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Factors associated with maturation of hemodialysis arteriovenous fistula: A single center cohort study

Eunghyun Lee, Hyung Duk Kim, Byung Ha Chung, Cheol Whee Park, Chul Woo Yang, Yaeni Kim
Department of Internal Medicine-Nephrology, The Catholic University of Korea, Seoul St. Mary's Hospital, Korea, Republic of

Objectives: This study aimed to analyze maturation rate and factors associated with unassisted, assisted maturation and failure to maturation of hemodialysis arteriovenous fistulae (AVF).

Methods: A prospectively maintained database between 2012 and 2020 at a tertiary university hospital was analyzed retrospectively. Demographic and ultrasonographic factors associated with AVF maturation were determined by univariate and multivariate analyses. Postoperative ultrasound parameters including diameters of brachial/feeding artery, anastomosis, draining vein(mm), access blood flow rate(ml/min) were measured and presence of stenosis and calcification was recorded.

Results: During the period, 1,414 vascular access(1,133 AVF and 281 arteriovenous graft (AVG)) were created in the upper extremities in 1,297 patients. Among 971 AVF whose successful cannulation for hemodialysis were determined, unassisted, assisted maturation and failure rates for AVFs were 68%(n=659), 22%(n=219), and 10%(n=93), respectively. Postoperative ultrasonography data acquired within 60 days of creation were available in 623 newly created AVFs. 412 AVFs(66%) matured without assistance, 138 AVFs(22%) matured as assisted by percutaneous angioplasty(PTA), and 73 AVFs(12%) failed to mature no matter what. Baseline demographic characteristics between patients with unassisted AVF maturation(n=412) versus(vs) assisted AVF maturation and failure to mature(n=211) were comparable. Brachial and feeding artery diameter were larger in unassisted maturation group when compared to assisted and failure to maturation group(5.53±0.83 vs. 5.33±0.74, p=0.006 and 4.92±1.04 vs. 4.59±1.04 p<0.001, respectively). Unassisted maturation group showed higher access flow rate and lower presence of stenosis(1,009±504 vs 769±395, p<0.001, 11% vs 20%, p<0.001, respectively). Multivariate analyses showed that larger draining vein diamete (p = 0.002), greater blood flow rate(p = 0.001), and absence of stenosis(p = 0.005) were associated with unassisted maturation of AVFs.

Conclusions: Unassisted AVF maturation is predicted by greater AVF blood flow rate, diameter of the draining vein, and absence of stenosis