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Dialysis

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High dose administration of erythropoietin-stimulating agent in hemodialysis patients is associated with late arteriovenous fistular failure

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Background: Investigating the vascular access failure risk is a critical issue for chronic hemodialysis patients. Erythropoietin stimulating agents (ESA) is a prevalent drug for anemia on chronic kidney disease (CKD) and could stimulate neointimal hyperplasia which is the most important factor of late arteriovenous fistula (AVF) failure. The aim of this study was to investigate whether ESA treatment is associated with late AVF failure

Methods: All patients were end stage renal disease (ESRD) patients who were treated with maintenance hemodialysis(MHD) at the hemodialysis center of CHA Bundang Medical Center between 2006 and 2015. For late AVF failure, we selected patients who received percutaneous intervention or surgery to revise the fistula after successful use of AVF for at least 3 months. 51 patients were eligible for late AVF failure group. 51 controls were selected whose AVF had been patent for at least 24 months.

Results: The mean age of the study population was 54.2 ± 13.5. The mean ESA dose was 5972.0±2828.6 IU/ml/week and 99.4 ± 50.0 IU/mL/week/kg. Average weekly dose of ESA was significantly higher in the patients with AVF failure . (4782.2 ± 2360.5 IU/mL/week versus 7161.8 ± 2775.2 IU/mL/week, $P < 0.001$ and 79.2 ± 42.4 versus 119.6 ± 49.2 IU/mL/week/kg, $P < 0.001$). The binary logistic regression test was performed to assess the effects of covariates on AVF patency. The variables chosen were those found in the univariate analysis to be significantly correlated with late AVF failure and the only independent predictor of late AVF failure on binary logistic regression test was high average dose of ESA ($P = 0.002$, table 1).

Conclusion: High ESA administration therapy might be the possible culprit of late AVF patency loss. AVF failure is important factor increasing MHD patient morbidity risk. Since the regulation of ESA dose is correctable factor, it would be very important for physicians to adjust ESA dose with great deliberation.

Table: Table 1. Binary logistic regression test for AVF failure

	Odds ratio (95% CI)	P value
High dose ESA	5.117 (1.790-14.622)	0.002
Age	1.033 (0.988 - 1.081)	0.157
HTN	1.338 (0.339 - 5.280)	0.677
Diabetes	2.491 (0.840 - 7.385)	0.100
Ischemic heart disease	3.166 (0.581 - 17.252)	0.183

Blood flow rate	0.986 (0.971 – 1.002)	0.082
Albumin	0.723 (0.297 – 1.757)	0.474
iPTH	0.999 (0.996 – 1.002)	0.476

AVF, arteriovenous fistula; CI, confidence interval, ESA, erythropoietin stimulating agent.; HTN, hypertension; PTH, intact parathyroid hormone.

Keywords: Arteriovenous fistula, Erythropoietin stimulating agents