

## **Conditionally Essential Amino Acid Supplementation Reduces Postoperative Complications and Muscle Wasting in Orthopaedic Trauma Patients**

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**Purpose:** Increased metabolic demand combined with inadequate oral intake after musculoskeletal trauma results in compromised wound healing, skeletal muscle wasting, and increased risk of complication. Decreased muscle mass limits potential for functional recovery after injury. The purpose of this study was to evaluate standard perioperative nutrition compared to oral supplementation with conditionally essential amino acids (CEAAs) on body composition and postoperative complications following acute fracture fixation. We hypothesized that oral CEAA supplementation will have a protective effect against postoperative complication and skeletal muscle wasting.

**Methods:** Patients sustaining operative pelvis and extremity fractures presenting at a Level-I trauma center were enrolled in this prospective single-blinded randomized clinical trial. Demographics, injury classification, and comorbidities were collected via chart review at baseline. Fat free mass (FFM) was measured within 72 hours of surgery using A-Mode Ultrasound to measure subcutaneous fat thickness according to the Jackson Pollock 3-site method. Patients were allocated by stratified randomization to standard nutrition (Control) or standard nutrition plus an oral supplement (CEAA) containing 14 g of amino acids to be taken 2x daily for 2 weeks. FFM was reassessed at 6 weeks and 3 months. All complications were prospectively documented. Statistical analysis was performed by intention-to-treat comparing least squared mean for FFM and  $\chi^2$  for complication rates. Significance was established at  $P < 0.05$  a priori.

**Results:** 243 subjects (Control: 117, CEAA: 126) were included in this analysis. There were no differences in age, gender, body mass index (BMI), or baseline FFM between Control and CEAA subjects. Median compliance in the CEAA group was 22/28 servings ( $78.6\% \pm 36.9\%$ ). Patients randomized to CEAA had significantly lower rates of mortality (0.80% vs 6.0%,  $P = 0.031$ ), overall complication rate (54.7% vs 41.3%,  $p=0.040$ ), surgical complications (32.5% vs 23.0%,  $p=0.010$ ), and medical complications (23.0% vs 32.5%,  $P = 0.039$ ). Surgical site infection rates were lower in CEAA, although this narrowly missed statistical significance (14.3% vs 23.9%,  $P = 0.056$ ). Nonunion rates were similar for both groups (4.8% vs 3.4%,  $P = 0.751$ ). FFM decreased significantly at 6 weeks in the control group ( $-1.28$  kg,  $P = 0.004$ ), but normalized at 12 weeks ( $-0.02$ ,  $P = 0.962$ ). There was no change in FFM for CEAA at 6 ( $-0.56$  kg,  $P = 0.189$ ) or 12 weeks ( $+0.36$  kg,  $P = 0.442$ ).

**Conclusion:** Results of this prospective single-blinded randomized clinical trial indicate CEAA supplementation has a protective effect against postoperative complications and skeletal muscle wasting following acute fracture fixation. Large scale prospective studies are warranted given the potential benefits of this inexpensive and low-risk intervention.