

**Post Extubation Bridge with a Vapotherm High Flow Nasal Cannula on a Pediatric Patient Following Left Main-Stem Bronchial Resection.**

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**INTRODUCTION:** A 9 1/2 month-old male who at 5 days of age underwent a resection of a brochogenic cyst through a left thoracotomy. He was admitted to Children's Healthcare of Atlanta's CICU following a left main-stem bronchial end to end resection due to complete left main-stem occlusion. His initial post-operative course required extensive mechanical ventilation, numerous fiberoptic bronchoscopic procedures, the addition of HeO2 for improvement of CO2 clearance, persistent RUL atelectasis, and DNASE (Pulmozyme) lavages to enhance secretion removal. The patient also demonstrated small airway disease that was responsive to Beta-2 agonist and an anticholinergic by continuous measurements of airway resistance via NICO Cardiopulmonary Profile Monitor (Novametrix-Respironics, Carlsbad, CA, USA).

**CASE PRESENTATION:** On post-operative day 14, the patient was electively extubated to a Vapotherm Nasal Cannula System (Vapotherm, Stevensville, MD, USA) for high flow nasal cannula (HFNC) for positive pressure as a bridge from mechanical ventilation. Prior to extubation his ventilator settings were 30%, +8cmH2O CPAP, and +8 cmH2O of PSV generating tidal volumes of 5cc/Kg with RR of 28 BPM.

EXTUB. HR	FLOW / FiO2	HR	RR	pH	PaCO2	PaO2	BE / HCO3
0	20LPM/ 0.30	130	20	7.37	61	88	+8/35
8	20LPM/ 0.30	115	18	7.36	65	77	+9/36
24	18LPM/ 0.30	111	18	7.39	59	88	+9/36
32	16LPM/ 0.30	124	28	7.46	55	83	+12/39
48	14LPM/ 0.30	136	30	7.44	49	94	+7/34
84	8LPM/ 0.30	146	36	7.44	46	87	+7/31
88	8LPM/ 0.30	158	30	7.01	121	89	+3/38
96	20LPM/ 0.30	146	30	7.34	64	84	+6/35
120	25LPM/ 0.50	128	26	7.38	59	117	+8/36
180	25LPM/ 0.60	178	44	7.25	65	138	0/26

On extubation hour 180, the patient was electively re-intubated, rested for several days, and the left diaphragm was plicated. On post-operative day # 1 from the diaphragm plication the patient was extubated to a Vapotherm HFNC at 8LPM and 40%.

**DISCUSSION:** The ease of application of HFNC via Vapotherm was attractive in its utilization as a bridge with a tenuous patient with primary large airway disease. The high flows transmit positive airway pressure as demonstrated by specific flow threshold that prevented an increase in WOB, HR, anxiety, and a worsening CO2 clearance. The ability to provide an airway "stent" with positive pressure was accomplished without an increase in sedation and analgesia. In fact the patient continued on a slow methadone and ativan wean post extubation. It was felt that delivering positive pressure via a traditional BI-Level device would increase the level of anxiety and the need for further sedation/analgesia due to the cumbersome head-gear, excessive flow due to leaks, the auditory over stimulation, and the possible inability for the patient to trigger /synch the device. The one worrisome concern during the post extubation trial, despite continuous NJ feedings, the patient lost weight. The strategy to avoid both re-intubation and an invasive surgical procedure by a HFNC approach as a bridge was not successful. However, the ability to support a tenuous patient with respiratory failure was recognized as a valuable tool in the critical care arsenal.

OF-05-047