Malnutrition as a marker of carotid in-stent restenosis

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Related article
by Karaduman et al.

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In the latest issue of the *Polish Heart Journal*, the article by Karaduman et al. [1], titled "Predictive Significance of the Prognostic Nutritional Index (PNI) for In-Stent Restenosis Following Carotid Artery Stenting", explores an interesting hypothesis: PNI, a simple and commonly tool used to assess patients' nutritional and immune status, can serve as a predictor for in-stent restenosis (ISR) in patients who have undergone carotid artery stenting (CAS). This hypothesis is based on the premise that nutritional and inflammatory states may influence restenosis, as do other factors such as age, female sex, diabetes or dyslipidemia, as reported in the International Carotid Stenting Study [2].

CAS has emerged as an intervention for patients with carotid artery disease as an alternative to carotid endarterectomy. CAS helps to prevent ischemic stroke by revascularizing symptomatic or asymptomatic carotid stenosis. In the CREST trial, no significant difference in the estimated 4-year rates of the primary endpoint (stroke, myocardial infarction, or death from any cause during the periprocedural period or any ipsilateral stroke within 4 years after randomization) was found between the stent group and the endarterectomy group [3]. Despite those benefits, ISR remains a significant concern, often leading to repeat interventions and compromised outcomes.

ISR is caused by a simultaneous process of neointimal hyperplasia and smooth muscle cell proliferation within the stent, which leads to the atherosclerotic plaque being reformed [4]. Traditionally, risk assessment for ISR has focused on factors such as lesion characteristics, procedural details, and patient comorbidities. However, Karaduman et al. introduce an innovative approach by examining the predictive value of PNI, reflecting patients' nutritional and inflammatory status, which can be calculated using serum albumin and blood lymphocyte count. Recently, the PNI has been validated to identify the negative impact of malnutrition on prognosis in cardiovascular diseases (heart failure, valvular heart disease, atrial fibrillation, and acute coronary syndrome) [5–7]. Compared to other clinical variables, malnutrition has the advantage of being a modifiable risk factor on which physicians could act.

Karaduman et al. report a retrospective single-center study of 819 patients who were subdivided into groups in line with the presence or absence of ISR. During a follow-up of 24 months, ISR was observed in 35 patients (4.3%). Independent predictors of ISR were total cholesterol, stent overlap, residual stenosis, and lower PNI. The best cut-off for PNI to predict IST was 39.5 points, with a sensitivity of 83% and a specificity of 77%. This result reinforces the prior findings of Öcal et al. [8] who found that PNI was independently associated with long-term mortality and major stroke in CAS patients.

The strength of the study by Karaduman et al. lies in the methodological rigor, using a well-defined cohort, and performing an appropriate multivariate analysis helping to control confounding factors. Authors identify a simple, cost-effective biomarker that could have significant clinical implications. Nevertheless, there are certain considerations to address. The study's retrospective nature introduces potential biases, also the reliance on single-center data might limit the gener-

alizability of the findings. Given that ISR can occur over varying periods, short-term follow-up could not capture late events. Future prospective, multi-center studies would be valuable to validate these results across diverse populations and settings. Additionally, while PNI offers promise, it should be considered alongside other established risk factors rather than as a standalone predictor.

The incorporation of PNI into risk stratification models could refine our ability to identify patients at higher risk for adverse events following CAS, thus guiding more personalized and preventive care strategies. Identifying patients at higher risk could lead to more targeted surveillance and intervention strategies, such as optimizing nutritional status or managing inflammation, and it could be employed to mitigate the risk of IST. Therefore, future research to understand the underlying mechanisms and clinical trials are needed to validate these findings.

Article information

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