

THE ROLE OF REHABILITATION MANAGEMENT IN INTENSIVE CARE UNIT ACQUIRED WEAKNESS

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ABSTRACT

Intensive care unit-acquired weakness (ICUAW) is condition of weakness that found in critically ill patient when no reasonable reason besides the presence of critical illness. This condition often occurs in intensive care unit (ICU) patient that undergo prolong bed rest. Rehabilitation intervention has important role to prevent and manage this condition. This case report aims to depict the role of rehabilitation management in ICU patient and its benefit.

Keywords: rehabilitation, intensive care unit acquired weakness

ABSTRAK

Intensive care unit-acquired weakness adalah kelemahan yang ditemukan pada pasien penyakit kritis tanpa ada penyebab lain selain penyakit kritis itu sendiri. Kondisi ini sering ditemukan pada pasien ICU dengan tirah baring lama. Intervensi rehabilitasi memiliki peran yang penting untuk mencegah dan menangani ICUAW. Laporan kasus ini bertujuan untuk menggambarkan peran penatalaksanaan rehabilitasi pada pasien ICU serta manfaatnya.

Kata kunci: rehabilitasi, intensive care unit acquired weakness

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INTRODUCTION

Intensive care unit-acquired weakness (ICUAW) is weakness that found in critically ill patient when no reasonable reason besides the presence of critical illness itself. Intensive care unit-acquired weakness is classified into 3 groups; critical illness polyneuropathy (CIP); critical illness myopathy (CIM); critical illness neuromyopathy (CINM).¹ The risk factors of this condition including premorbid health, bed rest, sepsis and multiorgan failure, hyperglycaemia, corticosteroid, and neuromuscular blockers.^{2,3} Intensive care unit-acquired weakness was diagnosed in up to 67% of long-term ventilated patients.⁴ The objective of this case report is to depict the role of rehabilitation management in ICU patient and its benefit.

CASE REPORT

A, women, 38 years old, was admitted to intensive care unit due to abdominal pain. She was referred from another hospital with diagnosis of peritonitis with paralytic ileus. Patient underwent several surgeries during hospitalization, including laparotomy, relaparotomy surgery, and also debridement and repair of relaparotomy. Patient's recent complaint was weakness of all extremity muscles. She also felt tired easily. She was denied of loss of sensation on extremities. Her activities of daily living (ADL) were fully dependent. There were no dyspnea, fever, and dizziness. She got feeding by nasogastric tube.

The physical examination showed hypotrophy and hypotonus of both upper and lower extremity muscles. The manual muscle testing (MMT) of bilateral upper extremity muscles were 3 meanwhile for lower bilateral extremity muscles were 1 for both sides. There was no neurological deficit.

Laboratory examination showed hemoglobin was 11,8 gr/dL, hematocrit 34,3%, leucocyte was 26.030/ μ L, thrombocyte was 684.000/ μ L. For electrolyte value, Natrium was 131 mEq/L, Kalium 5 mEq/L, and Chloride 99,4 mEq/L. Blood gas analysis showed pH 7,496, pO₂ 106,29 mmHg, pO₂ 34,1 mmHg, HCO₃ 26,7

mEq/L, SpO₂ 96,2%. Chest X-ray during ICU admission depicted right pleural effusion, so that chest tube was inserted on right thorax



Figure 1. Chest X ray showed right pleural effusion

She was consulted to Physical medicine and rehabilitation department at day 30 of ICU admission. The rehabilitation intervention involving intensivist, physiatrist, nurse, physiotherapist, and occupational therapist. The rehabilitation management consisted of isotonic strengthening exercise of upper extremities muscles, isometric exercise of lower extremities, breathing exercises, active mobilization (progression from tilting table to sit at the edge of bed), cardiorespiratory endurance exercise using arm ergometer, and ADL exercise such as feeding, dressing, and grooming.



Figure 2. One of rehabilitation intervention (active mobilization)



Figure 3. ADL exercise such as feeding, by occupational therapist

Duration of mechanical ventilation was 44 days. The patient was discharged from ICU and transferred to ward at day 49. The Barthel index at ICU discharge was 10 (moderate dependent). The ICU mobility score before rehabilitation intervention was 0, and became 3 at the day of ICU discharge.

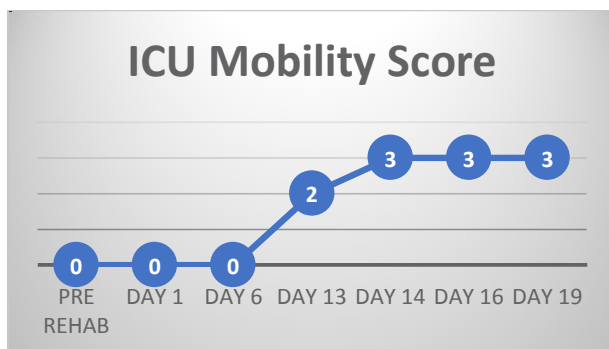


Figure 4. patient's ICU mobility score during ICU admission

The rehabilitation management was continued during hospitalization in ward, with addition of neuromuscular electrical stimulation on lower extremities. The strength of upper and lower extremity muscles was improved, MMT of bilateral upper extremity muscles became 4 and MMT of bilateral lower extremity muscles were 2 before hospital discharge.



Figure 5. Application of neuromuscular electrical stimulation on bilateral quadriceps muscles

During home program, patient done exercise regularly. Patient and her family understand about the importance of exercises. Now, she can walk with assistive from her husband.

DISCUSSION

In this patient, there were several factors contributed to ICUW, including prolong bed rest, corticosteroid medication, and history of sepsis. Pathophysiology of ICUAW involving skeletal muscle wasting and polyneuropathy with axonal degeneration. Skeletal muscle wasting due to microvascular ischemia and catabolism, meanwhile polyneuropathy is occurred due to microvascular injury that leads to nerve ischemia, sodium channel dysfunction, and injury to nerve mitochondria.⁵

The criteria for diagnosing ICUAW are; (1) developing of weakness after the onset of critical illness; (2) the weakness is generalized, (involving both proximal and distal muscles), symmetrical, and flaccid. Usually, cranial nerves are intact; (3) muscle assessed by the Medical Research Council (MRC) sum score of 48 (or a mean score of 4 in all testable muscle groups) found in two occasions separated by 24 hours; (4) dependence on mechanical ventilation; (5) another causes of weakness unrelated to the underlying critical illness have been excluded. The diagnosis of ICUAW is established in the presence of 1, 2, 5, and either 3 or 4.¹ This condition differs from other neuromuscular disorder; no abnormality in facial muscles; creatinine kinase level is not

increased; demyelination is not the characteristic.⁵

This patient fulfilled ICUAW diagnosis criteria; patient's weakness was found after critical illness occurred; proximal and distal muscles weakness (muscle strength score was <48 according to Medical MRC score) and no weakness in cranial muscles; used mechanical ventilation; no other causes to explain her weakness.

One of strategies to prevent ICUAW is rehabilitation, including early mobilization (from bed mobility and progress to standing and walking), occupational therapy including ADL exercises, cardiorespiratory exercise such as cycle ergometry, neuromuscular electrical, strengthening exercise, and breathing exercise.³ In this patient, unfortunately, there was delayed in rehabilitation therapy, as the patient was consulted to medical rehabilitation department after 30 days hospitalization. Better result can be achieved if the rehabilitation interventions were administered earlier.

Intensive care unit-acquired weakness (ICUAW) can cause long term consequences. The muscles strength can improve gradually in long time. However, complete functional recovery occurs only in 68% of the patient. Persistent disability is found in 28% patient.¹ The patient can have permanent residual activity limitations and restriction of participation.⁶

CONCLUSION

Earlier implementation of rehabilitation management will give more benefit. Initial rehabilitation including early active mobilization help to minimize probability of ICUAW. To achieve successful result, rehabilitation intervention in ICU setting needs multidisciplinary team, including intensivist, physiatrist, nurse, physiotherapist, and occupational therapist.

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