

## Another two elective cases with Ventrain®:

### tumor removal from the upper airways

**Ventrain® + transtracheal catheter<sup>1</sup>** P.A.J. Borg MD et. al. Maastricht University MC, the Netherlands  
*Summary of case report as published on BJA website 4 Sept. 2012. Hard copy publication BJA in Nov. 2012*

A 60 year old man with an exophytic glottic tumor and serious inspiratory stridor (supposedly caused by the tumor) was presented by the ENT-surgeon for diagnostic laryngotracheo-bronchoscopy and possibly tracheostomy. Out of several options, detailed in the BJA Letter to the Editor, the Anesthetist and ENT-surgeon agreed on using Ventrain with a 2 mm ID, 75 mm long Emergency Transtracheal Airway Catheter (ETAC; Cook Medical) as it is minimally invasive and safe compared with the other techniques and leaves all therapeutic options intact.

Ventrain was connected to a 2 L oxygen bottle with the flow set at 15 L/min and the patient was ventilated with 2 seconds each for in- and expiration (15 breaths per min.). This produced moderate but clearly visible thoracic excursions with the chest always returning to its original shape. Temporarily closing nose and mouth led to greater excursions, but not to air trapping. Laryngoscopy by the ENT-surgeon revealed left-sided vocal paralysis beside the large glottic tumor, explaining the inspiratory stridor at least in part. Laryngoscopy and taking biopsies lasted 15 minutes. SpO<sub>2</sub> was 100% throughout. After the surgical procedure the syringe drivers were stopped, the muscle relaxant was reversed and ventilation was reduced by lowering the driving oxygen flow to 5 liter min<sup>-1</sup> in order to raise the pCO<sub>2</sub>. Capnography was connected to Ventrain and spontaneous ventilation started at an endtidal pCO<sub>2</sub> of 6.3 kPa. The patient woke up quietly. The Ventrain was disconnected and the ETAC was left in position and was only removed 6 hours later on the PACU when it was clear there was no increase of inspiratory stridor by swelling or bleeding. The whole procedure was uneventful. The diagnostic information gathered led to the decision to start radiotherapy.



**Ventrain® + endotracheal catheter<sup>2</sup>** Dr M. Kalkoff MD et.al. Whangarei Hospital, New Zealand.  
*Case report not published (yet).*

A healthy patient with a small laryngeal tumor and swelling came in for a Microlaryngoscopy and Biopsy. The team normally uses a size 5 microlaryngoscopy tube, whose placement often requires paralysis. To trial the Ventrain in an elective simulated situation, a special procedure was taken to allow the use of a small diameter tube, giving the surgeon a good view of the larynx. This was regarded a reasonably short safe procedure. A cricoid injection was not necessary.

A Cook Frova intubating introducer (4,6 mm OD, 70 cm length) was used in conjunction with the Cook luer lock connector from a Cook Tube Exchange Catheter to allow the Ventrain to be secured to the catheter.

The patient was informed about the intended off-licence use and the possible publication and gave his consent. As back-up a normal Microlaryngoscopy tube and a LMA was prepared. The anesthetic was performed under propofol and remifentanyl infusion. After induction, laryngoscopy was performed, with the introducer inserted ca. 3 cm past the vocal cords, Ventrain connected via the rapifit adapter-luer lock system. On the proximal end, Ventrain was connected to an oxygen bottle with a flow set on 15 L/min, ventilating with I/E=1:1 in a frequency of 15 to 30 cycles per minute. The capnography port was utilized. A slight chest rising was observed despite the open airway. Air could be heard hissing out of the mouth. There was a good CO<sub>2</sub> trace throughout the procedure. The view of the surgeon was fantastic. At the end of the procedure (30 min.) the patient was extubated, an oropharyngeal guedel was placed, holding the mask. The patient maintained 100% oxygenation throughout the procedure; the highest endtidal CO<sub>2</sub> observed was 55 mmHg. The patient woke up speedily. Both ease of use, capnography capability and the active expiration feature were all noted as big positives by the clinicians.

<sup>1</sup> Use of Ventrain with a 2 mm transtracheal catheter on adults is within the Intended Use

<sup>2</sup> Use of Ventrain with an endotracheal catheter is outside the current Intended Use. Please note that off-label use of Ventrain is in no way promoted by Dolphys.

## **Previous cases:**

### **Emergency - neonate**

#### **1,6 mm Frova Intubating Introducer (1) Maastricht University Medical Centre, Netherlands**

A 2 months old male baby, born premature at 29 weeks with multiple disorders including severe bronchopulmonary dysplasia, was transferred to the operating theatre for surgery of retinopathy. Following repeated intubation attempts with various endotracheal tubes, ventilation with face and laryngeal mask finally failed leading to oxygen desaturation decreasing to 40 % and severe bradycardia. In this desperate situation a Frova Intubating Introducer (1,6 mm ID, length 35 cm, Cook Medical Inc.) was successfully advanced into the trachea and Ventrain was connected. Ventilation was started with an oxygen flow of 4 l/min at a frequency of 60 breaths/min, while continuously observing chest movements. Within seconds oxygen saturation and heart rate recovered. Increasing the oxygen flow to 6 l/min, oxygen saturation could be stabilized above 90 %. Finally, the baby was successfully intubated with a 2 mm ID endotracheal tube using a soft-tipped guide wire for exchanging the Frova Intubating Introducer.

### **Elective - 18 months old male**

#### **Bronchoscopy, foreign body removal**

**Marmara Univ. Sch. of Medicine, Istanbul, Turkey**

An 18 months old male had undergone an incomplete foreign body removal: a nut was cracked and removed, but small particles had remained in the bronchi. Therefore, three weeks later an additional bronchoscopy was needed to remove the residual pieces. After laryngoscopy a bronchoscope was placed and Ventrain was attached. Ventilation with Ventrain was chosen during an important part of the procedure, because of the low pressures and gas speed that Ventrain applies compared to conventional jet ventilation. This was expected to reduce the risk of forcing the foreign bodies further down the airways. No unexpected desaturation or decrease in SpO<sub>2</sub> related to potential insufficient ventilation by Ventrain was experienced.

### **Emergency - neonate**

#### **1.6 mm Frova Intubating Introducer (2)**

**University Clinic Mainz, Germany**

Neonate, very difficult intubation. After several intubation attempts had failed, Ventrain was connected to the Cook Airway Exchange Catheter (1,6 mm ID, length 45 cm) that was already in place. With a flow of 4 l/min oxygen, adequate ventilation was maintained with Ventrain. This provided ample time for a proper intubation after which Ventrain was disconnected again.

### **Emergency - adult ENT patient**

#### **3 mm jet ventilation catheter**

**Maastricht University Medical Centre, Netherlands**

A 53 year old female patient diagnosed with larynx carcinoma and paresis of the left vocal cord entered with breathing problems. For laryngo-tracheoscopy including biopsy jet ventilation was initiated via a 40 cm, 3 mm ID nasotracheally placed jet ventilation catheter with a Monsoon jet ventilator (Acutronic Medical Systems AG). Because of extended manipulations and multiple biopsies outflow via the upper airway was more and more compromised during the intervention. Consequently the jet ventilator repeatedly reached the maximum pause pressure set to 25 mbar, resulting in increasingly longer periods of paused ventilation. Despite sufficient oxygen saturation an undesirable raise in etCO<sub>2</sub> up to 8.5 kPa had to be noted. In this situation the jet ventilator was disconnected and Ventrain was attached to the jet ventilation catheter. Ventilation of the patient with Ventrain at a flow of 15 l/min oxygen immediately resulted in an increased oxygen saturation of 100 % and within some minutes etCO<sub>2</sub> could be brought down to 5.5 kPa. Spontaneous breathing of the awaking patient still suffering from an edematous larynx and hypopharynx was then assisted by synchronized ventilation with Ventrain for a while. Finally, with the jet ventilation catheter still kept in place for safety reasons, the stridorous patient sitting upright in her bed could be transferred to the recovery room with no need to undergo tracheostomy that day.