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Partner Success Stories

Enhancing Drug-Induced Sleep Endoscopy (DISE) Accuracy with Millar Pressure Catheters

Partner:
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Perelman School of Medicine

Technology:
Millar Mikro-Cath™

Study Duration: 3+ Years

Status: Active

Approximately 39 million adults in the U.S. suffer from obstructive sleep apnea (OSA). During DISE procedures, the Millar Mikro-Cath™ is used to highlight the importance of thoroughly assessing upper airway dynamics, which enables data driven surgical decisions for OSA patients.

Problem

Drug-induced sleep endoscopy (DISE) is a critical tool for evaluating the anatomical causes of obstructive sleep apnea (OSA). However, traditional DISE primarily relies on visual inspection, which can miss dynamic changes in airway collapse and it's impact on airflow and respiratory effort. This limitation can lead to suboptimal surgical decisions and variable patient outcomes. Identifying precise sites of airway collapse and understanding it's contribution to respiratory dynamics remain challenging, often resulting in incomplete or ineffective treatment plans.

Solution

To address these limitations, an enhanced DISE protocol using Millar's Mikro-Cath™ pressure catheters was implemented by Dr. Dedhia at the University of Pennsylvania Perelman School of Medicine.
The Mikro-Cath™ delivers real-time, precise measurements of airway pressure, with signals that remain unaffected by patient position or movement during respiratory cycles. In his studies, two Mikro-Cath™ pressure catheters were positioned – one below the distal rim of the soft palate and the other posterior to the epiglottic petiole. A nasal CPAP mask connected to a pneumotachometer was also used to monitor airflow. This setup allowed for the simultaneous collection of nasal airflow, catheter pressures, endoscopic images, and blood oxygen saturation.

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With its reduced size and signal accuracy, the Mikro-Cath™ can easily measure esophageal pressure changes and monitor upper airway pressures in patients, increasing understanding of the anatomical and physiological differences in patients diagnosed with obstructive sleep apnea (OSA).

Study References:

Harkins, Tice R., et al. "The Whimsical Nature of Airway Obstruction during Drug Induced Sleep Endoscopy." The Laryngoscope, Apr. 2024, https://doi.org/10.1002/lary.31461.

Impact

The integration of Millar's pressure catheters into the DISE procedure yielded significant clinical insights:

- **Identification of Dynamic Collapse Sites:** The enhanced DISE revealed that the flow-limiting site can migrate within a single apnea episode. Initially, the site was distal to the upstream catheter, but later it moved proximal to the upstream catheter. This migration was detected through changes in pressure readings, which would have been missed with endoscopy alone.

- **Detection of Secondary Collapse Sites:** The enhanced protocol showed that increased inspiratory effort can cause secondary collapse sites downstream from the primary obstruction. This was evident from the dissociation of pressure readings between the two catheters during inspiration.

These insights have profound implications for treatment, allowing for more precise surgical planning by understanding the dynamic nature of airway collapse .For instance, targeting the primary site of collapse may relieve flow limitation and prevent secondary collapses, potentially eliminating the need for multi-level surgery. This tailored approach can improve surgical outcomes and enhance overall treatment efficacy of OSA.

Millar's pressure catheters significantly enhance the diagnostic capabilities of DISE, leading to more informed surgical decisions and better patient outcomes. This case underscores the importance of combining anatomical and physiological assessments to address the complexities of OSA effectively.

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