ID: 112
TITLE: NON-INVASIVE RESPIRATORY SUPPORT FAILURE IN PRETERM INFANTS: THE INFLUENCE OF INSPIRATORY TIME ON THE EFFICIENCY OF BI-LEVEL CPAP. RANDOMISED PROSPECTIVE TRIAL.
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CONTENT:
It remains unclear whether non-invasive ventilation in Bi-level CPAP mode is more effective than nasal CPAP in premature infants. Short inspiratory time can lead to ineffectiveness of non-invasive ventilation when device with open exhalation circuit such as Infant Flow SiPAP is used in BiPhasic mode (Bi-level CPAP). Optimal inspiratory time could compensate circuit leakage and improve the efficiency of non-invasive ventilation. The aim of present study is to compare three modes of non-invasive respiratory support of Infant Flow SiPAP to define whether inspiratory time influences on the efficiency of non-invasive ventilation in preterm infants compared to nasal CPAP.

298 premature babies born at 28–35 weeks were included. After initial stabilization on CPAP in delivery room, they were randomized immediately after admission to NICU and divided into 3 groups. 97 newborns formed 1st group where BiPhasic mode with insp.time1.0 sec and frequency 30 per minute. 86 newborns formed 2nd group BiPhasic mode with insp. time 0.5 second and frequency 60 per minute. Group 3 included 115 premature babies on CPAP mode. Estimated mean airway pressure was similar on BiPhasic groups (1st and 2nd). Incidents of non-invasive support failure in groups was evaluated. The failure criteria were the increase of FiO2>0.4 (FiO2 >0.3 for <1000 g) and/or Silverman score = 4 or higher

In 1st group, where the respiratory therapy was provided by BiPhasic mode with inspiratory time of 1.0 second the failure was in two times less than in 2nd group and 3rd group: 33% vs 65% vs 62% (p=0.00003). Respiratory support failures in 2nd and 3rd group were similar. RR of failure BiPhasic Tin1.0/Fr30 vs CPAP: 0,53 [0,39; 0,72], RR of failure BiPhasic Tin1.0/Fr30 vs BiPhasic Tn0.5/Fr60: 0.50 [0,36; 0,70]; RR of failure BiPhasic Tn0.5/Fr60 vs CPAP: 1,05 [0,85; 1,28]

At the sametime the time of respiratory support failure incidents was similar in three groups: Me (min-max) (hours age of life) 2,0 (1-26); 1,75(1-27); 2(1-23) in group 1,2 and three.

Infant Flow SiPAP on BiPhasic mode (Bi-Level CPAP) has advantage over CPAP when inspiratory time is 1.0 second to compensate the leakage and create an optimal peak inspiratory pressure. BiPhasic mode with inspiratory time 0.5 sec has the same efficiency as CPAP mode and has no advantages over CPAP

The time of incidents of non-invasive support failure does not depend on respiratory support mode.

COI: None declared
ID: 131

TITLE: PREDICTION OF RESPIRATORY DISTRESS SYNDROME AT BIRTH IN PRETERM INFANTS USING A FAST TEST BASED ON SPECTROSCOPY OF GASTRIC ASPIRATES

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CONTENT:

Only about half of infants with a gestational age (GA) below 30 weeks need surfactant treatment and prophylactic surfactant treatment increases the combined mortality and incidence of BPD contrary to selective rescue surfactant treatment. Therefore, there is a need for a rapid test to guide early targeted surfactant treatment in infants born prematurely.

Several invasive prenatal tests based on amniotic fluid such as foam tests, click tests, drop volume methods and thin-layer chromatography of phospholipids have been developed and have been used to assess lung maturity. But these tests are invasive if done antenatally and amniotic fluid is difficult to sample at delivery.

A number of lung maturity tests based on gastric aspirates (GAS) sampled at delivery have been developed over time - for example, the microbubble stability test and lamellar body counts. Our group have previously published a large randomised trial using lamellar body counts to guide surfactant treatment. However, the methods are time-consuming laboratory-tests and are too slow to be used as a point-of-care test (POC) to guide surfactant treatment, and a common problem with all these methods is dilution with foetal urine. The sphingomyelin concentration in amniotic fluid and accordingly in GAS is relatively constant during the pregnancy whereas the lecithin concentration increases with the lung maturation, and by measuring the L/S ratio in GAS the problem with dilution is avoided. The most promising method has been based on mid-red Fourier Transform Infrared spectroscopy (FTIR) where our group could demonstrate a high sensitivity. We have now improved this method for use as a POC test, optimising it for fresh GAS rather than frozen GAS.

In this abstract we describe an observational clinical study in premature infants in which the clinical course of RDS is compared with L/S measured at delivery with the new method.

Fresh gastric aspirate (GAS) was sampled at birth in a cohort of preterm infants with gestational ages ranging between 24 to 31 completed weeks for lung-surfactant measurement as lecithin-sphingomyelin ratio (L/S). L/S was prospectively compared with RDS development as per European RDS guidelines. Severity of RDS was graded based on requirement for surfactant and oxygen-need as done in our previous studies. The clinical outcome was blinded for the investigators of L/S.

L/S was measured by dry transmission spectroscopy with concentration of lung surfactant by centrifugation of the lamellar bodies and dilution of the proteins. Thereby we obtain a spectroscopic amplification of the surfactant signal and omitting interference from proteins and cells.

The time for analysis was less than 15 min.

GAS was obtained from 72 infants (GA, median (IQR) 28.3 weeks (26.9-30.7) and Birth weight, median (IQR), 1061 grams (799-1417)). Forty-four (61%) developed RDS, 12 (27%) mild, 14 (32%) moderate and 18 (41%) severe. The optimal L/S cut-
off value was 3.05. RDS was predicted with a sensitivity of 91% (95% CI: 78-97), specificity of 79% (95% CI: 59-92), positive predictive value of 87% (95% CI: 74-95), and negative predictive value of 85% (95% CI: 65-96).

32 infants with moderate and severe RDS were treated with surfactant. Surfactant was administered before 1 hour of age to six infants; at 1-5 hours of age to nine infants; at 6-9 hours of age to eight infants; at 10-24 hours of age to seven infants and at 25-48 hours of age to two infants. None of the six infants with false positive L/S values (L/S lower the cut-off value) were treated with surfactant.

The new improved spectroscopic L/S method of lung maturity on GAS has high sensitivity. The method is designed for use as a POC test at birth, and a spectroscopic prototype has been developed for bedside use. Clinical trials with this new lung maturity test are planned.

IMAGES:
https://www.eiseverywhere.com/eselectv3/v3/events/351149/submission/files/download?fileID=639b3ac2aecb86c17db762c3f717b981-MjAxOS0wNSM1Y2UyNjY2YmQ4ZmFl

Table 1. Demographic and clinical characteristics of included patients, IQR=interquartile range
Table 2. Gestational age and L/S ratio in different degrees of RDS severity
Table 3. Comparison of L/S and gestational age for prediction of RDS
Figure 1: Lecithin/sphingomyelin ratio (L/S) in gastric aspirates determined by mid-infrared spectroscopy in 44 infants with RDS and 28 infants with non-RDS. The best cut-off value is 3.05 moles/mole

COI: Agnar Höskuldsson and Henrik Verder hold part of a patent for spectroscopic analysis of biological samples and Peter Schousboe and Henrik Verder hold part of a patent for a foetal lung maturity test based on lamellar body purification. The authors have no other conflict of interest.
Remaining authors: none declared
ID: 252

TITLE: A COMPARISON OF THE EFFECT OF TWO INTERFACES FOR RESPIRATORY SUPPORT ON BREATHING IN PRETERM INFANTS AT BIRTH: A MATCHED-PAIRS ANALYSIS

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CONTENT:

Applying a face mask for respiratory support affects breathing in preterm infants at birth by provoking the trigeminocardiac reflex. We compared the effect of bi-nasal prongs on breathing and heart rate with a face mask in preterm infants at birth.

In a retrospective matched-pairs study of infants < 32 weeks of gestation receiving respiratory support via bi-nasal prongs or face mask were compared at the Leiden University Medical Centre and the General University Hospital in Prague. Infants who were initially breathing at birth and an interface was applied at birth were matched with a 1:1 ratio for gestational age (+/- 4 days), birth weight (+/- 300 gram), general anaesthesia and gender. Breathing, heart rate and other parameters were collected before and after interface application and in the first 5 minutes thereafter.

In total, 130 infants were included (65 infants with bi-nasal prongs were matched to 65 infant with face mask) with a median (IQR) gestational age of 27+2 (25+3 – 28+4) vs 26+6 (25+3 – 28+5). The percentages of infants who stopped breathing after the interface was applied were not different between the groups (bi-nasal prongs 43/65 (66%) vs face mask 46/65 (71%), p=NS). However positive pressure ventilation was significantly more often given when bi-nasal prongs were used (55/65 (85%) vs 40/65 (62%), p<0.001). Heart rate (101 (75-145) vs 110 (68-149) bpm, p=NS) and oxygen saturation (59% (35-84) vs 56% (48-87), p=NS) were similar in the first 5 minutes after an interface was applied in the infants who stopped breathing.

The trigeminocardiac reflex occurred often and was similar when using bi-nasal prongs or face mask.

COI: None declared
**ID:** 386  
**TITLE:** THE EVALUATION OF THE EFFICACY AND SAFETY OF NON-INVASIVE NEURALLY ADJUSTED VENTILATORY ASSIST (NIV-NAVA) IN COMBINATION WITH INSURE TECHNIQUE FOR INFANTS AT 28 TO 33 WEEKS OF GESTATION WITH RESPIRATORY DISTRESS SYNDROME  
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**CONTENT:**  
Flow-synchronized nasal intermittent positive pressure ventilation (SNIPPV) have been reported to decrease the rate of INSURE failure compared with NCPAP. NIV-NAVA, another type of SNIPPV, is also available for infants and NIV-NAVA has been shown to improve patient-ventilator interactions even in infants with large air leak compared with flow-SNIPPV. No previous studies have evaluated the efficacy of NIV-NAVA after INSURE. The aim of this study was to evaluate the efficacy and safety of NIV-NAVA used after INSURE for RDS in infants at 28 to 33 weeks of gestation.

We conducted a prospective observational study that included inborn preterm infants at 28 (0/7) to 33 (6/7) weeks of gestation with RDS in the period from April 2017 to March 2019. Soon after the diagnosis of RDS, we performed the INSURE technique. After INSURE, infants underwent NIV-NAVA for at least 24 h using a SERVO-n neonatal ventilator. INSURE failure was defined as follows: FiO2 requirement > 0.4, respiratory acidosis, and severe apnea within 5 days after surfactant administration. The primary outcome of the study was the rate of INSURE failure. Complications included pneumothorax, CLD, PDA ligation, severe IVH (Grade III or IV), PVL, mortality, severe abdominal distension, feeding intolerance, and Edi catheter-associated complications.

Within the study period, 33 preterm infants born at 28 (0/7) to 33 (6/7) weeks gestation with RDS were admitted to our NICU. Of these, 15 infants met one of the exclusion criteria. The remaining 18 infants were eligible for inclusion in the study. Enrolled infants had a median birth weight of 1306 g (range 996-2092 g) and median gestational age of 30.6 weeks (28.2-33.7 weeks). Two of the 18 (11.1%) infants showed INSURE failure and required mechanical ventilation. No infants experienced complications such as pneumothorax, CLD, PDA ligation, severe IVH (Grade III or IV), PVL, or death, severe abdominal distension, feeding intolerance, and Edi catheter-associated complications.

This study demonstrated that the rate of INSURE failure when NIV-NAVA was used after INSURE technique for preterm infants with RDS was 11.1%, and that NIV-NAVA was performed safely without severe complications for preterm infants soon after birth. Randomized control studies are needed to confirm the best respiratory support after INSURE for preterm infants with RDS.


**COI:** None declared