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LISA-CODE; A Novel Method to Confirm Tracheal Catheter Placement in Less Invasive Surfactant Administration (LISA)

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Abstract

Respiratory distress syndrome is common in premature infants, and exogenous surfactant administration has been shown to be an effective treatment.

In 1992, The less invasive surfactant administration (LISA) method was first described as placing a small catheter in the trachea with Magill forceps under direct laryngoscopy, during spontaneous breathing with continuous Pressure Airway pressure (CPAP) support [1].

A recent Cochrane systematic review [2] reported a decrease in death and bronchopulmonary dysplasia and a reduction of the need for mechanical ventilation within 72 and severe intracranial hemorrhage when LISA is used.

The main challenge in applying LISA is the absence of reliable methods of confirming the placement of the thin catheter into the airway [3].

We are presenting the LISA-CODE method which is a novel method to confirm the placement of the LISA catheter into the airway using a CO_2 detector attached to a connector from a size 3.0 mm endotracheal tube attached to the distal part of LISA catheter. In All our LISA-CODE cases, the CO_2 detector color changed yellow demonstrating the presence of CO_2. In only one case there was suspicion that the catheter wasn't in the airway and didn't show the change in the CO_2 detector initially then the color changed after reinsertion of the catheter with the use of the same CO_2 detector.

Introduction

Respiratory distress syndrome (RDS) is common in premature infants. Exogenous surfactant administration has been shown to be an effective treatment for RDS since the 1980s. There are different reported methods of surfactant administration that progressed over the last decades from administration via an endotracheal tube, to a less invasive method via a fine catheter under visualization with a laryngoscope blade (LISA) to a non-invasive method via nebulization.

In 1992, Verder et al. [1] first described the LISA method of placing a small catheter in the trachea with a Magill forceps under direct laryngoscopy, while the infant spontaneously breathes with the assistance of CPAP support.

A recent Cochrane systematic review [2] included 16 RCTs comparing LISA versus ETT surfactant administration has demonstrated the benefits of LISA method in decreasing mortality and severe intraventricular hemorrhage (IVH) (NNTB 22). In

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addition to reducing the need for mechanical ventilation within 72 hours (NNTB 8).

The main challenge in applying LISA is the lack of a reliable method of confirming the placement of the thin catheter into the airway [3].

We are presenting the LISA-CODE method which is a novel method to confirm the placement of the less invasive surfactant catheter into the airway.

Methods

LISA is not only a single technical procedure but rather a component of a complex care bundle. We aim to introduce using LISA at Tawam hospital (which is a tertiary teaching hospital in the United Arab Emirates and has a capacity of 51 level III NICU beds.) A multidisciplinary team including attending neonatologists, neonatal-perinatal medicine fellows, respiratory therapists, and nurses was formed. The protocol was formulated, and we started applying LISA at our hospital in February 2022 (Figure 1).

11 cases received surfactant through LISA in 2022. Table 1 shows the demographic characteristics. The mean gestational age of LISA recipient neonates was 31 weeks, and the median birth weight was 1,670 grams.

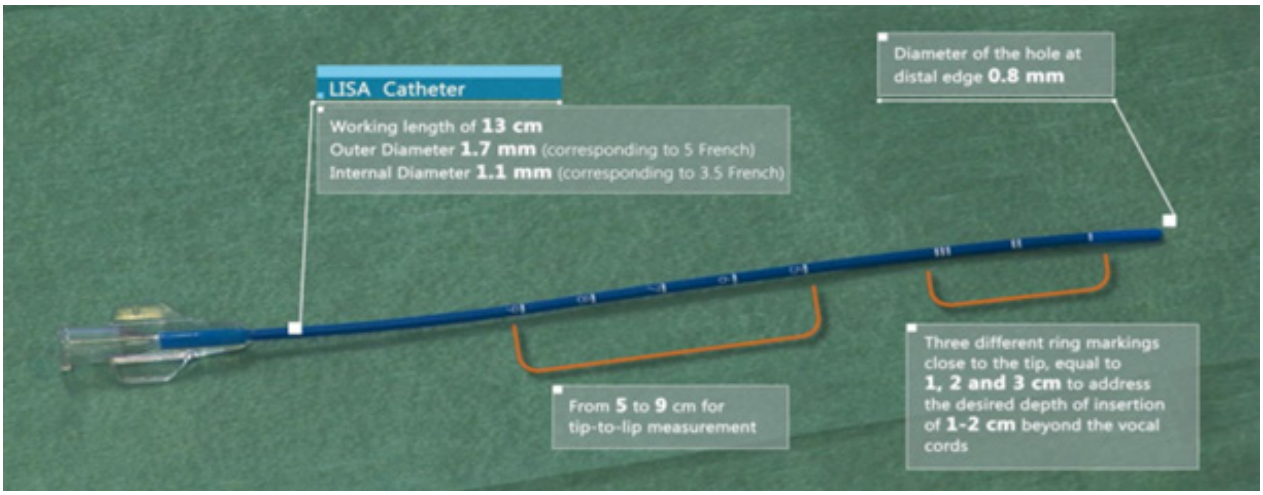

Figure 1:

Table 1

Case No	Gestational Age	Weight/gram	Age of Applying LISA / hr
1	28	1200	2
2	28+4	700	1
3	28+4	700	13
4	29+6	1350	3
5	30+4	1500	15
6	32+1	1700	3
7	32+4	1910	18
8	33+3	2100	31
9	33+5	1970	2
10	34	2110	51
11	40+6	3130	14
Mean	31	1670	14

We use LISA Cath, (Chiesi Farmaceutici S.p.A, Parma, Italy) Figure 1 shows the specifications of the catheter.

To confirm the position of the LISA catheter in the airway. We obtained a connector from a size 3.0mm Endotracheal (SUMI Tracheal Tube without Cuff ETT reference number 04-3014). We used this connector as an adaptor to attach the distal part for the LISA catheter with CO_2 Detector (Westmed #562135 Pedi CO_2 Easy Carbon Dioxide Detector) Figure 2.

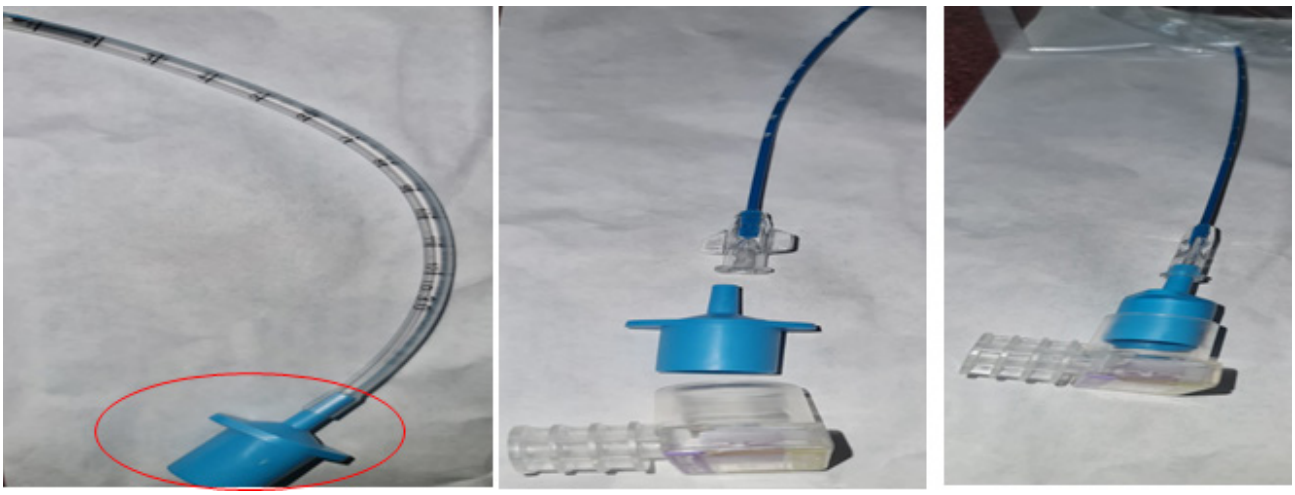

Figure 2:

In all LISA-CODE cases, the CO_2 detector color changed to yellow demonstrating the presence of CO_2. In only one case there was suspicion that the catheter wasn't in the airway and didn't show the change in the CO_2 detector initially then the color changed after reinsertion of the catheter with the use of the same CO_2 detector Figure 3.

Figure 3:

Conclusion

Using LISA-CODE can provide a reliable method to confirm the placement of a less invasive surfactant catheter into the airway.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

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