Introduction
With increasing frequency outpatients are being treated with mechanical ventilation via a tracheostomy tube. In this setting of home ventilation, life-threatening tracheostomy tube obstruction has been repeatedly described [1,2]. Suctioning by either patient or care-giver is presumed to reduce the frequency of this complication as is humidification of the inspired air. In this type of patient the airway may also become obstructed at a lower level, as is illustrated by the following case report.

Case report
A 63-year-old male, who had been on home ventilation for 15 years, was referred to our tertiary referral centre because of increasing dyspnoea and peripheral oedema. His chronic respiratory failure had developed 40 years ago after removal of an ependymoma, complicated by cervical atrophy and tetraplegia. At the referring district general hospital a rise in ventilatory peak pressure had been noted. There was no history of recurrent aspiration. A bronchoscopy was performed which revealed a mass under the level of the tracheostomy tube.

Physical examination on admission revealed wheezing, normal heart sounds without murmurs, a blood pressure of 160/90 mm Hg and a pulse rate of 102 beats per minute. Examination of the skin around the tracheostomy opening showed no abnormalities. Bowel sounds were normal, but the abdomen was slightly tense on palpation.

There was significant oedema of the upper and lower limbs. The pulse oximeter showed oxygen saturation values of between 93 and 95%.

Diagnostic imaging of the chest showed bilateral pleural effusion, pulmonary consolidation and a normally positioned tracheostomy tube (Fig.1). The ECG showed normal sinus rhythm. After adjustment of the ventilator settings normal blood gas values were obtained. An ultrasound study of the heart revealed no abnormalities. After one month of admission to hospital he was discharged home.

Discussion
An increasing number of patients require prolonged mechanical ventilation via a tracheostomy tube [1]. The prevalence of serious upper airway obstruction (>50%) in hospital patients with weaning difficulties has been reported as 10% [3]. It is sometimes heralded by a rise in peak pressure but may go unrecognized for a long time. The clinical picture of airway obstruction may vary from minor discomfort to sudden death [1]. All cases from the literature refer to obstruction of the tracheostomy tube or just beneath the tracheostomy tube. Most cases describe luminal tube obstruction due to inspissated sputum or thick mucus [1]. Another frequent cause of tracheal occlusion is granulation tissue which often forms around the stoma, suprastomally within the trachea and at the end of the tracheostomy tube [2,4].

The presentation in our patient was unusual in two ways: no granulation tissue was found and the obstruction was found not at the level of the tracheostomy tube, but more distally in the trachea.

Abstract. We describe a 63-year-old male on home ventilation who presented with signs of airway obstruction. The airway turned out to be obstructed by a large mass of necrotic material, not in the tracheostomy tube but in the trachea and right main bronchus. Possible causes and potential remedies are discussed.
and in the right main bronchus. The obstruction was diagnosed to have been caused by inspissated sputum and necrotic material. In patients on mechanical ventilation the nose and upper airway are bypassed, interfering with normal heat and moisture exchanging processes. Dry air may cause damage to the tracheobronchial system and inspissation of sputum. In combination with decreased expiratory force this may lead to sputum plugs in the airway. Regular suctioning should prevent accumulation of dry sputum, but it may also damage the epithelium which theoretically could be the cause of further obstruction by forming granulation tissue. Humidification of inspired air is standard practice in mechanical ventilation of patients with acute respiratory failure, either with active humidification or with a heat and moisture exchanger.

No guidelines exist as to the applicability of this approach in patients with a tracheostomy on chronic mechanical ventilation. Our patient had no humidification of inspired air and appeared to perform self-suctioning only rarely.

In patients on chronic home ventilation, studies of the incidence of airway obstruction and the usefulness of humidification of inspired air are lacking. Definitive recommendations on airway management of patients on chronic home ventilation have to await further research.

References