

Less Invasive Surfactant Administration: Fine Tuning a Disparate Practice

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Less Invasive Surfactant Administration (LISA) is a growing method for treatment of respiratory distress syndrome. Although it has become standard of care in parts of Europe[1], its adoption in North America remains slow[2], but with increased interest. Many centers are developing their own guidelines and procedures[3, 4]. This study in *Pediatric Pulmonology* directly compares two different techniques for administration of surfactant via thin catheter (LISA). Studies like this highlight the importance of fine-tuning techniques for common procedures using an evidence-based approach; allowing new therapies to reach our patient population.

Prospective trials of LISA were first performed by Verder et al[5]. A thin, flexible catheter is guided into the trachea and surfactant is administered. The thin catheter does not occlude the airway, allowing the infant to remain on non-invasive respiratory support. While comparable to Intubate-Surfactant-Extubate (INSURE), the use of an endotracheal tube occludes the infant's airway and necessitates the use of positive pressure ventilation (PPV). The avoidance of PPV prevents volutrauma and the subsequent inflammatory cascade that is associated with chronic lung disease of prematurity or bronchopulmonary dysplasia[6, 7]. Randomized control trials and subsequent meta-analyses demonstrated that LISA reduced rates of bronchopulmonary dysplasia and death compared to the CPAP, surfactant and mechanical ventilation and the standard of care, INSURE [8-11].

Thin catheter administration of surfactant is one of the most popular ways to administer surfactant. Two main techniques have emerged over the past decade. Both techniques require direct visualization of the airway. The first technique is insertion of a rigid catheter (such as the off-label use of an Angiocath) using direct manipulation. The second technique involves the use of Magill forceps to guide a more flexible catheter (such as a feeding tube) into the airway for instillation of surfactant. Both techniques require a highly skilled operator who is familiar with direct visualization of the airway. The study shared in this issue of *Pediatric Pulmonology* compares the two techniques and demonstrated decreased time to placement and increased success at first attempt with a rigid vs. soft catheter. As this practice was refined most institutions have reappropriated instruments and devices intended for another purpose to successfully implement this practice. Quality improvement initiatives have been helpful in streamlining this process and guiding implementation at individual institutions [3]. It is important for each institution to identify the target patient population, standardize the instruments used for the procedure, and adequately train staff on the procedure.

In recent years, some manufacturers have recognized the need for specialized equipment for this procedure. There are three devices that have been specifically designed for surfactant administration, including Surfath (Vygon, Ecouen, France), LISAcath® (Chiesi, Parma, Italy), and Neofact® (Lyomark Pharma, Oberhaching, Germany). Surfath has added benefits over an Angiocath, including a centimeter marking to guide insertion. The distal tip of the device is a blunt black tip of 2 cm, bent at 30 degrees which allows ease of use for insertion. It can be manipulated into the desired shape more easily than an Angiocath. LISAcath(r) is

very similar including a rounded, soft tip at the distal edge and printed markings on the outer surface. One multi-center study surveyed neonatologists and found that they preferred the LISAcath(r) for ease of use and safety compared to an Angiocath[12]. LISAcath(r) is currently no longer being produced. Neofact(r) is an application device with a tracheal catheter. It has an angled applicator tip which allows for positioning directly in front of the glottis. This facilitates the use of a flexible catheter without the use of Magill forceps. This device was studied in a feasibility study and found to be successful in 19 of 20 infants, with a median of 2 attempts[13]. These devices are not available for use in the United States at the time of this publication.

Ultimately, direct laryngoscopy remains a noxious procedure for neonates despite incremental improvements over intubation. Alternative approaches continue to be tested including techniques such as surfactant administration via laryngeal or supraglottic airways. These techniques allow for administration of surfactant without direct visualization of the airway. This could be especially helpful in settings where a provider skilled in airway manipulation is not available[14]. Meanwhile, the search for a nebulized surfactant product with similar efficacy continues as a method for truly non-invasive surfactant administration to treat respiratory distress syndrome.

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