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Original Article

Clinical characteristics and survival outcomes of terminally ill patients undergoing withdrawal of mechanical ventilation

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KEYWORDS

Artificial ventilation;
End-of-life care;
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Withdrawal

Background: Withdrawal of mechanical ventilation is an important, but rarely explored issue in Asia during end-of-life care. This study aimed to describe the clinical characteristics and survival outcomes of terminally ill patients undergoing withdrawal of mechanical ventilation in Taiwan. **Methods:** One-hundred-thirty-five terminally ill patients who had mechanical ventilation withdrawn between 2013 and 2016, from a medical center in Taiwan, were enrolled. Patients' clinical characteristics and survival outcomes after withdrawal of mechanical ventilation were analyzed. **Results:** The three most common diagnoses were organic brain lesion, advanced cancer, and newborn sequelae. The initiator of the withdrawal process was family, medical personnel, and patient him/herself. The median survival time was 45 min (95% confidence interval, 33–57 min) after the withdrawal of mechanical ventilation, and 102 patients (75.6%) died within one day after extubation. The median time from diagnosis of disease to receiving life-sustaining treatment and artificial ventilation support, receiving life-sustaining treatment and artificial ventilation support to "Withdrawal meeting," "Withdrawal meeting" to ventilator withdrawn, and ventilator withdrawn to death was 12.1 months, 19 days, 1 day, and 0 days, respectively. Patients with a diagnosis of advanced cancer and withdrawal initiation by the patients themselves had a significantly shorter time interval between receiving life-sustaining treatment and artificial ventilation support to "Withdrawal meeting" compared to those with non-cancer diseases and withdrawal initiation by family or medical personnel.

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Conclusion: This study is the first observational study to describe the patients' characteristics and elaborate on the survival outcome of withdrawal of mechanical ventilation in patients who are terminally ill in an Asian population. Understanding the clinical characteristics and survival outcomes of mechanical ventilation withdrawal might help medical personnel provide appropriate end-of-life care and help patients/families decide about the withdrawal process earlier.

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Introduction

Cardiopulmonary resuscitation (CPR), including endotracheal intubation and ventilatory support, was introduced as a resuscitation method in acute cardiac events and became a standard procedure performed for all life-threatening illnesses.¹ However, CPR was considered to be a futile therapy because of its invasive interventions and limited benefit in patients who were terminally ill, during end-of-life care.^{2,3} One early study including 171 inpatients with cancer reported that none of the patients who experienced anticipated cardiac arrest survived after CPR.⁴ Furthermore, in a meta-analysis study involving 1707 inpatients with cancer who had undergone CPR, the survival rate at discharge was only 5.6%.⁵ As a result, CPR was seldom provided to patients with a definitive terminal illness, mostly with advanced cancer, after the promotion of do-not-resuscitate orders (DNR) by palliative care providers in Taiwan since 2000.

Unfortunately, some terminally-ill patients were put on mechanical ventilation because of acute critical illnesses without cardiac arrests. Unfortunately, some even had CPR because of emergent events, unpredictable acute events or personal wills toward end-of-life care. A small subset of patients who were terminally ill might regain hemodynamic stability after initial resuscitation; these surviving patients might subsequently experience the dilemma of difficult extubation and being intubated with a ventilator support till death.^{5,6} Fewer than half of the patients with prolonged ventilatory dependence, who were treated with mechanical ventilation for more than 14 days after critical illness, survived beyond one year.⁷ The definition of withdrawal of mechanical ventilation is elective withdrawal of life-sustaining therapy and artificial ventilation support in patients who are terminally ill. The aim of withdrawal of mechanical ventilation is to relieve patients' suffering and provide comfortable end-of-life care; therefore, it is an important step toward high quality end-of-life care in patients who are terminally ill on artificial ventilatory support. However, this issue has rarely been explored in the Asian population because of the lack of consensus regarding the withdrawal of mechanical ventilation between medical personnel and patients/families, resistance from the families, as that might represent an assisted dying process in Asian culture, and lack of legal protection from the country. Recently, one self-administered structured survey, conducted among 1465 physicians across 16 Asian countries, evaluated physicians' attitudes toward withdrawal of life-sustaining treatment in end-of-life care. Even for

patients with no possibility of recovering a meaningful life, only 20% of the respondents reported often withdrawing life-sustaining treatments.⁸

Palliative care has been promoted in Taiwan for more than two decades to improve the quality of end-of-life care among patients who are terminally ill. The Nature Death Act was legislated in Taiwan to promote DNR in patients who were terminally ill in 2000, but the issues concerning the withdrawal of mechanical ventilation were still widely debated until 2013, when the enactment of the Nature Death Act Amendment allowed the withdrawal of life-sustaining therapy and artificial ventilation in patients who are terminally ill. To the best of our knowledge, Taiwan is the first Asian country that legislated forgoing life-sustaining therapies and withdrawal of mechanical ventilation in patients at end-of-life. Although the withdrawal of life-sustaining therapy and mechanical ventilation is a routine clinical practice when in agreement with patients, families, and clinicians' decisions, data on patients' clinical characteristics and survival outcome of patients undergoing withdrawal of mechanical ventilation in Taiwan are scarce. This study aimed to describe the clinical characteristics of terminally-ill patients on mechanical ventilation and their survival after withdrawal. We would analyze the clinical factors relevant to mechanical ventilation withdrawal among these patients from a signal medical center in Taiwan.

Methods

Patient selection

A total of 135 terminally-ill patients withdrew from life-sustaining therapy and mechanical ventilation from January 2013 to December 2016 were enrolled from Chang Gung Memorial Hospital in Linkou. Terminal illness was defined as having end-of-life status and had no chance of recovering a meaningful life based on at least two specialist physicians' judgments.⁸ Patients and/or families who refused to forgo life-sustaining therapies or withdrawal of mechanical ventilation were excluded. The study protocol was approved by the Institutional Review Board of the hospital.

Withdrawal of mechanical ventilation process

Withdrawal of life-sustaining therapy and mechanical ventilation could be initiated by patients (based on verbal consent or a written document of Advance Care Planning [ACP]), their families, or primary care physician in the case

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