Hiroyasu Inoue[1], Kazuki Komaba[2], Rihito Mitsuhashi[3], Satoshi Nogawa[3], Seiya Takahashi[4], Ryuta Kinno[4]

[1]Division of Physical Therapy, Department of Rehabilitation, School of Nursing and Rehabilitation Sciences, Showa Medical University, Yokohama, Kanagawa, Japan

[2]Division of Occupational Therapy, Department of Rehabilitation, School of Nursing and Rehabilitation Sciences, Showa Medical University, Yokohama, Kanagawa, Japan

[3]Department of Clinical Engineering, Showa Medical University Fujigaoka Hospital, Yokohama, Kanagawa, Japan

[4]Department of Neurology, Showa Medical University Fujigaoka Hospital, Yokohama, Kanagawa, Japan

Innovative Application of the LIC TRAINER for Respiratory Rehabilitation in Neuromuscular Disorders

Abstract: The LIC TRAINER is a respiratory rehabilitation device developed in Japan for patients with neuromuscular diseases such as amyotrophic lateral sclerosis. In this report, we present a clinical demonstration of modified lung volume recruitment (mLVR) therapy using the LIC TRAINER, showcasing its practical application in respiratory rehabilitation. A 60-year-old man with anti-mitochondrial M2 antibody-positive myositis experienced progressive proximal muscle weakness, dyspnea, and CO_2 narcosis. Despite corticosteroid treatment, respiratory failure worsened, necessitating tracheostomy and mechanical ventilation. Given the limitations of conventional lung volume recruitment in patients with impaired respiratory muscle strength and tracheostomy, mLVR therapy was introduced using the LIC TRAINER. A physiotherapist administered insufflations via bag-valve mask, starting at 1500 mL and gradually increasing to 2500 mL, while monitoring airway pressure and patient comfort. A structured demonstration protocol was used to adjust volume and pressure safely. Respiratory function was assessed through thoracic expansion, inspiratory capacity, vital capacity, tidal volume, and visual analogue scale. Substantial improvements were noted in both objective respiratory parameters and subjective comfort. The patient was successfully weaned off the ventilator after 48 days and resumed oral feeding by day 56 without complications. This clinical demonstration underscores the effectiveness and adaptability of LIC TRAINER-based mLVR therapy as a respiratory rehabilitation option for neuromuscular respiratory failure.

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It offers individualized, safe, and scalable therapy even in patients with complex airway management. These findings support further investigation of mLVR using the LIC TRAINER in broader clinical settings to supplement pharmacologic approaches in inflammatory myopathies.

Keywords: autoimmune myositis, lung volume recruitment, respiratory failure, respiratory muscle weakness, tracheostomy, respiratory rehabilitation

Biography: Dr. Hiroyasu Inoue is an Associate Professor in Physical Therapy at Showa Medical University and Section Chief of Rehabilitation at Showa Medical University Fujigaoka Hospital. He earned his Ph.D. in Health Sciences in 2019. He specializes in critical care rehabilitation, dysphagia management, and early mobilization in the ICU. He holds certifications in stroke, dysphagia, respiratory, and intensive care physical therapy. His research focuses on ICU rehabilitation, swallowing ultrasound, and post-extubation pneumonia. He contributes to clinical guidelines and presents widely at academic congresses.

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