Options also include various augmentative and alternative communication (AAC) devices for non-verbal patients. The conclusion urges ICU MDTs to proactively integrate these evidence-based options to restore voice, acknowledging that effective communication is integral to patient recovery, engagement, and psychological well-being.

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Modified Technique of Percutaneous Tracheostomy Using Borescope Camera: A Case Series

Lay Summary:

This report describes a creative and low-cost way to make a breathing tube procedure, called a percutaneous dilatational tracheostomy (PDT), safer for critically ill patients. PDT is routinely performed in the Intensive Care Unit (ICU), but doctors usually need a camera called a bronchoscope to see inside the windpipe during the procedure to prevent complications. Unfortunately, bronchoscopes are expensive, hard to get, and can actually block the patient's airflow, leading to low oxygen or high carbon dioxide levels.

To fix this, doctors successfully used an affordable, waterproof 4 mm borescope examination camera—like a small inspection camera—in place of the traditional bronchoscope. This borescope camera is inserted through the patient's existing breathing tube and sends real-time images directly to a smartphone or tablet.

The authors report that this technique was successfully used in a series of patients, with no procedure-related complications observed. The key advantages are that the small camera does not compromise the patient's continuous ventilation, meaning they avoid the risk of low oxygen or high carbon dioxide. The images were clear enough to guide the doctors precisely and safely. Furthermore, the images can be shared wirelessly to a control room, allowing senior doctors to monitor and guide junior staff. The doctors conclude that this practical, affordable method is a better alternative to bronchoscopy, especially for patients who are sensitive to changes in oxygen or carbon dioxide levels, such as those with neurological issues.

Summary for Healthcare Professionals:

This letter to the editor reports a case series demonstrating a modified technique for percutaneous dilatational tracheostomy (PDT) using a low-cost borescope examination camera as a visualization adjunct. The technique addresses the limitations of conventional bronchoscopic guidance, specifically cost constraints and the risk of compromised ventilation, which can induce hypoxia and hypercarbia during the procedure.

The successful application involved inserting an affordable, waterproof 4 mm borescope camera through the endotracheal tube (ETT) and connecting it to a tablet for real-time visualization of the tracheal lumen. This technique allows for continuous ventilation without compromising airflow, providing a significant advantage over larger bronchoscopes. In the reported cases, no procedure-related complications were observed, and specifically, no episodes of hypoxia or hypercarbia occurred.

The advantages of this modified approach are several: it provides a non-inferior visual field compared to bronchoscopy, allows for real-time confirmation of the puncture site and guidewire placement, effectively avoiding posterior tracheal wall injury. Furthermore, the system permits wireless transmission of the procedure feed, enabling remote monitoring and guidance for junior staff. The authors conclude that this practical and affordable borescope-guided PDT is a superior alternative to bronchoscopy, particularly benefiting patients sensitive to ventilatory compromise, such as those with neurological conditions or pulmonary hypertension.

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Retrograde Percutaneous Tracheostomy. Early Experience With a Cadaveric Case Report.

Lay Summary:

This report introduces a new technique for performing a tracheostomy, a common surgical procedure in the intensive care unit (ICU) where a breathing tube is inserted into the neck. The new method, called retrograde percutaneous tracheostomy, aims to avoid some of the risks associated with the standard procedure. Currently, a breathing tube is placed through the front of the neck, which carries a risk of accidentally injuring the back wall of the windpipe (posterior tracheal wall injury), damaging the existing tube, or creating a false path.

The novel technique was evaluated using a cadaver to determine if it was technically possible. The process involves first passing a wire with a sharp tip through the breathing tube from the inside, then carefully puncturing the windpipe outwards toward the skin. Once the wire is outside, the rest of the procedure is carried out as usual. The authors found that the technique was technically feasible on the cadaver. They believe that by puncturing from the inside out, the procedure may offer a way to eliminate the risk of injuring the back wall of the windpipe. However, since this was only an initial test, they stress that further clinical trials are necessary to confirm the safety and effectiveness of this innovative method in living patients.

Summary for Healthcare Professionals:

This report details the early experience and feasibility assessment of a novel retrograde percutaneous dilational tracheostomy (PDT) technique, developed to circumvent recurrent complications observed in conventional PDT. The primary motivation is the potential to avoid complications such as posterior tracheal wall injury, inadvertent bronchoscopic/ETT puncture, and false track formation. The evaluation was conducted as a cadaveric case report on a 75-year-old male.

The technique involves a reversal of the standard approach: a sharp-terminal-ended wire is passed through the bronchoscope channel and deliberately punctures the trachea from the intraluminal space outwards toward the skin. Following external puncture, the wire is secured, the original bronchoscope is removed, and the remainder of the procedure (dilation and tube placement) is completed in the routine fashion. The procedure proved to be technically feasible in the cadaveric model. The authors hypothesize that this retrograde puncture trajectory innately safeguards against posterior wall and ETT injury, eliminating a significant source of morbidity. However, they conclude that further clinical trials are mandatory to confirm the safety and definitive validity of this innovative method prior to its integration into mainstream intensive care practice.

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Early postoperative complications following tracheotomy: Does suturing technique influence outcomes?

Lay Summary:

This study investigated whether the way a surgeon stitches a tracheostomy wound affects how often a patient has problems after surgery. A tracheostomy is a surgery to create a breathing hole in the neck, and afterward, doctors use different techniques to secure the incision and create a stable opening. The two common methods compared were the Bjork flap (a technique where a piece of cartilage and tissue is stitched to the skin) and stay sutures (stitches passed through the trachea cartilage and skin). Both techniques are designed to help doctors quickly reinsert a tube if it accidentally falls out or needs to be changed.

The researchers looked back at the records of 518 patients who had open surgical tracheostomies. The main finding was that neither the Bjork flap nor the stay suture technique was found to be better or safer than the other in preventing early complications. Both techniques had similar low rates of major complications, including breathing tube bleeding, infection, mucus plugging, or the tube being wrongly placed when changed.

However, the study highlighted a common problem: accidental decannulation (the tube accidentally coming out) was the most frequent tracheostomy-related reason patients had to return to the emergency department (12 patients). Overall, the authors conclude that a patient's underlying health issues and the reason for the tracheostomy are much more important factors in predicting postoperative problems than the specific way the surgeon secured the wound. The results suggest that clinicians can confidently choose either technique without increasing the risk of early adverse outcomes.

Summary for Healthcare Professionals:

This retrospective cohort study investigated the effect of two distinct surgical methods for securing the tracheostomy stoma—the Bjork flap (n=317) versus superior and inferior stay sutures (n=201)—on early postoperative complications (defined as within 30 days). The study cohort comprised 518 adult patients who underwent open surgical tracheostomy performed by Otolaryngology-Head and Neck Surgery providers. The primary goal of both techniques is to establish a secure tract for potential recannulation in the event of tube displacement.

The analysis demonstrated that no statistically significant difference was found between the Bjork flap and stay suture techniques across all measured complications, including tracheal bleeding, hematoma, pneumothorax, false passage, and infection. Complication rates were generally low in both cohorts. However, the study identified that accidental decannulation was the most common tracheostomy-related cause for Emergency Department (ED) readmission within 30 days of discharge (12 patients). Furthermore, eight patients were admitted to the hospital from the ED for bleeding.

The authors conclude that adverse outcomes are not associated with the specific suturing technique used to secure the stoma. Instead, the patient's underlying medical comorbidities and the indication for tracheostomy are posited to be the more significant determinants of postoperative complications and overall patient outcome. This finding supports the clinician's ability to exercise preference in their chosen surgical method without increasing the risk of early adverse events.

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Scientific abstracts and references

J Intensive Care Soc. 2023 Feb;24(1):104-111. doi: 10.1177/17511437221113162. Epub 2022 Jul 10.

Benefits and options for voice restoration in mechanically ventilated intensive care unit patients with a tracheostomy.

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Communication difficulties and their effects on patients who are mechanically ventilated are commonly reported and well described. The possibility of restoring speech for patients has obvious benefits, not only for meeting patient's immediate needs, but for helping them to re-engage in relationships and participate meaningfully in their recovery and rehabilitation. This opinion piece by a group of United Kingdom (UK) based Speech and Language Therapy experts working in critical care describes the various ways by which a patient's own voice can be restored. Common barriers to using different techniques and potential solutions are explored. We therefore hope that this will encourage intensive care unit (ICU) multi-disciplinary teams to advocate and facilitate early verbal communication in these patients.

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Modified Technique of Percutaneous Tracheostomy Using Borescope Camera: A Case Series.

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Percutaneous dilatational tracheostomy (PDT) is a routinely performed procedure in the intensive care unit (ICU). Bronchoscopy guidance is recommended which requires expertise to use it, and also it is not readily available in all ICUs. Moreover, it can lead to carbondioxide (CO2) retention and hypoxia during the procedure. To overcome these issues, we are using a waterproof 4 mm borescope examination camera in place of a bronchoscope which allows continuous ventilation, and real-time images of the tracheal lumen can be viewed on a smartphone or a tablet during the procedure. These real-time images can be transmitted wirelessly to a control room where experts can monitor and guide the junior staff performing the procedure. We are reporting successful use of the borescope camera during PDT. HOW TO CITE THIS ARTICLE: Mustahsin M, Srivastava A, Manchanda J, Kaushik R. Modified Technique of Percutaneous Tracheostomy Using Borescope Camera: A Case Series. Indian J Crit Care Med 2022;26(7):881-883.

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Retrograde Percutaneous Tracheostomy. Early Experience With a Cadaveric Case Report.

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Despite the many accomplishments since the introduction of percutaneous dilational (PDT) tracheostomy, we continue to observe emerging complications as we forge ahead in intensive care practice. As a result of this, we provide a new technique that could avoid some complications, notably posterior tracheal wall injury, bronchoscopic or endotracheal tube puncture, and false track. The new technology was evaluated on a 75-year-old Caucasian male cadaver was selected for a novel PDT technique. A wire with a sharp terminal end passed through the bronchoscopic channel and punctured the trachea from inside towards the skin. The wire was pulled and directed towards the mediastinum. The rest of the technique was carried out like a routine procedure. The procedure was technically feasible; further clinical trials are required to confirm the validity of this technique.

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Early postoperative complications following tracheotomy: Does suturing technique influence outcomes?

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INTRODUCTION: Tracheotomy is one of the most commonly performed procedure by otolaryngologists, but no consensus exists on the effect of suturing techniques on postoperative complications. Stay sutures and Bjork flaps are utilized frequently for securing the tracheal incision to the neck skin in order to create a tract for recannulation. METHODS: Retrospective cohort study of tracheotomies performed by Otolaryngology-Head and Neck Surgery providers (May 2014 to August 2020) was conducted to determine the effect of suturing technique on postoperative complications and patient outcomes. Patient demographics, medical comorbidities, indication for tracheostomy, and postoperative complications were analyzed with a statistical alpha set of .05. RESULTS: Out of 1395 total tracheostomies performed at our institution during the study period, 518 met inclusion criteria for this study. Three hundred and seventeen tracheostomies were secured by utilizing a Bjork flap, while 201 were secured with up and down stay sutures. Neither technique was noted to be more commonly associated with tracheal bleeding, infection, mucus plugging, pneumothorax, or false passage of the tracheostomy tube. One mortality was noted following decannulation during the study period. CONCLUSION: Though various techniques exist; adverse outcomes are not associated with the manner in which a new tracheostomy stoma is secured. Medical comorbidities and the indications for tracheostomy likely play a more significant role in postoperative outcomes and complications. LEVEL OF EVIDENCE: Level 3.

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