

#503 - Clinical Study

Perioperative Essential Amino Acid Supplementation Facilitates Quadriceps Muscle Strength And Volume Recovery Following Total Knee Arthroplasty: A Double-Blind Randomized Control Trial

Orthopaedics / Knee & Lower Leg / Joint Replacement - Primary

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Keywords: TKA, Essential Amino Acid, Muscle Atrophy, Muscle Strength, Nutrition, Quadriceps

Background

Supplementation of perioperative essential amino acid (EAA) suppresses lower limb muscle atrophy and promotes functional improvement in 4 weeks after total knee arthroplasty (TKA). However, its effect on the recovery of muscle volume and strength in the mid-term postoperative phase is unclear.

Objectives

The aim of this study was to evaluate the effect of perioperative EAA supplementation on the recovery of lower limb muscle volume and strength in 2-year after TKA.

Study Design & Methods

Sixty patients who underwent unilateral TKA for primary knee osteoarthritis were included in this double-blind, randomized, controlled trial. After excluding dropouts, 26 patients were assigned to the EAA group (9 g/day), and 26 to the placebo group (powdered lactose, 9 g/day). From one week prior to surgery to two weeks following surgery, EAA were given. Rectus femoris muscle area was measured using ultrasound, and quadriceps muscle strength was measured isometrically with a handheld dynamometer, preoperatively and periodically up to 2-year postoperatively. Knee pain, knee range of motion, functional mobility, and Knee Society Score 2011 subjective scores were measured at each time point. Perioperative management, except for supplementation, was identical in two groups.

Results

The relative changes in the rectus femoris muscle area were significantly greater in the EAA group than in the placebo group at 1 year ($122 \pm 27\%$ v.s. $105 \pm 23\%$, $p = 0.02$) and 2 years ($134 \pm 31\%$ v.s. $114 \pm 27\%$, $p = 0.01$) after TKA. Moreover, the relative change in quadriceps muscle strength two years after TKA was significantly greater in the EAA group than in the placebo group ($159 \pm 54\%$ v.s. $125 \pm 40\%$, $p = 0.02$). Other clinical outcomes were not significantly different between the two groups.

Conclusions

In two years after TKA, the rectus femoris muscle area and quadriceps muscle strength were significantly improved in the EAA group compared to the placebo group. Perioperative nutritional intervention could contribute to postoperative muscle recovery not only in the early phase, but also in the mid-term phase following TKA.