Abstract:

SAFETY AND EFFICACY OF EARLY EXTUBATION AFTER FONTAN SURGERY WITH THE USE OF NITRIC OXIDE DELIVERY WITH HIGH FLOW NASAL CANULA

Background and aims

In Fontan patients positive pressure ventilation is best weaned early. Fontan surgery: PCPC (Partial Cava Pulmonary Connection) and TCPC (Total Cava Pulmonary Connection) creates a passive lung circulation, which benefits from negative / spontaneous ventilation. Nitric Oxide (NO) commonly is used to treat pulmonary hypertension and elevated pulmonary vascular resistance. Up to recently mechanical ventilation was necessary to deliver NO. To reduce complications of prolonged mechanical ventilation and optimize circulation in Fontan patients, we set up a pilot to deliver NO by using High Flow Nasal Cannula (HFNC).

Methods

All Fontan patients requiring prolonged NO therapy were included if they were still intubated because of NO therapy and not because of respiratory insufficiency. NO was delivered via NO-A (EKU Elektronik GmbH). We retrospectively reviewed patient characteristics and clinical outcomes of children who received NO via HFNC.

Results

From 2015 4 children (median weight 14.5 kg) were treated with HFNC and NO after cardiac surgery. Reason of admission was post-operative care after PCPC and TCPC After initial stabilization with NO delivered with mechanical ventilation, patients were extubated and respiratory support with HFNC and NO was initiated immediately. No patients on HFNC with NO failed and were reintubated. PaO₂ in patients with mechanical ventilation and with HFNC were similar. Comfort score during NO therapy via HFNC was 10-18.

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>FiO₂ prior to extubation</th>
<th>NO (ppm) prior to extubation</th>
<th>Last PaO₂ (mmHg) prior to extubation</th>
<th>HFNC flow (l/min)</th>
<th>FiO₂ at start of HFNC</th>
<th>NO (ppm) at start of HFNC</th>
<th>PaO₂ (mmHg) at start of HFNC</th>
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Conclusions

HFNC with NO was used safely and successfully in children with Fontan circulation and high pulmonary vascular resistance, thereby optimizing circulatory status and reducing duration of mechanical ventilation with less ventilation associated complications.

Co-authors

M. Tinnevelt, E. Veldhoen, M. Poppel-van, E. Koomen

UMCU, PICU, Utrecht, Netherlands
Dear Marcel Tinnevelt

It is our pleasure to inform you that we have granted you with the first prize of the 2016 Nursing Award for your PICU oral presentation, "SAFETY AND EFFICACY OF EARLY EXTUBATION AFTER FONTAN SURGERY WITH THE USE OF NITRIC OXIDE DELIVERY WITH HIGH FLOW NASAL CANULA" during the 6th Annual Congress of European Academy of Paediatric Societies EAPS, 21-25 October 2016 in Geneva, Switzerland.

As a winner you will receive the following prize:
- EUR 1,000 Award
- One year complimentary nursing membership for 2017
- Complimentary registration to the 28th Annual Meeting of the ESPNIC, 6-9 June 2017, Lisbon Portugal

Kindly send us your international bank details at the following email address to Ella Nkanagu at info@espnic-online.org (IBAN, Swift code, account number and account holder full name and address) in order for us to proceed with the transfer of the funds to your account.

Please do not hesitate to contact the ESPNIC Office for any further information – info@espnic-online.org

Sincerely,

Barbara Grädel
Nursing President

Pierre Tissières
Chair of Scientific Affairs
Safety and efficacy of early extubation after Fontan surgery with the use of Nitric Oxide delivery with High Flow Nasal Cannula
Marcel Tinnevelt
Ventilation Practitioner
Wilhelmina Children's Hospital / University Medical Center Utrecht
The Netherlands

Disclosure

X No, nothing to disclose

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Fontan Circulation ≈ 10

Norwood  PCPC  TCPC
Shunt    Partial CavoPulmonary Connection    Total CavoPulmonary Connection
Nitric Oxide (NO) commonly is used to treat pulmonary hypertension and elevated pulmonary vascular resistance.

Up to recently mechanical ventilation was necessary to deliver NO.
To reduce complications of prolonged mechanical ventilation and optimize circulation in Fontan patients, we set up a pilot to deliver NO by using High Flow Nasal Cannula (HFNC).
< 10 kg Bodyweight X 2 L/min
> 10 kg 0.5 L/min per kg extra
After initial stabilization with NO delivered with mechanical ventilation, patients were extubated and respiratory support with HFNC and NO was initiated immediately.
Measurement of Nitric Oxide and NO₂

Accuracy?

<table>
<thead>
<tr>
<th>Weight (kg)</th>
<th>FIO₂</th>
<th>NO (ppm)</th>
<th>PaO₂</th>
<th>HFNC (L/min)</th>
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No patients on HFNC with NO failed and were reintubated. PaO₂ in patients with mechanical ventilation and with HFNC were similar.
Weaned Nitric Oxide & High flow Nasal Cannula within hours/days

HFNC with NO was used safely and successfully in children with Fontan circulation and high pulmonary vascular resistance,
thereby optimizing circulatory status and reducing duration of mechanical ventilation with less ventilation associated complications.