Summary

Over the past decades, non-invasive ventilation (NIV) has gained increasing acceptance as a treatment modality for respiratory failure. Its application on those who have decided to forego intubation and those who are approaching their end of lives has aroused controversies. We shared our experience on a case of NIV withdrawal after its failure from a gentleman with end-stage respiratory disease suffering also from a recurrent solid cancer. Investigators have tried to identify parameters that might aid in the prediction of NIV success and failure. Some have advocated a more systematic approach to the use of NIV in acute respiratory failure, including those who opted not for intubation, and those who used NIV as a means of palliation. NIV may be ethically and morally withdrawn if it is not providing net benefits of care.

Case History

Mr Chow was a 72 year-old gentleman with a past history of pulmonary tuberculosis treated a few decades ago. He suffered from an episode of pneumothorax in 1996 for which he was managed with talc pleurodesis. He was diagnosed with chronic obstructive pulmonary disease (COPD) with a history of intubation in 2004 for type II respiratory failure. His exercise tolerance was up to 1-2 flights of stairs in 2005 but had decreased to only 5 minutes of walk on level ground in 2008. He did not show up for the lung function test, and he declined the offer to arrange home oxygen.

Mr Chow was father of 3 children, living with his wife and the youngest daughter who was in her 30s. He quitted after having smoked for many years. Despite the slow pace because of limited lung function, Mr Chow remained independent for his daily activities, and was mentally shrewd enough to manage his financial accounts.

In 2000 he was diagnosed with Grade I transitional cell carcinoma of the urinary bladder and had undergone a transurethral resection of the tumour. Unfortunately he developed a local recurrence in 2005 but in preparation for the operation, both medical and anaesthesia colleagues determined that Mr Chow’s was a high risk case for radical operation because of the underlying poor pulmonary reserve. Instead of surgery, he received a course of whole pelvis radiotherapy, giving rise to subsequent complications of radiation proctitis and bulbous urethral stricture.

Since 2005, Mr Chow had made multiple visits to the emergency department which resulted in multiple hospital admissions because of either COPD exacerbations or urological complications and problems.

In early June 2008, Mr Chow was admitted again for COPD infective exacerbation, requiring up to 6L of oxygen support at the time of admission. Treatment with antibiotics, bronchodilators, steroids and chest physiotherapy was given. Despite his initial apparent response, Mr Chow gradually went into a worsening type II respiratory failure with the arterial blood gas measured pH 7.26, pCO2 12.5 kPa, pO2 7.5 kPa and a base excess of 11 taken a week after his admission. He was in respiratory distress and oxygen saturation was suboptimal even with maximal oxygen flow. His chest radiograph showed a whitened-out left lung and his fever respiked. Antibiotics regime was escalated to piperacillin/tazobactem, and BiPAP was started.

Request to support of Mr Chow in the intensive care unit was rejected because of his underlying poor premorbid condition. A do-not-intubate decision was agreed by his children and a DNR order was signed. In the next few days, all attempts to tail down the
BiPAP setting had failed, and his type II respiratory failure worsened. Ten days after the use of BiPAP, his arterial blood gas measured pH 7.27, pCO2 16.5, pO2 7.1. His progress had been reviewed by Respiratory team colleagues, who suggested that there was not much room for further optimizing the BiPAP setting and medication use.

Since the start of BiPAP, Mr Chow was physically restrained because of his excessive struggling against the machine. Five days into the use of BiPAP, a nasogastric tube was inserted for feeding purpose and it was further complicated by episodes of coffee ground aspirates. While Mr Chow was still alert and able to make simple gestures, he made a clear indication that he would like the BiPAP discontinued.

The issue of withdrawing BiPAP was raised. A series of interviews was arranged with his relatives discussing the clinical situation. The family showed understanding and agreed that the machine was adding discomfort to Mr Chow. They expressed no objection to respect patient’s wish yet they showed hesitance when it came to the actual process of withdrawing thinking that the action would lead to the immediate death of Mr Chow. Their concern was addressed with explanations on the anticipated course after discontinuing the BiPAP, reassuring them the action would not be the direct cause of the ultimate death. After a period of consideration, it was agreed that the BiPAP would be switched off in the presence of his closest relatives after the last ones had arrived from Mainland. Mr Chow finally passed away twelve hours after BiPAP was withdrawn.

The Role of Non-invasive Ventilation in Palliative Care

Non-invasive ventilation (NIV) has been shown to improve mortality and shorten hospital stay. The use of NIV provides time to assess and correct reversible factors in a clinical condition, hence potentially reduces the rate of endotracheal intubation. Respiratory distress is one of the most commonly reported symptoms in terminal patients and the physical sufferings associated with it can be substantial. Different pharmacological and non-pharmacological means of alleviating dyspnea in this group of patients have been actively studied. The application of NIV in those who opted not for intubation, however, has raised controversies. Reported success rates of NIV use in patients opted not for intubation varied across a wide distribution in different studies. One may argue that NIV will prolong the dying process or escalate the patient’s sufferings, and it may induce false expectations on the aim of care. Where medical resources are limited, the appropriateness of allocating utilities and manpower for the use of NIV in palliative care is also a legitimate concern. On the other hand, others may argue also that NIV can palliate symptoms, and provide time for terminal patients to complete their last wishes.

Whether to start NIV for patients under palliative care is partly subject to clinicians’ discretion, and it is expected to vary among different centres depending on the staff and equipment availabilities. Sinuff et al.1 did a survey study on clinicians at 18 Canadian and 2 US hospitals, analyzing factors associated with stated use of NIV for do-not-resuscitate and comfort-measures-only patients. They found that >80% clinicians used NIV for do-not-resuscitate patients with chronic obstructive pulmonary disease and cardiogenic pulmonary oedema, while fewer reported using NIV for patients with underlying malignancies (59% physicians and 69% respiratory therapists), or patients who choose comfort measures only (40% physicians and 51% respiratory therapists).

In response to the controversial issue of using NIV in patients who decided to forego endotracheal intubation, the Society of Critical Care Medicine formed a task force and developed a framework for considering the use of NIV in these patients2. They proposed an approach to the application of NIV, categorizing the clinical conditions with evaluations on 1) the goals of care; 2) the main goals to communicate with patient and family; 3) the determinants of success and failure; 4) the likely location of using NIV; and 5) the alternatives if NIV fails.

Based on the above, the task force reviewed the clinical evidence and proposed a 3-category approach regarding the use of NIV for acute respiratory failure. The first belongs to those without preset limits of life-sustaining treatments. If NIV fails, one would be expected to proceed to endotracheal intubation and mechanical ventilation. The second category applies to patients who decline endotracheal

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intubation and invasive ventilation. In this category, NIV is considered successful if it improves symptoms while the underlying cause of respiratory failure is treated. If it fails to do so, NIV is discontinued in favor of other comfort measures to alleviate symptoms. In the last category, NIV is regarded as a form of palliation to relieve dyspnea and maintain cognition. It is successful only if NIV improves symptoms without causing additional burden or discomfort to the patients. In particular, they stated that this category of NIV application could potentially be supported in hospice provided that the staffs had been appropriately trained. The authors stressed the importance of communication with patients and families on the goals of care under each category, and to take into consideration the patients’ own preferences. Further evaluations of the outcomes, and the perspectives of patients and relatives in each of these categories of NIV application would be an informative objective to pursue in future studies.

Predictors of NIV Success and Failures

One of the most frequently encountered uncertainties by physicians is whether the start of NIV would yield a net clinical benefit, and if so, how we should communicate with the relatives regarding the likelihood of success and failure. The latter is important because should the patient fails NIV, subsequent actions will have to be planned in advance. Several studies have investigated or reviewed the possible predictors of NIV success and failure.

Levy et al.³ tried to determine whether diagnosis and bedside observations could predict the outcomes of patients who had decided not for intubation. In this prospective cohort trial, they recruited 114 patients with do-not-intubate order who were begun on NIV. They found that those with diagnosis of congestive heart failure had significantly higher survival rates than those with chronic obstructive pulmonary disease, cancer, pneumonia, or other diagnoses. Those with better cough effort and who remained awake also had a more favourable odds for survival.

Cuomo et al.⁴ reported a prospective study of NIV use in 23 patients with solid malignancies receiving palliative care, 13 of these 23 patients were successfully ventilated and discharged alive. Of these 23 patients, only 4 were treated in palliative care units, while the rest were taken care of under respiratory intensive care units or the intensive care units. In this study, causes of failure of NIV included intolerance to NIV, a progressive worsening of arterial blood gas, irreversible vomiting, sudden death, and the need for palliative sedation. Two of the ten who failed accepted intubation. In the end, all but one died within a short time. The authors reported that the types of tumours, the causes and types of acute respiratory failure were not significantly different between the success group and the failure group.

Nava and Ceriana⁵ reviewed the parameters studied in the prediction of NIV failure: the arterial blood gas, the severity of disease, patient’s cooperation, mixed indexes, training and equipment, and the environment⁶⁻¹⁰. While pH changes 1 hour after start of NIV was shown to be a strong predictor in hypercapnic patients, it was not significant in the group of hypoxic patients. Integrity of patients’ sensorium and severity of disease were also predictors of NIV success though they were less reliable as compared to blood gas. With hypoxic failure, besides disease severity, patients’ age, degree of oxygenation, and the presence of community-acquired pneumonia or ARDS all contributed to poor prognosis on NIV failure. These studies, however, were conducted in the acute settings where most of the patients were not under palliative care.

Ethical Aspects of NIV in Palliative Patients

Few people will doubt the value of NIV in the management of exacerbations in chronic lung diseases. The application of NIV in end-stage non-COPD diseases, however, is still short of the substantiation from randomized controlled trials. The decision to start NIV in a palliative patient should be individually contemplated, and so should the action to take when NIV fails. It is important that patients understand that there exist alternatives to NIV, and the goal of care with the start of NIV should be discussed.

The American College of Chest Physicians published a position statement in 2005¹¹ supporting palliative and end-of-life care for patients with cardiopulmonary diseases. They recognized the transition to palliative care as patients enter the terminal phase of their illnesses. With this, they stated that ‘as part of this process, it may be necessary to withhold or withdraw treatment measures that can no longer
achieve the patient’s goals for care’. While the decision on withdrawal should be individualized, the principle behind the action should follow ethical guidelines.

Continuing NIV in a failing clinical condition poses a burden on the patients and stress on the relatives. While being kept behind the machine, patients are unable to communicate with their families, and it is not uncommon to find them feeling depressed and isolated with the fear of dying and being abandoned. The process of NIV removal follows the same principle as withholding or withdrawing life-sustaining treatment in that treatment which does not provide net benefit may be ethically and morally withheld or withdrawn. There are no specific guidelines on when to withdraw ventilation, but it is important to gain the understandings of the relatives, while taking into account patients’ wish and perception on quality of life. It is good practice to provide information to the patients and families regarding the potential outcomes of withdrawing NIV, and the process of withdrawal should be explained.

Conclusions

Respiratory failure is among the most common symptoms seen in palliative patients, either those suffering from end-stage cardiopulmonary diseases or other terminal illnesses, both cancer and non-cancer. While we have an armoury of pharmacological and non-pharmacological options for the treatment of dyspnea, studies have been going on to investigate the value of adding non-invasive ventilation in the treatment protocol. Evidence has shown that NIV for palliative patients is acceptable among clinicians but the reported success rate varied in different studies. Investigators have been trying to identify the various parameters that may help predict the likelihood of success in an NIV application. As for all treatments, the goal of care should be communicated with the patients and family and patient’s own preference should be sought. With proper use, NIV can add valuable time to palliative patients, but when this goal of care cannot be met without compromising patient’s quality of life, withdrawal of NIV is ethically justified with subsequent enhancement of other means of comfort measures for symptoms control.

References