

End-of-Life Decisions of Intracranial Hemorrhage Patients Successfully Weaned From Prolonged Mechanical Ventilation

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Abstract

Factors related to the end-of-life decisions of patients with intracranial hemorrhage who were successfully weaned from prolonged mechanical ventilation remain unclear. This study aimed to evaluate factors that influence the end-of-life decisions of these patients. **Methods:** This retrospective study examined patients with intracranial hemorrhage successfully weaned from prolonged mechanical ventilation between January 2012 and December 2017. The following data was collected and analyzed: age, gender, comorbidities, Glasgow Coma Scale scores, receipt or non-receipt of intracranial hemorrhage surgery, discharge status, and end-of-life decisions. **Results:** In total, 91 patients with intracranial hemorrhage were successfully weaned from prolonged mechanical ventilation. The families of 62 (68.1%) patients signed the do-not-resuscitate order. A Glasgow Coma Scale score of ≥ 10 at discharge from the respiratory care center and zero comorbidities were the influencing factors between patients whose do-not-resuscitate orders were signed and those whose orders were not signed. Patients with intracranial hemorrhage successfully weaned from prolonged mechanical ventilation had chronic kidney disease comorbidity and Glasgow Coma Scale score of < 7 on admission to respiratory care center with a general ward mortality rate of 83.3%. **Conclusions:** The families of intracranial hemorrhage patients with multiple comorbidities and higher neurologic impairment after successful weaning from the ventilator believed that palliative therapy would provide a greater benefit. Patients with intracranial hemorrhage successfully weaned from prolonged mechanical ventilation with chronic kidney disease comorbidity and Glasgow Coma Scale score of < 7 on admission to respiratory care center are candidates for the consideration of hospice care with ventilator withdrawal.

Keywords

prolonged mechanical ventilation, intracranial hemorrhage, respiratory care center, successfully weaned from ventilator, do-not-resuscitate, hospice care, ventilator withdrawal

Background

Palliative care has been recognized as an essential component of comprehensive care for both acute and chronic critically ill patients, including those receiving restorative or life-sustaining therapies.¹⁻³ Patients receiving prolonged mechanical ventilation (PMV) typically experience long-term morbidity and a poor quality of life.⁴⁻⁶ According to Cox et al,⁷ it was found that during the initiation of ventilation, 93% of patients and caregivers often expect that the patient would be alive for 1 year, 71% aspire for their patient to have a good functional status, and 83% expect a good quality of life. However, in Cox's study, only 56% of patients survived after a year, of whom only 9% had a good functional status and 33% had a good quality of life.⁷ Patients on PMV often have a high burden of comorbidities and are candidates for the consideration of palliative care.⁸ Barchfeld et al reported that 66% of patients on PMV received palliative care⁹ because palliative care has been recommended in the overall care of patients who need long-term mechanical ventilation.¹⁰⁻¹²

The “Trial Plan for National Public Health Insurance Ventilator Dependent Patients Comprehensive Care System” was initiated in Taiwan in July 2000 to resolve the intensive care unit (ICU) bed shortage; it is considered as a step-down care procedure for patients on PMV. This program covers mechanical ventilator care in the following settings: ICU (an acute stage for critical care), respiratory care center (RCC) (a subacute stage for patients receiving ventilator support for > 21 days), respiratory care ward (RCW) (a chronic phase or long-term care), and home care service (a stable

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period during which the patient is cared for directly by family caregivers or by nursing home nurses).¹³ We retrospectively evaluated 574 RCC patients and reported (in 2019) the comprehensive clinical experience of those on PMV, including 109 patients in whom intracranial hemorrhage (ICH) necessitated PMV.¹⁴ Of these 109 patients with ICH on PMV, 12 (11.0%) died in RCC, 6 (5.5%) were unsuccessfully weaned and needed long-term ventilator dependence, 25 (22.9%) died in the general ward before hospital discharge after successfully weaning from PMV, and 66 (60.0%) were discharged after successfully weaning from PMV. This study aimed to evaluate the factors that influence the end-of-life decisions of patients with ICH who were successfully weaned from PMV and of patients died in the general ward before hospital discharge. We try to explore who are candidates for the consideration of hospice care with ventilator withdrawal in RCC. We believe this study would be of importance to the families of such patients as the study findings may assist them in clinical decision-making.

Methods

Design and Setting

Hospital Details. Dalin Tzu Chi Hospital is a tertiary-level teaching hospital with 600 acute care beds and an ICU containing 59 beds. A 10-bed ventilator weaning unit (RCC) is available for patients on PMV.

Patient Details. We conducted a retrospective study of a single institution's experience and enrolled all ICH patients who were successfully weaned from PMV and consecutively admitted to the RCC of Dalin Tzu Chi Hospital between 1 January 2012 and 31 December 2017.¹⁵ Glasgow Coma Scale (GCS) at ICU admission, RCC admission and RCC discharge, each patient's clinical condition was evaluated using the GCS.

A patient receiving PMV was defined as one who used a mechanical ventilator for at least 6 hours daily for at least 21 consecutive days.¹⁶ Successful weaning was defined as independence from the mechanical ventilator for 5 consecutive days and nights; thereafter, successfully weaned PMV patients were transferred to the general ward for further care. We classified the successfully weaned PMV patients into two groups: (1) patients who were weaned from PMV but died in the general ward before hospital discharge (general ward mortality patients after weaning from PMV) and (2) patients who were discharged from the hospital after weaning from PMV (patients discharged after weaning from PMV).

Comorbidities. The number of comorbidities was assessed. These included cardiovascular disease (such as essential hypertension, decompensated heart failure, coronary atherosclerotic disease, and acute myocardial infarction),

chronic lung disease (such as COPD, asthma, bronchiectasis, and interstitial lung disease), chronic kidney disease (CKD) (CKD stage 3, stage 4, and stage 5), neurologic disease (such as bed-ridden stroke survivors, or those with dementia or parkinsonism), chronic liver disease (such as chronic hepatitis and liver cirrhosis), metabolic disease (such as diabetes mellitus or other endocrine disorders requiring treatment), malignant diseases, and miscellaneous diseases.

End-of-Life Decisions

For every patient who was successfully weaned from the ventilator in RCC, the patient's primary medical team discussed the following two issues with the patient's family before endotracheal extubation: (1) If the patient experienced cardiac arrest, the patient's family decided whether the patient needed cardiopulmonary cerebral resuscitation (CPCR). In case the patient's family did not want the patient to undergo CPCR, the family signed the do-not-resuscitate (DNR) order for the patient. (2) If the patient experienced respiratory distress, shock, or apnea again after endotracheal extubation, the patient's family decided whether the patient needed endotracheal intubation with an invasive ventilator. In case the patient's family did not want the patient to undergo endotracheal intubation again, the family signed the DNR and do-not-intubate (DNI) orders for the patient.

Data Collection

We collected data from the hospital's clinical information systems as well as medical charts on all patients with ICH on PMV who were successfully weaned from the ventilator. These data included their age, gender, comorbidities, GCS score on admission to ICU, GCS score on admission to RCC, GCS score at discharge from RCC, receipt or non-receipt of ICH surgery, duration of RCC stay, discharge status, and end-of-life decisions.

Statistical Analyses

Continuous variables were expressed as means \pm standard deviations or medians (ranges), whereas categorical variables were expressed as frequencies and percentages. Differences in baseline characteristics, number and type of comorbidities, GCS score on admission to ICU, GCS score on admission to RCC, GCS score at discharge from RCC, and end-of-life decisions were evaluated using Student's *t*-test for continuous variables. Meanwhile, Pearson's chi-squared tests and Fisher's exact test were used for categorical variables. Univariate analysis was used to analyze differences in variables for both patients whose DNR orders were signed and those whose DNR orders were not signed. Multivariate stepwise logistic regression models were used

Table 1. Comparison of Clinical Variables of Demographic Data and Comorbidities Between Patients With ICH Who Were Successfully Weaned From Prolonged Mechanical Ventilation Whose DNR Orders Were Signed and Those Whose DNR Orders Were Not Signed.

| | DNR patients (No = 62) | No DNR patients (No = 29) | P value |
|--|------------------------|---------------------------|--------------------|
| Age groups (years), No (%) | | | |
| <45, No (%) | 2 (3.23%) | 3 (10.34%) | .188 |
| 45-54, No (%) | 9 (14.52%) | 4 (13.79%) | .972 |
| 55-64, No (%) | 11 (17.74%) | 9 (31.04%) | .158 |
| 65-74, No (%) | 16 (25.81%) | 6 (20.69%) | .596 |
| 75-84, No (%) | 19 (30.64%) | 5 (17.24%) | .182 |
| ≥85, No (%) | 5 (8.06%) | 2 (6.90%) | .864 |
| Type of comorbidities, No (%) | | | |
| Cardiovascular disease, No (%) | 48 (77.41%) | 17 (58.62%) | .068 |
| Chronic lung disease, No (%) | 1 (1.61%) | 1 (3.44%) | .587 |
| Chronic kidney disease, No (%) | 17 (27.40%) | 3 (10.34%) | .078 |
| Neurologic disease, No (%) | 24 (38.70%) | 5 (17.24%) | .046 |
| Metabolic disease, No (%) | 23 (37.09%) | 11 (37.93%) | .939 |
| Malignant diseases, No (%) | 2 (3.22%) | 1 (3.44%) | .956 |
| Number of comorbidities, No (%) | | | |
| Zero comorbidities, No (%) | 4 (6.45%) | 11 (37.93%) | .001 |
| One comorbidity, No (%) | 20 (32.26%) | 5 (17.24%) | .141 |
| Two comorbidities, No (%) | 22 (35.48%) | 8 (27.59%) | .456 |
| ≥3 comorbidities, No (%) | 16 (25.81%) | 5 (17.24%) | .369 |
| GCS score | | | |
| GCS on admission to ICU (mean) | 6.90 | 6.31 | .494 ^a |
| GCS on admission to RCC (mean) | 6.69 | 7.51 | .042 ^a |
| GCS on admission to RCC < 7, No (%) | 35 (56.45%) | 12 (41.37%) | .182 |
| GCS at discharge from RCC (mean) | 7.18 | 9.44 | <.001 ^a |
| GCS at discharge from RCC ≥ 10, No (%) | 7 (11.29%) | 15 (51.72%) | <.001 |
| Others, No (%) | | | |
| Duration of RCC stay (mean days) | 17.7 | 17.3 | .847 |
| ICH surgical intervention, No (%) | 40 (64.51%) | 25 (86.20%) | .040 |

^aGCS score on admission to ICU, GCS score on admission to RCC, and GCS score at discharge from RCC were evaluated using the Student's t-test. Footnotes: ICH, intracranial hemorrhage; DNR, signed do-not-resuscitate; No, number; GCS, Glasgow Coma Scale; ICU, intensive care unit; RCC, respiratory care center.

Table 2. Difference in Clinical Characteristics and Outcome Variables Between Patients With ICH Who Were Successfully Weaned From Prolonged Mechanical Ventilation Whose DNR Orders Were Signed and Those Whose DNR Orders Were Not Signed.

| | Odds ratios | 95% confidence | P |
|------------------------------------|-------------|----------------|-------|
| Univariate analysis | | | |
| Neurologic disease comorbidity | 0.330 | 0.111-0.982 | .046 |
| GCS ₂ ≥ 10 ^a | 8.418 | 2.882-24.591 | <.001 |
| Zero comorbidities | 8.861 | 2.512-31.259 | .001 |
| Surgical intervention | 3.437 | 1.060-11.150 | .040 |
| Multivariate analysis | | | |
| GCS ₂ ≥ 10 ^a | 8.871 | 2.667-29.512 | <.001 |
| Zero comorbidities | 8.414 | 1.919-36.888 | .005 |

^aGCS₂, GCS score at discharge from RCC. Footnotes: GCS, Glasgow Coma Scale; ICH, intracranial hemorrhage; DNR, signed do-not-resuscitate.

to evaluate the impact of each variable in both patients whose DNR orders were signed and those whose DNR orders were not signed. Differences in variables for patients discharged after weaning from PMV and general ward mortality patients after weaning from PMV were analyzed using univariate

analysis. The impact of each variable in patients discharged after weaning from PMV and general ward mortality patients after weaning from PMV was evaluated using multivariate stepwise logistic regression models. All statistical analyses were performed using SPSS for Windows (Version 17.0,

Table 3. Comparison of Clinical Variables of Demographic Data and Comorbidities Between ICH Patients Discharged After Weaning from Prolonged Mechanical Ventilation and General Ward Mortality ICH Patients After Weaning from Prolonged Mechanical Ventilation.

| | Patients discharged after weaning from PMV (No = 66) | General ward mortality patients after weaning from PMV (No = 25) | P value |
|--|---|---|---------------------|
| Age groups (years), No (%) | | | |
| <45, No (%) | 4 (6.06%) | 1 (4%) | .702 |
| 45-54, No (%) | 10 (15.15%) | 3 (12%) | .702 |
| 55-64, No (%) | 16 (24.24%) | 4 (16%) | .400 |
| 65-74, No (%) | 16 (24.24%) | 6 (24%) | .981 |
| 75-84, No (%) | 15 (22.73%) | 9 (36%) | .203 |
| ≥85, No (%) | 5 (7.58%) | 2 (8%) | .946 |
| Type of comorbidities, No (%) | | | |
| Cardiovascular disease, No (%) | 44 (66.66%) | 21 (84%) | .111 |
| Chronic lung disease, No (%) | 2 (3.03%) | 0 (0%) | 1.000 |
| Chronic kidney disease, No (%) | 8 (12.12%) | 12 (48%) | .003 |
| Neurologic disease, No (%) | 20 (30.30%) | 9 (36%) | .987 |
| Metabolic disease, No (%) | 23 (34.84%) | 11 (44%) | .422 |
| Malignant diseases, No (%) | 1 (1.51%) | 2 (8%) | .165 |
| Number of comorbidities, No (%) | | | |
| Zero comorbidities, No (%) | 14 (21.21%) | 1 (4%) | .080 |
| One comorbidity, No (%) | 16 (24.24%) | 9 (36%) | .265 |
| Two comorbidities, No (%) | 24 (36.36%) | 6 (24%) | .266 |
| ≥3 comorbidities, No (%) | 12 (18.18%) | 9 (36%) | .077 |
| GCS score | | | |
| GCS on admission to ICU (mean) | 6.50 | 7.28 | .388 ^a |
| GCS on admission to RCC (mean) | 7.41 | 5.76 | < .001 ^a |
| GCS on admission to RCC < 7, No (%) | 25 (37.88%) | 22 (88%) | .001 |
| Others, No | | | |
| Duration of RCC stay (mean days) | 16.82 | 19.94 | .095 |
| ICH surgical intervention, No (%) | 53 (80.30%) | 12 (48%) | .003 |

^aGCS score on admission to ICU and GCS score on admission to RCC were evaluated using the Student's t-test. Footnotes: PMV, prolonged mechanical ventilation; ICH, intracranial hemorrhage; No, number; GCS, Glasgow Coma Scale; ICU, intensive care unit; RCC, respiratory care center.

Table 4. Difference in Clinical Characteristics and Outcome Variables Between ICH Patients Discharged After Weaning From Prolonged Mechanical Ventilation and General Ward Mortality ICH Patients After Weaning From Prolonged Mechanical Ventilation.

| | Odds ratios | 95% confidence | P |
|-----------------------|-------------|----------------|--------|
| Univariate analysis | | | |
| CKD comorbidity | 6.692 | 2.277-19.667 | .001 |
| GCSI < 7 ^a | 12.027 | 3.262-44.341 | < .001 |
| Surgical intervention | 0.226 | 0.084-0.610 | .003 |
| Multivariate analysis | | | |
| CKD comorbidity | 9.644 | 2.361-39.558 | .002 |
| GCSI < 7 ^a | 15.307 | 3.179-73.703 | .001 |

^aGCSI: GCS score on admission to RCC. Footnotes: ICH, intracranial hemorrhage; CKD, chronic kidney disease; GCS, Glasgow Coma Scale; RCC, respiratory care center.

SPSS, Inc., Chicago, IL), and a *P*-value of < .05 was considered statistically significant.

Results

Over a 6-year period, 91 patients with ICH were successfully weaned from PMV. Of the patients, 55 were men and 36 were women, with a mean age of 65.2 years (range: 17-94 years). The families of 62 (68.1%) patients successfully weaned from PMV signed the DNR order for the patient. The mean age differed significantly between patients whose DNR orders were signed and those whose DNR orders were not signed (68.9 vs 61.4 years, *P* = .029). Moreover, neurologic disease comorbidity, zero comorbidities, surgical intervention, and GCS score of ≥10 at discharge from RCC were significantly different between patients

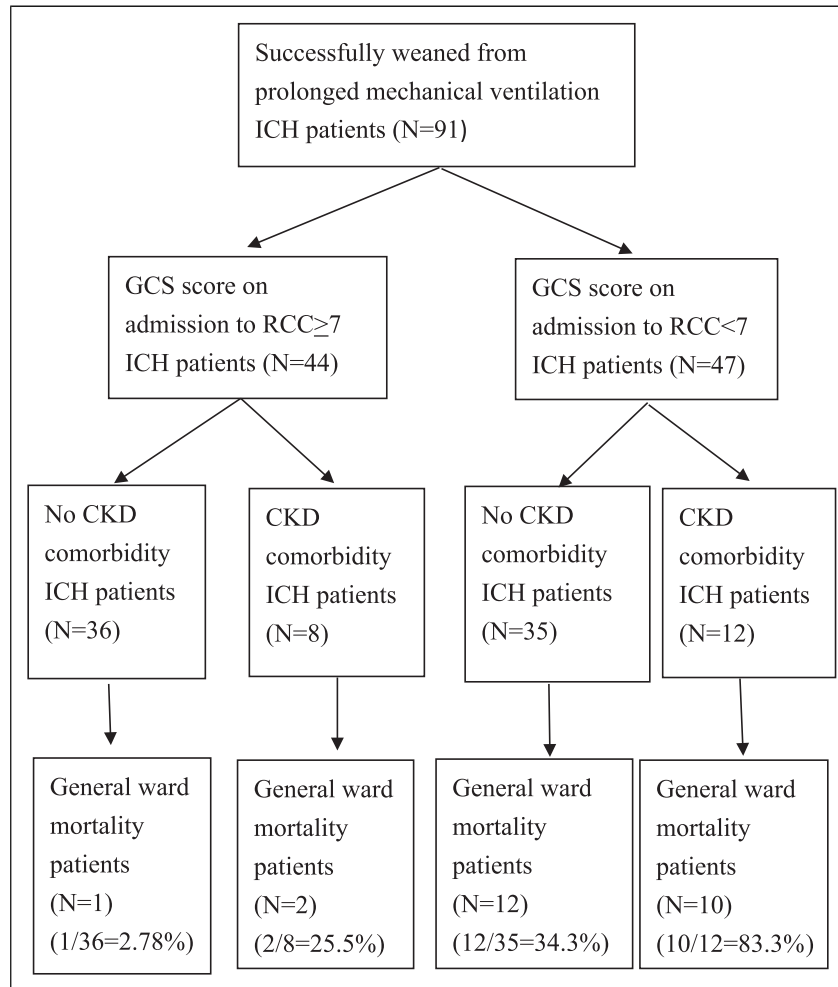


Figure 1. Clinical outcome of patients with ICH successfully weaned from prolonged mechanical ventilation according to CKD comorbidity and GCS score <7 on admission to RCC. Footnotes: ICH, intracranial hemorrhage; CKD, chronic kidney disease; GCS, Glasgow Coma Scale; RCC, respiratory care center; N, number.

whose DNR orders were signed and those whose DNR orders were not signed (Table 1). Multivariate analysis was performed to compare clinical variables and outcomes between patients whose DNR orders were signed and those whose DNR orders were not signed. The results showed that GCS score of ≥ 10 at discharge from RCC and zero comorbidities were significantly different between the two groups (Table 2).

Among the 91 successfully weaned patients with ICH, 25 were general ward mortality cases, wherein the causes of death included 11 pneumonia, 7 respiratory failure, 5 sudden death, 1 renal failure, and 1 hepatoma with tumor rupture and hepatic failure. Twenty-two patients had GCS less than 7 at the time of RCC admission. DNR orders were signed for 25 patients, including 24 signed DNR and DNI orders.

No significant difference was noted in the mean age between patients discharged and general ward mortality patients after weaning from PMV (65.1 vs 70.3 years,

$P = .154$). Furthermore, chronic kidney disease comorbidity, surgical intervention, and GCS score of <7 on admission to RCC were significantly different between patients discharged and general ward mortality patients after weaning from PMV (Table 3). Multivariate analysis was performed to compare clinical variables and outcomes between patients discharged and general ward mortality patients after weaning from PMV. The results showed that chronic kidney disease comorbidity and GCS score of <7 on admission to RCC were significantly different between the two groups (Table 4).

Figure 1 shows the clinical outcomes of successful weaning from PMV in patients with ICH according to CKD comorbidity and GCS score of <7 on admission to RCC. Patients with CKD comorbidity and GCS score of <7 on admission to RCC have the worst prognosis and patients without CKD comorbidity and GCS score of ≥ 7 on admission to RCC have the optimal prognosis.

Discussion

Hua et al³ reported that 85.4% of ICU admissions required palliative care consultation because of the following five triggers: (1) ICU admission after a hospital stay of ≥ 10 days, (2) multisystem organ failure of more than three systems, (3) stage IV malignancy, (4) status post-cardiac arrest, and (5) intracerebral hemorrhage requiring mechanical ventilation. Unlike most chronic diseases, ICH can be sudden and unexpected. Indeed, most of our patients had good self-care ability and could perform daily life activities before suffering from ICH. Most of their families expected the patient to recover smoothly from ICH during the initiation of mechanical ventilation. Then, they were made to decide whether to save the patient's life. Patients with ICH then received critical ICU care and were put on mechanical ventilation and life support. These patients with ICH were subsequently put under PMV status. When the families visited at the first time of transition, the patients with ICH on PMV were transferred to RCC for the aggressive ventilator weaning process. Patients then received comprehensive care in our RCC, where the medical team provides full-day care. In total, 83.5% of patients with ICH on PMV were successfully weaned from the ventilator in our RCC. Despite being successfully weaned from ventilation, these patients showed neurologic deficits, consciousness impairment, cognitive deficiencies and functional dependence. When the families visited at the second time of transition, these successfully weaned patients were transferred to the general ward for care. These patients with acute critical illness entered the chronic illness phase, which required shifting the goals of chronic illness care to restorative treatment and long-term care. Critical chronically ill patients are generally unable to participate directly in communication and decision-making.¹⁸ Ormseth et al¹⁹ reported that the factors that influence these decisions include the pattern and severity of outcome, probability of outcomes, burden of treatment, and other factors, including age, cultural and spiritual beliefs, preexisting comorbidity, caregiver burden, and financial consequences. In Taiwan, very rarely have the patients with ICH on PMV prepared an advance directive. Hence, the discussions and decision-making concerning the goals of care generally involve the patient's families. The challenges and the emotional, physical, and practical burdens on families weigh heavily throughout the illness trajectory.

End-of-Life Decisions in Patients With ICH Who Were Successfully Weaned From PMV

In our study, the families of 62 (68.1%) patients with ICH who were successfully weaned from PMV had signed the DNR order, including those of 31 patients (34.1%) who signed both the DNR and DNI orders. It is important to analyze the reason for signing the DNR order for these patients. Multivariate analysis revealed that a GCS score of ≥ 10 at discharge from RCC and the absence of comorbidities differed significantly between patients whose DNR orders were signed and those whose DNR orders were not signed. The GCS score on the day on which weaning from PMV was to be performed was lower in patients with neurologic deficits,

indicating that there was a persistent neurologic dysfunction in patients at the time of weaning.²⁰ A GCS score of ≥ 10 at discharge from RCC implied that these patients had less neurologic impairment after successful weaning from PMV. Our previous study demonstrated that a GCS score of ≥ 10 at discharge from RCC affected the long-term survival of patients with ICH successfully weaned from PMV.¹⁵ Moreover, 22 (24.2%) patients with ICH with a GCS score of ≥ 10 at discharge from RCC were identified to have higher chances of recovery. Family members expected such patients to gradually recover in the future. Hence, a GCS score of ≥ 10 at discharge from RCC is an influencing factor that can help decide whether to sign the DNR order. Another influencing factor is the absence of comorbidities. Zero comorbidities implied that the patients were previously in a very good health condition. Family members could not bear to give up on such patients; hence, they provided more time for the patients to recover. If patients with ICH had high burden of comorbidities and showed higher neurologic impairment after weaning from PMV, their families were often not that hopeful of their patients' recovery. Thus, they often opted for palliative therapy instead.

General Ward Mortality Patients After Weaning From PMV

Studies have shown that mechanically ventilated patients with neurologic impairment had higher reintubation rates after planned endotracheal extubation than mechanically ventilated patients without neurologic impairment.²¹ Our previous study showed that patients with ICH successfully weaned from PMV revealed an excellent successful weaning rate (83.5%);¹⁴ however, the general ward mortality rate after weaning from PMV was 27.5%. Hence, being successfully weaned did not substantially help these patients. We tried to explore who were candidates for the consideration of hospice care with ventilator withdrawal in RCC. This study showed that CKD comorbidity and GCS score of < 7 on admission to RCC were two poor prognostic factors of patients with ICH successfully weaned from PMV. Further, 60.0% of patients with CKD comorbidity died in the general ward (12/20 = 60.0%; DNR and DNI orders were signed for 11 patients). Similarly, 46.8% of patients with a GCS score of < 7 on admission to RCC died in the general ward (22/47 = 46.8%; DNR and DNI orders were signed for 21 patients). Moreover, 83.3% of patients with both CKD comorbidity and a GCS score of < 7 on admission to RCC died in the general ward (10/12 = 83.3%; DNR and DNI orders were signed for 9 patients, all of which were died before hospital discharge). DNR and DNI orders were signed for 31 patients, and among these, 74.2% died in the general ward (23/31 = 74.2%). We tried to discuss with the patient's family about the decision-making of DNR and DNI orders in advance on the day of patient admission to RCC. Differences in variables for patients discharged after weaning from PMV and general ward mortality patients after weaning from PMV were analyzed in this study for all clinical variables that were available on the day of patient admission to RCC. Therefore,

we did not include the GCS score at discharge from RCC in this analysis. If patients with ICH can be successfully weaned from PMV in future, the family can still decide to sign DNR and DNI orders on the day of patient admission to RCC. The patients with ICH signed as DNR and DNI are candidates for the consideration of hospice care with ventilator withdrawal in RCC.

A GCS score of <7 on admission to RCC indicated that these patients with ICH had more neurologic impairment after an aggressive surgical management in the ICU. In 47 patients with ICH with a GCS score of <7 on admission to RCC, only four patients had a GCS score of ≥ 10 at discharge from RCC in this study. Most of them had no clinical improvement of neurologic function in the RCC stage and therefore had a poor prognosis after being successfully weaned from the ventilator. In Huang et al²²'s study, reduced RCC GCS score is an independent prognostic factor for higher in-hospital mortality rate in patients with acute stroke and brain trauma requiring PMV support.

In view of CKD comorbidity, previous studies reported that ESRD was a factor related to a poor 1-year survival rate of patients on PMV.^{13,14,23-25} Jang et al showed that >85% of patients receiving PMV and undergoing maintenance dialysis would die within 1 year and more than three-quarters of these patients survived for <6 months.²⁶ Therefore, patients with ICH on PMV with preexisting CKD had significantly higher mortality rate.

Hospice and Palliative Care of PMV Patients in Taiwan

Most family members agreed to accept palliative care; however, fewer family members accepted ventilator withdrawal in Taiwan.²⁷⁻²⁹ Ankrom et al³⁰ reported that 13 patients underwent ventilator withdrawal during a 6-year retrospective review of a chronic ventilator unit in the USA. Our previous study demonstrated that only 5 patients underwent ventilator withdrawal.¹⁴ Family members usually try to do their best to rescue and treat the patient and desire to provide their loved ones with a chance to recover. Therefore, the proportion of family members receiving palliative care is higher, and most family members are unwilling to make decisions regarding ventilator withdrawal.

Study Limitations

This study included a limited number of patients and we have explored who are candidates for the consideration of hospice care with ventilator withdrawal. However, these results must be interpreted with caution because they were derived from a retrospective single-unit study. We expect that further studies on the palliative care of patients with ICH who are successfully weaned from PMV would yield additional insights.

Conclusions

Two factors were independently associated with not signing the DNR order for the patients who were successfully weaned from PMV: a GCS score of ≥ 10 at discharge from RCC and zero comorbidities. Patients with ICH successfully weaned from PMV with chronic kidney disease comorbidity and Glasgow Coma Scale score of <7 on admission to RCC are candidates for the consideration of hospice care with ventilator withdrawal, especially patients who signed DNR and DNI orders.

Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agreed to be accountable for all aspects of the work.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval and Consent to Participate

This study was a retrospective analysis of medical records. The study represented the lowest risk to the research subject, and all information was anonymized before being made available for research. The study conformed to the Declaration of Helsinki 1975, revised Hong Kong 1989. The project was approved by the research ethics committee of Buddhist Dalin Tzu Chi General Hospital (Approved IRB No.: B10802009), which exempted the study from the requirement of informed consent.

Availability of Data and Materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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