



Station 8B: Front of Neck Access Jet ventilation, EVA

- 1. Manual jet ventilation (Manujet)
- 2. Flow-regulated ventilation with passive expiration (Oxygen Flow Modulator)
- 3. Flow-regulated ventilation with active expiration (EVA ~ Ventrain)
- 4. Practice of small lumen ventilation





Petro Charco Mora, MD, PhD

Department of Anesthesiology and Intensive Care Airway Management Teaching Center Clinic University Hospital Valencia, Spain pcharco@hotmail.com

Station 8B: Front of Neck Access Jet ventilation, EVA

Special interests: Videoflexible endoscopy, airway management education, learning curves, simulation & research





Dietmar Enk, MD, PhD

Department of Anesthesiology and Intensive Care Medicine

University Hospital Münster (UKM) Münster, Germany

d.enk@t-online.de

Station 8B: Front of Neck Access Jet ventilation, EVA

Special interests: Pediatric airway management, small lumen ventilation, lung protection, innovative techniques, education





Ventilation through small lumen catheters

Dietmar Enk

Department of Anesthesiology and Intensive Care Medicine University Hospital Münster (UKM), Münster, Germany

Conflict of interest declaration

WHAT	DECLARATION
Grants/research support/P.I.	
Employee	
Consultation fees	Ventinova Medical
Honoraria	
Speakers bureau	
Company sponsored	
Stock shareholder	
Spouse/partner	
Scientific Advisory Board	
Other	Royalties (Cook Medical, Ventinova Medical)





- injection of oxygen (enriched gas) at high pressure (to be preset) and (resulting) high flow through small-bore cannulae / catheters
- passive egress of gas demands a sufficiently patent upper airway
- in emergencies preset pressure of max. 0.5 bar (= 7.3 psi = 50 kPa)









Manujet III (VBM Medizintechnik)

Manual Jet Ventilator BE 183 (Instrumentation Industries)









modified from Larson G: The Far Side. Chronicle Features (1982)







preset pressure 0.5 bar = approx. 5 m water column







preset pressure 1.0 bar = approx. 10 m water column







preset pressure 2.0 bar = approx. 20 m water column







positive pressure ventilation = up to 0.4 m water column





Risk of barotrauma ... and circulatory failure!



MAP of 100 mmHg = approx. 1.35 m water column





- injection of oxygen (enriched gas) at high pressure (to be preset) and (resulting) high flow through small-bore cannulae / catheters
- passive egress of gas demands a sufficiently patent upper airway
- in emergencies preset pressure of max. 0.5 bar (= 7.3 psi = 50 kPa)
- injected volume <u>unpredictable</u>
- need to wait for egress of gas





Transtracheal jet ventilation in the 'can't intubate can't oxygenate' emergency: a systematic review

L. V. Duggan^{1,2,*}, B. Ballantyne Scott³, J. A. Law⁴, I. R. Morris⁵, M. F. Murphy⁶ and D. E. Griesdale^{7,8}

Conclusions: "TTJV is associated with a high risk of device failure and barotrauma in the CICO emergency. Guidelines

and recommendations supporting the use of TTJV in CICO should be reconsidered."

Duggan LV et al.: Br J Anaesth 117 / S1 (2016) i28-i38





Flow-regulated ventilation

- insufflation of oxygen (enriched gas) at low flow (to be preset) and (resulting) lower insufflation pressure through small-bore cannulae / catheters
- egress of gas also through flow-regulated device (either passive = Oxygen Flow Modulator / Rapid O₂ or active = Ventrain)







Oxygen Flow Modulator (Cook Medical)





Sufficient release of flow and pressure!



Enk D et al.: Anesth Analg 86 / S (1998) 203







Rapid O₂ (Meditech Systems)







three-way stopcock (attached to a Ravussin cannula)







Bould MD, Bearfield P: Anaesthesia 63 (2008): 535-639 Schaefer R et al.: Paediatr Anaesth 17 (2007): 972-976 Gal TJ: Miller's Anesthesia, 6th ed. (2005): 1637-1639





Insufficient release of flow and pressure!



Hamaekers A et al.: Paediatr Anaesth 19 (2009): 452-457





<u>Flow</u>-regulated ventilation / active expiration (also elective small lumen ventilation)



equilibration ("off")

Ventrain (Ventinova Medical)





<u>Flow</u>-regulated ventilation / active expiration (also elective small lumen ventilation)



equilibration ("off")

inspiration

Enk D: Patent 8950400, USPTO, 10.2.2015





<u>Flow-regulated ventilation / active expiration</u> (also elective small lumen ventilation)



equilibration ("off")

inspiration

expiration (EVA)

Hamaekers A, Borg P, Enk D: Br J Anaesth 108 (2012) 1017-1021





Flow-regulated ventilation

- insufflation of oxygen (enriched gas) at low flow (to be preset) and (resulting) lower insufflation pressure through small-bore cannulae / catheters
- egress of gas also through flow-regulated device (either passive = Oxygen Flow Modulator / Rapid O₂ or active = Ventrain)
- preset flow depending on patient (small children = 1 l/min/year; adults 10-15 l/min)
- insufflated volume <u>predictable</u> (6 l/min = 100 ml/s)
- need to wait for egress of gas (OFM / Rapid O₂)





Ventilation through a "straw" (45 cm long, 1.66 mm ID pediatric tube changer)



https://www.youtube.com/watch?v=LtQzeZJ6x4I





You need to know what you are doing!





