

# Muscle Mass and Strength as Determinants of Early Recovery After Hip Fracture Surgery



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## Objective

❖ Sarcopenia has been recognized as a risk factor for poor outcomes after hip fracture surgery. However, the independent contributions of skeletal muscle mass and muscle strength remain unclear. This study aimed to investigate the independent associations of DXA-defined low muscle mass and handgrip strength with early postoperative functional recovery in older adults undergoing hip fracture surgery.

## Methods

❖ The study participants were patients aged 65 years and older who underwent hip fracture surgery at Konyang University Hospital between January 2023 and May 2024. Dual-energy X-ray absorptiometry (DXA) was performed to assess body mass index (BMI), skeletal muscle index (SMI). Low muscle mass was defined according to the AWGS 2019 criteria. Muscle strength was assessed using handgrip strength. Additionally, bone mineral density (BMD), functional ambulation classification (FAC), hemoglobin and albumin level, geriatric nutritional risk index (GNRI), and medical history were evaluated.

❖ Early postoperative physical performance was evaluated at approximately 2–3 months after surgery using the Short Physical Performance Battery (SPPB), BBS, FAC, length of hospital stay, and discharge destination. Multivariable linear regression analysis was performed to assess the independent association between low muscle mass and SPPB scores, adjusting for age, sex, Charlson Comorbidity Index, and Geriatric Nutritional Risk Index.

## Results

❖ A total of 33 patients were included. Patients with low muscle mass had significantly lower body mass index but did not differ in age, baseline functional status, comorbidity burden, nutritional status, or length of hospital stay.

❖ In multivariable analysis, DXA-defined low muscle mass was not independently associated with postoperative SPPB scores. Increasing age was independently associated with lower SPPB scores. In contrast, handgrip strength showed a significant independent association with SPPB scores in sensitivity analyses; higher grip strength was associated with better physical performance, whereas low grip strength was associated with lower SPPB scores.

❖ Comparison of postoperative functional outcomes between patients with low muscle mass and those with normal muscle mass revealed no significant differences in total SPPB scores or in individual components, including balance, gait speed, and chair stand (Figure 1). Similarly, balance performance assessed by the BBS, ambulation ability assessed by the FAC, and activities of daily living assessed by the MBI did not differ significantly between groups (Figure 2).

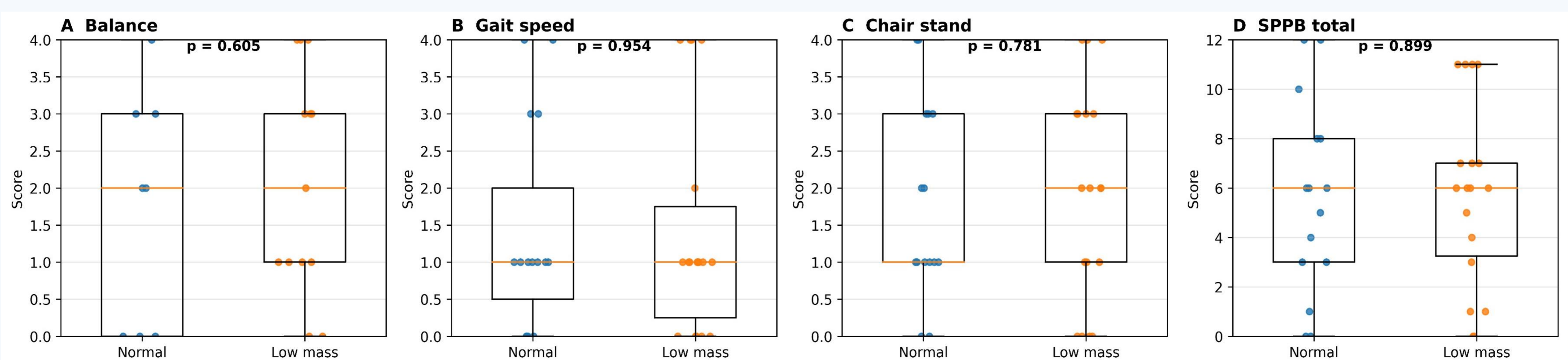


Figure 1. Early postoperative Short Physical Performance Battery (SPPB) scores according to DXA-defined muscle mass status.

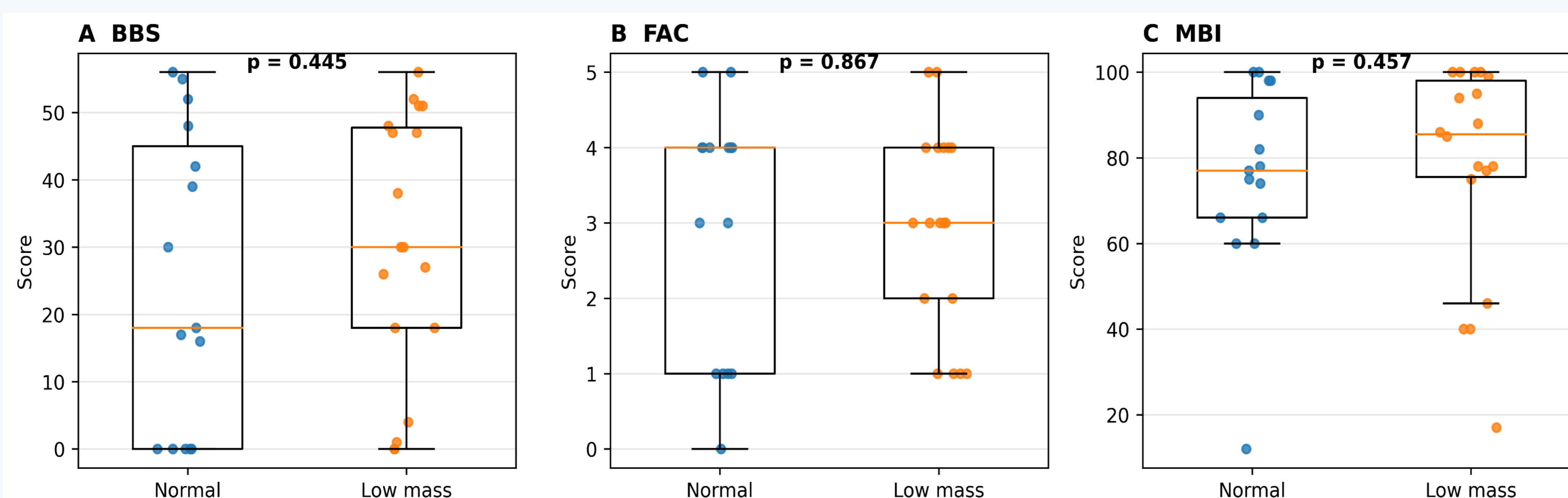


Figure 2. Early postoperative secondary functional outcomes (BBS, FAC, and MBI) according to DXA-defined muscle mass status.

## Conclusion

❖ In older adults undergoing hip fracture surgery, DXA-defined low muscle mass was not independently associated with early postoperative physical performance, whereas muscle strength showed a significant independent association. These findings indicate that muscle strength is more clinically relevant than muscle mass for predicting early functional recovery.