Analysis of nutrition status and osteoporosis-related parameters in elderly patients with hip and distal radius fractures

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INTRODUCTION: Osteoporosis and fragility fractures including Hip fractures (HF) and distal radius fractures (DRF) are major public health problem. Malnutrition has been suggested to increase the risk of falls and to be a possible causal factor in fragility fractures. However, data on the prevalence of malnutrition in elderly surgical patients with HF and DRF are limited. The objective of this study is to investigate the prevalence of malnutrition in those patients by using the controlling nutritional status (CONUT) score, which is a reliable tool for assessment of nutrition status and the association of CONUT score with age and osteoporosis-related parameters.

METHODS: We retrospectively enrolled patients with HF and DRF aged ≥ 50 years who were treated surgically at our hospitals from 2017 to 2019. CONUT score was calculated based on the three parameters measured on admission: serum albumin concentration (Alb), total cholesterol concentration (T-col), and total lymphocyte count (TLC). The results were then used to classify the nutritional status of each patient as either normal (CONUT score, 0-1), or one of light (2-4), moderate (5-8), or severe malnutrition (9-12) (Table. 1). Other parameters on admission were also collected for body mass index (BMI), and serum 25-hydroxyvitamin D (25(OH)D), and history of fragility fractures of other bones. Bone mineral density (BMD) of the lumber spine, femoral neck, and total hip area were measure using dual-energy X-ray absorption after surgery. This study was approved by an Ethics Committee.

RESULTS SECTION: The data of 155 patients with HF (age 79.9 years; 123 women) and that of 104 patients with DRF (age 71.2 years; 89 women) were subject to analysis. The overall mean CONUT score was 2.8 ± 2.4. The mean CONUT score in the HF and DRF groups was 3.8 ± 2.3 and 1.3 ± 1.5, respectively. In the HF group, 132 patients (85.2%) were malnourished, as defined by a CONUT score > 1, 76 light (49.0%), 50 (32.3%) moderate, and 6 (3.9%) severe. In the DRF group, 132 patients (28.8%) were malnourished, 27 light (26.0%), 2 (1.8%) moderate, and 1 (1.0%) severe. The prevalence of malnutrition in patients with HF was significantly higher than that in patients with DRF ($p < 0.01$).

The mean age in the HF group was significantly higher than that in the DRF group ($p < 0.01$). The mean BMI and BMD of femoral neck and total hip in the HF group was significantly lower than those in DRF groups ($p < 0.01$). The percentage of patients with past fragility fractures in the HF group was significantly higher than that in the DRF group ($p < 0.01$).

Pearson correlation (Table. 2) revealed that there were no significant correlations among CONUT score and variables in the HF group. In the DRF group, CONUT score correlated significantly with 25(OH)D ($r = -0.288$, $p < 0.05$), BMI ($r = -0.347$, $p < 0.01$), BMD of femoral neck and total hip ($r = -0.261$ and -0.317, $p < 0.05$ and $p < 0.05$, respectively). Moreover, there was a positive correlation between CONUT score and age ($r = 0.203$, $p < 0.05$).

DISCUSSION: The prevalence of malnutrition on admission assessed by CONUT score was much higher in patients with HF than in patients with DRF. In the DRF group, CONUT score inversely correlated with vitamin D levels, BMI, and BMD of femoral neck and total hip. Our results suggest that the necessity of introducing nutrition assessment in elderly patients with osteoporosis.

SIGNIFICANCE/CLINICAL RELEVANCE: Modification of nutritional status may be beneficial in patients at a risk of fragility fractures such as HF and DRF.

Table. 1 CONUT score

Parameters	Undernutrition Degree			
	Normal	Light	Moderate	Severe
Alb (g/dL)	≥ 3.5	3.0–3.49	2.5–2.99	< 2.5
Score	**0**	**2**	**4**	**6**
TLC (/mm^3)	≥ 1600	1200-1599	800-1199	< 800
Score	**0**	**1**	**2**	**3**
T-chol (mg/dL)	≥ 180	140-179	100-139	< 100
Score	**0**	**1**	**2**	**3**
CONUT score	**0-1**	**2-4**	**5-8**	**9-12**

Table. 2 Correlation between CONUT score and parameters in DRF

	DRF (n =104)	
Parameters	*r*	*P*
Age	0.203	< 0.05
BMI	-0.347	< 0.01
25(OH)D	-0.288	< 0.05
BMD of femoral neck	-0.261	< 0.05
BMD of total hip	-0.317	< 0.05