

**Abstract Type : Poster exhibition****Abstract Submission No.: A-0873****Abstract Topic : Dialysis**

Lipid Profiles and Early Outcomes of Arteriovenous Access in Hemodialysis Patients

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Objectives : In end-stage renal disease (ESRD), traditional cardiovascular risk factors exhibit paradoxical associations with outcomes due to malnutrition-inflammation complex syndrome. Non-HDL cholesterol has been linked to cardiovascular mortality in dialysis patients, yet its impact on arteriovenous (AV) access outcomes remains poorly defined.

Methods : We conducted a single-center retrospective cohort study of 1,587 hemodialysis patients who underwent arteriovenous fistula (AVF) or graft (AVG) creation between January 2010 and June 2025. Patients with a lipid profile measured within 6 months before access creation were included. Time to first PTA was analyzed using Cox proportional hazards models with restricted cubic splines to characterize non-linear lipid effects. Early access events—PTA ≤ 6 months, thrombectomy ≤ 6 months, and restenosis ≤ 3 months—were analyzed using logistic regression with non-HDL cholesterol categorized into quintiles.

Results : Mean age was 65.0 ± 13.9 years; 75.1% had diabetes mellitus. During follow-up, 526 PTA events occurred (14.04/100 person-years). Early PTA occurred in 307 patients (19.3%), early thrombectomy in 17 (1.1%), and early restenosis in 194 (12.2%). Spline analyses revealed a non-linear inverse association between non-HDL cholesterol and PTA risk, with the highest risk in the lowest non-HDL range. Patients in the lowest non-HDL quintile (Q1) had significantly higher odds of early PTA (adj OR 1.54, 95% CI 1.03–2.31, $p=0.036$) and early restenosis (adj OR 1.91, 95% CI 1.17–3.18, $p=0.011$) versus Q3 (Table 1). This association was confined to early events (≤ 6 months) and was absent for late PTA (> 6 months). No significant interaction was found between non-HDL quintiles and albumin status for either outcome.

Conclusions : Low non-HDL cholesterol was independently associated with early AV access dysfunction, including early PTA and restenosis, in hemodialysis patients. This association was not mediated by hypoalbuminemia, suggesting low non-HDL may reflect systemic frailty or altered lipid metabolism beyond malnutrition. Prospective studies are warranted to clarify the underlying mechanisms.

Table 1.png

Characteristic	Early PTA		Early thrombectomy		Early restenosis	
	Adj OR (95% CI)	p-value	Adj OR (95% CI)	p-value	Adj OR (95% CI)	p-value
non-HDL (quintile)						
Q1	1.54 (1.03–2.31)	0.036	2.81 (0.79–12.20)	0.11	1.91 (1.17–3.18)	0.011
Q2	1.29 (0.85–1.95)	0.23	1.26 (0.29–5.90)	0.76	1.50 (0.9–2.52)	0.12
Q3	1 (ref)		1 (ref)		1 (ref)	
Q4	1.08 (0.71–1.65)	0.72	0.33 (0.03–2.07)	0.24	1.24 (0.73–2.12)	0.4
Q5	1.05 (0.69–1.61)	0.83	0.13 (0.001–1.50)	0.11	1.24 (0.73–2.12)	0.4



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KSN SEOUL, KOREA
2026

The 46th Annual Meeting of the Korean Society of Nephrology



Jun 11 (Thu) – 14 (Sun), 2026
COEX, Seoul, Korea