Does Nutritional Intervention Improve Nutritional Outcomes in Orthopaedic Trauma Patients: A Randomized Prospective Study

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Purpose: Malnutrition is associated with poor clinical outcomes, including higher infection rates, impaired wound healing, depression of the immune response, longer length of stay (LOS), increased muscle loss, increased recovery time and increased mortality. A previous study conducted by our group displayed high prevalence rates of malnutrition in orthopaedic trauma patients that progressively worsened during the acute hospital stay, as diagnosed by laboratory markers. The primary aim of this study was to determine if aggressive nutritional consultation and protein supplementation could prevent malnutrition in the orthopaedic trauma patient population.

Methods: Orthopaedic trauma patients at a Level I regional trauma center were electronically randomized on admission to a control group versus a treatment group. The treatment group received nutritional counseling from a nutritionist on admission with protein supplementation at every meal. Furthermore, patients were seen by a study member on a daily basis and reminded of the importance of nutrition and counseled accordingly. Serum laboratory markers were obtained for both the control and treatment group on admission, hospital day 3, hospital day 7, and at 2 and 6 weeks post surgery. Nutritional markers included albumin, prealbumin, transferrin, CRP (C-reactive protein), and vitamin D. Nutritional status was determined using the validated Rainey MacDonald Nutritional Index (RMNI), with negative numbers representing malnutrition. The control group was treated based on the preference of the admitting team. Patient demographics, ISS, and surgical treatment were also recorded prospectively.

Results: 94 patients were enrolled, but 14 patients were excluded because either they were discharged before and/or appropriate labs were not drawn on hospital day 3 or they refused to continue to be in the study. Final analysis included 40 patients randomized to the control group and 40 patients in the treatment arm. As a result, 80 orthopaedic trauma patients with an average age of 47 years were included in the final analysis. No statistically significant difference was noted between the two groups in regards to: age, sex, ISS, and BMI (body mass index). Average nutritional marker values and statistics for the control arm and treatment arm are reported in the table. Based on the RMNI 38% of control patients were diagnosed as malnourished on admission, which increased to 60% by day 3 and remained elevated at 57% of patients being malnourished at hospital day 7. In the treatment arm on admission 20% of patients were malnourished based on RMNI; this increased to 93% on hospital day 3, and decreased to 57% by hospital day 7. CRP values significantly increased from admission to hospital day 3, but we did not see a significant increase from day 3 to day 7. Furthermore, no statistically significant difference was noted between the treatment arm and the control arm at the 2 and 6-week follow-up appointments in regards to the nutritional markers.

PAPER ABSTRACTS

Conclusion: The prevalence of malnourishment, based on serum values of albumin and prealbumin and the RMNI, in the presence of acute orthopaedic injury, is substantial, and it continues to rise during the acute hospital stay. We were not able to prevent malnutrition based on laboratory markers with nutritional supplementation and counseling. This suggests that the nutritional markers we routinely utilize are not sensitive enough to measure a difference, or that the supplementation is ineffective. The next stage is to determine if counseling and protein supplementation leads to lower complication rates and better outcomes.

	Control	Treatment	p-value
Age	44	50	0.17
BMI	28	27	0.52
LOS	8	7	0.41
Admit CRP	60	47	0.23
Admit Prealbumin	18	20	0.17
Admit Albumin	3.6	3.7	0.07
Admit RMNI	0.51	0.75	0.21
Admit Vit. D	23	22	0.97
Day 3 CRP	122	108	0.39
Day 3 Prealbumin	11.1	11.9	0.72
Day 3 Albumin	3.2	3.3	0.64
Day 3 RMNI	-0.2	-0.12	0.09
Day 7 CRP	125	128	0.9
Day 7 Prealbumin	10.9	10.3	0.66
Day 7 Albumin	3.3	3.1	0.17
Day 7 RMNI	-0.15	-0.62	0.16