

NONINVASIVE NEURALLY ADJUSTED VENTILATORY ASSIST TO TREAT CHILDREN WITH ACUTE HYPOXEMIC RESPIRATORY FAILURE: A MATCHED-CONTROL STUDY

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Argomento: Insufficienza respiratoria acuta e ventilazione meccanica

Objective. To compare, in a single-center retrospective match-controlled study, early delivered noninvasive Neurally Adjusted Ventilatory Assist (NIV-NAVA) and noninvasive flow-cycled Pressure Support (NIV-PS) in children with infective Acute Hypoxemic Respiratory Failure (AHRF) admitted to a six-bed Pediatric Intensive care Unit (PICU). **Methods.** Children treated with NIV-NAVA for infectious AHRF during a NIV-NAVA implementation period were included. Each patient (NIV-NAVA group) was matched with a control patient treated with NIV-PS (NIV-PS group) according to following matching criteria: age \pm 3 months, weight \pm 1 Kg, PIM3 \pm 0.5 points,; paO_2/FiO_2 \pm 20 points, $paCO_2$ \pm 10 mmHg;. Primary end-point was intubation rate between groups. Secondary end-points included: days on mechanical ventilation, number of invasive devices, nosocomial infections, PICU and hospital length of stay, survival at 2 and 6 months. Comparison between groups was performed using Fisher Exact t-test or Rank Sum test, as appropriate (significance for $p < 0.05$). **Results.** Twenty patients treated with NIV-NAVA were matched with twenty patients receiving NIV-PS. Characteristics of patients and outcome variables are summarized in Table 1. Intubation rate in NIV-NAVA group was significantly lower as compared to NIV-PS group (13% vs. 51%, $p = 0.018$). Patients of the NIV-NAVA group required fewer invasive devices ($p = 0.038$), had lower incidence of ventilator acquired pneumonia ($p = 0.004$) and showed lower PICU ($p = 0.032$) and hospital ($p = 0.013$) length of stay. No difference were found in PICU and hospital mortality ($p = 1$). $PaO_2:FiO_2$ at 1 hour was higher in NIV-NAVA group compared to baseline (245, 245-284 vs 180, 156-190 $p = 0.001$) and to NIV-PS (245, 245-284 vs 175-242 $p = 0.001$) whereas $paCO_2$ and RR at 1 hour were lower in NIV-NAVA group compared to NIV-PS (45,29-42 vs 50, 39-65 mmHg $P = 0.001$; and 35, 33-43 vs 50,39-65 breaths/min $p = 0.001$). **Conclusions.** In this retrospective study, early delivered NIV-NAVA in pediatric AHRF was associated with lower intubation rate, shorter PICU and hospital stay. Further studies are needed to confirm these findings.

	NIV PS N=20	NIV NAVA N=20	p
Matching parameters			
Gender, n (%)	12 (60)	10 (50)	0.768
Age, mos	8, 5-12	12, 8-20	0.181
Weight, Kg	8, 6-10	8, 7-11	0.784
PIM3	1, 1-2	1, 1-1.5	0.569
paO ₂ :FiO ₂	180, 160-210	180, 156-190	0.805
paCO ₂ , mmHg	46, 41-54	45,39-52	0.724
Arterial pH	7.36, 7.34-7.38	7.36, 7.34-7.38	0.478
RR, breaths min ⁻¹	60, 55-70	60, 50-70	0.576
HR, beats min ⁻¹	132, 121-143	120, 120-133	0.079
MAP, mmHg	55, 50-56	55, 55-67	0.745
Physiological parameters			
Inspired Oxygen Fraction	0.5, 0.4-0.55	0.5, 0.5-0.6	0.084
PEEP, cmH ₂ O	7, 6-8	7.5 (7-8)	0.070
PS above PEEP, cmH ₂ O	10, 8-12	na	-
Peak Airway Pressure, cmH ₂ O	16, 13-18	13, 12-14	0.003
Gain, mEv	na	0.8, 0.7-1.2	-
Tidal Volume, ml Kg PBW	9, 8, 9.5	8, 7-11	0.006
paO ₂ :FiO ₂ baseline	180, 160-210	180, 156-190	0.805
paO ₂ :FiO ₂ 1 h	33-43	245, 245-284	0.001
paCO ₂ baseline	46, 41-54	45,39-52	0.724
paCO ₂ 1 h	50, 39-55	41, 37-45	0.018
RR baseline, breaths min ⁻¹	60, 55-70	60,50-70	0.576
RR 1 h, breaths min ⁻¹	55, 41-66	35, 33-43	0.001
HR baseline , beats min ⁻¹	132, 121-143	120, 120-133	0.079
HR 1 h, beats min ⁻¹	134, 113-145	120, 100-132	0.044
MAP, mmHg	55, 50-56	55, 55-67	0.745
MAP 1 h, mmHg	58, 54-66	58, 55-65	0.634
Outcome Variables			
Intubation rate, n (%)	11 (51)	3 (13)	0.018
Days on invasive ventilation, n	3.23±3.43	0.45±1.28	0.001
Ventilator Acquired Pneumonia, n (%)	5 (20)	0	0.004
Catheter Related Bacteremia, n (%)	1 (5)	0	1
Days of PICU stay, n	9 (5.5-10)	5 (3.7-7)	0.006
Devices per pts, n	2 (0.75-4)	1 (0-2)	0.032
PICU los, days	9 (6-9.4)	5 (4-7)	0.002
PICU mortality	0	0	1
Hospital los, days	12 (11-15)	8.5 (7-12)	0.013
Hospital mortality	0	0	1
Two months mortality	0	0	1
Six months mortality	0	0	1