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Hemodynamic and Metabolic Instability in Sarcopenic Patients Following Aortic Surgery

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Introduction

This study aimed to determine whether preoperative sarcopenia influences hematologic stability and transfusion requirements under acute surgical stress, thereby informing early risk stratification and perioperative management strategies in high-risk aortic surgery patients.

Methods

Study design Retrospective cohort study

Subjects 93 patients admitted for aortic disease who were referred for nutritional consultation

Method Sarcopenia was defined by L3 skeletal muscle index (SMI) on CT using AI-based segmentation (AID-UTM, iAID Inc.), with sex-specific cutoffs (<40.8 cm^2/m^2 in men, <34.9 cm^2/m^2 in women). Hemoglobin (Hb) and albumin (Alb) levels were measured preoperatively and on postoperative day (POD 1,3,7). Correlation between Hb and Alb changes was assessed, and multivariable analysis was performed to evaluate the independent association between sarcopenia and Alb variation after adjusting for age and Hb change. Stratified sub-analysis was additionally performed in patients aged ≥65 years.

Results

Hb change correlated with Alb change (r = 0.232, p = 0.025). Sarcopenia group showed lower baseline Hb and Alb (Alb: 3.82 vs. 3.96, p > 0.05; Hb: 11.92 vs. 13.26, p < 0.05). Absolute Alb change was smaller in sarcopenia (0.30 vs. 0.56, p = 0.003), while Hb change was not different. Postoperative Hb increase was more frequent in sarcopenia (54.2% vs. 37.7%). After adjustment (age, Hb change), Alb change remained lower in sarcopenia (p < 0.05). Findings remained significant after age stratification (≥65 years).

	Sarcopenia (n=24)	Non-sarcopenia (n=69)
Baseline characteristics		
Age (years)*, mean ± SD	70.9 ± 10.3	63.0 ± 13.6
Sex (Male/Female)	17/7	52/17
SMI (cm^2/m^2)*	34.66	48.60
Clinical parameters (mean)		
Preoperative Hb (g/dL)*	11.92	13.26
Preoperative Alb (g/dL)	3.82	3.96
Δ Hb (POD1–Preop)*	0.73	-0.66
Δ Alb (POD1–Preop)	-0.28	-0.44
Δ Hb (absolute change)	1.48	1.82
Δ Alb (absolute change)*	0.30	0.56
Positive Hb change (POD1 > Preop), n (%)	13 (54.16%)	26 (37.68%)
Subanalysis, Age > 65	**Sarcopenia (n=17)**	**Non-sarcopenia (n=34)**
Age (years)*, mean ± SD	75.47 ± 6.3	73.65 ± 6.6
SMI (cm^2/m^2)*	34.71	46.72

Table 1 Comparison of baseline characteristics and clinical parameters between sarcopenia and non-sarcopenia groups (*P < 0.05)

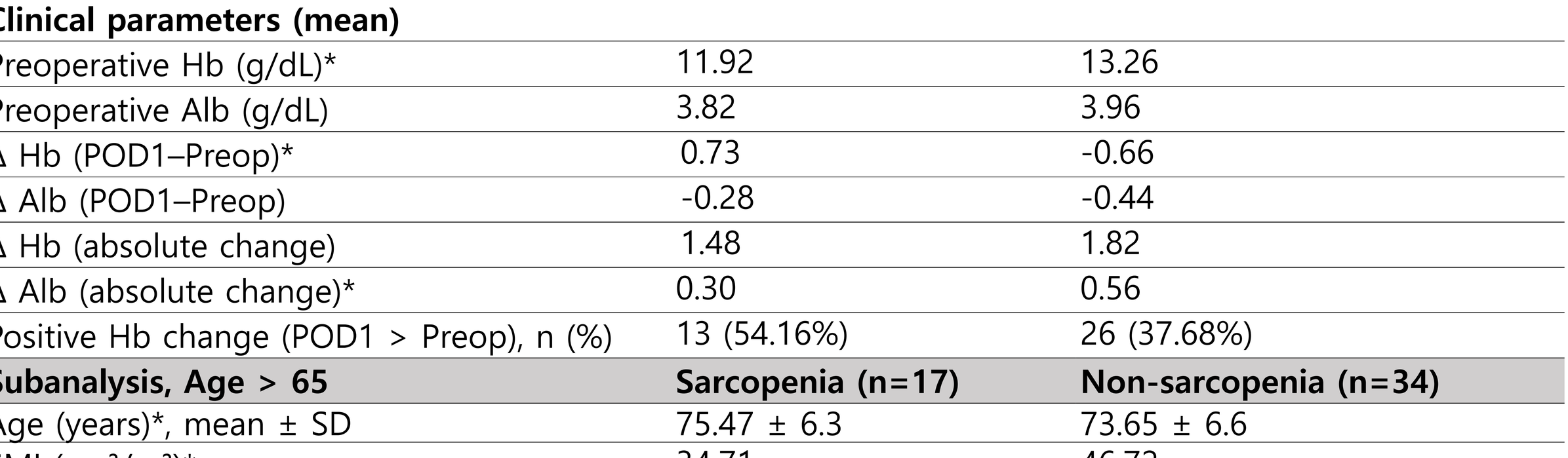

Figure 1 Temporal changes in serum albumin and hemoglobin levels from the preoperative period to postoperative days (POD) 1, 3, and 7 in patients with and without sarcopenia.

Conclusion

Patients with sarcopenia demonstrated greater metabolic and hematologic vulnerability following aortic surgery. The relatively attenuated decline in albumin may reflect reduced physiologic reserve and a blunted acute-phase response rather than a favorable metabolic state. The hemoglobin pattern suggests impaired recovery from systemic inflammatory stress, with a possible contribution from perioperative hemodilution. These findings highlight the importance of preoperative identification of sarcopenia and support individualized perioperative nutritional and rehabilitation strategies to improve early postoperative stability.