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Changes in brachial artery flow rate and factors affecting the flow by duplex ultrasound during access maturation in incident hemodialysis patients

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Objectives: Little is known about the changes in hemodynamic parameters during access maturation using duplex ultrasound in incident hemodialysis patient. The objective of this study was to evaluate change in brachial artery blood flow and factors affecting blood flow in arteriovenous access by duplex ultrasonography during vascular access maturation in incident hemodialysis patients

Methods: This study is a prospective observational study conducted from March 2019 to February 2020. In patients with fistula(n=39) and graft(n=19), duplex ultrasonography was performed on the day before access creation, further, 1 day, 2 weeks, and 4 weeks later after access creation in incident hemodialysis patients. Blood flow were measured in the brachial artery. Patients with arrhythmia were excluded from the study.

Results: There were 35(60.3%) males, mean age was 62.3 years and 40(69%) were diabetic patients. The preoperative brachial artery flows were 83.2±51.4 ml/min, the day after creation (1,006.8±410.4 ml/min), 2 weeks later (1,069.4±370.3 ml/min), and the flow were 1,151.1±407.5 ml/min after 4 weeks later. There was no maturation failure. Except for radiocephalic fistula, brachiocephalic fistula, fore-arm loop and upper arm straight graft had no difference in flow rate at 1 day and 4 weeks later after access creation. In the multiple regression analysis, serum albumin levels (p=0.005, Beta=0.408) and pulse rate (p=0.001, Beta= -0.433) in patients with normal sinus rhythm were significant factors affecting blood flow rate. Diameter of brachial artery (p=0.271) and systolic blood pressure(p=0.584) did not affect blood flow rate in the multiple regression analysis.

Conclusions: Clinically, there were no differences between the brachial artery flow at 1day and 4 weeks after access creation. Albumin level and pulse rate were significant factors for increase in the brachial artery flow rate after access creation.