Quadriceps Femoris Ultrasonography: A Tool to Assess Nutritional Status and Prognosticate Mortality Outcome in Adult Mechanically Ventilated Patients

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Objective: Intensive Care Unit (ICU) patients possess higher nutritional risk due to their heterogeneity of demographic factors and disease trajectories upon hospitalization. mNUTRIC score was used to classify them into High Nutritional Risk; HNR (Score ≥5) or Low Nutritional Risk; LNR. These HNR patients have been shown to have significant muscle loss during ICU stay which led to significant adverse outcomes. Thus, skeletal muscle ultrasonography was introduced as a tool to assess the nutritional status thus predicting their disease outcome.

Methods: A prospective cohort study involving 60 patients was conducted in Hospital Universiti Sains Malaysia, whereby blood parameters, skeletal muscle thickness, and nutritional intake measurement of the patients were recorded during their ICU stay. The adverse outcome such as duration of mechanically ventilated days, hospitalisation days and mortality events were recorded. The serial percentage decline of quadriceps femoris thickness is then used to prognosticate mortality.

Results: Overall, the recruited patients had a mean APACHE II score of 13, SOFA score of 8, Charlson Comorbidity Index score of 3.3, and the average score for mNUTRIC score is 3.6. This study revealed that 85% of our patients received optimal nutritional delivery by an average of 2.6 days. The HNR patients had a significant percentage of skeletal muscle thickness decline by day 5, with ≥7.80% decline that can predict mortality. However, there were no statistically significant changes in mechanical ventilated days and hospitalisation days.

Conclusion: Ultrasonography of quadriceps femoris was perceived as a new emerging utility as a surrogate tool to assess nutritional status and predict mortality. Serial scanning of quadriceps femoris was seen as a more dynamic approach to evaluate the degree of muscle wasting, thus alarming for an earlier method for nutritional optimisation, early muscle rehabilitation and patient mobility which may reduce morbidity and mortality of these patients.

Keywords: mNUTRIC score, critical ill nutrition, ultrasonography, quadriceps femoris, mortality

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