

HOME VENTILATION

VENTImotion® relieves respiratory pump muscles

VENTImotion®, a new modern bi-level ST device, was introduced by Weinmann GmbH at the DGP (German Pneumology Society) congress. VENTImotion® is quiet and easy to operate and has good trigger sensitivity which can be adjusted for each patient. The device's performance reserves are very good.

According to a report made by Dr. Bernd Schucher of the Center for Pneumology and Thoracic Surgery, Großhansdorf, at the symposium, "Home Ventilation – State-of-the-Art", VENTImotion® can achieve an inspiratory pressure of up to 35 hPa, easily reaching an effective ventilation pressure of 20 hPa, which is required to treat COPD patients. The maximum effective ventilation pressure of VENTImotion® is 31 hPa.

In his introductory lecture, Dr. Dieter Köhler of Kloster Grafschaft Hospital in Schmallenberg, emphasized the device's significance for respiratory effort and the importance of easing the burden on respiratory muscles. The respiratory muscles of COPD patients expend a lot of energy as the patients strain to breathe. To compensate, the body first reduces its activity and later hypoventilates. The PaCO₂ increases and polyglobuly results as compensation for secondary hypoxemia. The compensatory mechanisms are so effective that many patients have hypoxemia but no tissue or organ hypoxia.

Asthmatics succumb to an asthma attack because the respiratory muscles use up their energy reserves, causing the respiratory pump muscles to fail. In cases of chronic strain, the diaphragm's glycogen storage which has been emptied during the day partially refills at night. Home ventilation, said Dr. Köhler, is more effective at refilling glycogen stores.

Some presume that everything is all right when a patient with hypercapnia is given assisted ventilation and his arterial CO₂ decreases somewhat. However, only controlled ventilation relieves the diaphragm competely and allows quick replenishment of empty glycogen stores. This recompensation is visible in normocapnia outside the scope of ventilation.

Indications for home ventilation

A cross-over study with 18 COPD patients under non-invasive ventilation (NIV) observed significantly better PaO₂ and PaCO₂ values, increased sleep efficiency and improved quality of life, reported Dr. Thomas Köhnlein of the Hannover medical university in Berlin.¹ He applies NIV when the PaCO₂ is above 51.8 mmHg and the patient can tolerate an inspiratory ventilation pressure of 18 mmHg and more than six hours of ventilation per day. Pink puffers are less frequently ventilated than blue bloaters because they slip through inclusion criteria. Pink puffers often require even longer periods of ventilation and are especially grateful for ventilation, added Dr. Schucher.

NIV is indicated in cases of neuromuscular diseases when the patient is tired; suffers from dyspnea at rest and morning headaches; has mild hypercapnia (PaCO₂ > 45 mmHg) or a nocturnal five-minute-long decrease in oxygen saturation to below 88% or an evident disorder of the respiratory pump muscles.

Several studies have shown that quality of life improves and survival time is prolonged^{2,3,4} in cases of ALS (Amyotrophic Lateral Sclerosis) and Duchenne muscular dystrophy.

Technical aspects of home ventilation

The level of effective ventilation pressure is critical for a reduction in respiratory effort, explained Dr. Schucher in his lecture on the technical aspects of home ventilation. The pressure should be above 20 hPa for COPD, scoliosis and Tbc. A patient with neuromuscular disease does not require such high pressure because he has a healthy thorax and intact lung parenchyma. For such patients, pressure-controlled ventilation is more comfortable than volume-controlled ventilation. Pressure-controlled ventilation is used for longer periods per day and improves sleep quality according to subjective and objective measures. Volume-controlled ventilation is indicated only for neuromuscular diseases accompanied by cough-induced weakness.

Should preference be given to an open or closed exhalation system? Open systems require a PEEP to prevent rebreathing of CO₂ and, starting at an EPAP of 4 hPa, no clinically relevant amount of CO₂ is rebreathed. Open systems are quiet and less susceptible to disruption because they require no external control hose. Closed systems are louder, but offer better CO₂ elimination.

Using VENTImotion[®] as an example, Dr. Schucher explained the importance of the trigger setting. For each trigger the patient has to exert a certain amount of effort before the device recognizes that the patient wants to inhale. For this reason, the VENTImotion[®] trigger is sensitive, but not overly sensitive. Dr. Schucher reported that he had also tested different pressure increase speeds on the new patient-friendly device. According to Dr. Schucher, all patients previously wanted faster increases; with a powerful device like VENTImotion[®], however, preferences vary. ALS patients, who have problems with pharyngeal and laryngeal closures, do not want such a fast increase. COPD patients on the other hand tolerate rapid increases very well.

The great interest in this symposium shows how correct the subject of non-invasive ventilation is, Dr. Schucher said in his closing remarks. NIV is one of the seminal areas in pneumology since more and more patients require home ventilation.

1. Meecham-Jones: AJRCCM 1995; 152: 538 – 54
2. Kleopa a et al: J Neurol Sci 1999; 164: 82 – 88
3. Raphael JC: Lancet 1994; 343: 1600 – 1604
4. Pinto AC et al; J Neurol Sci 1995; 129: 19 – 26
5. Higgins: Thorax 2002; 57: iii49

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