Takeo Ishii, J Nephrol Ther 2017, 7:5(Suppl)
DOI: 10.4172/2161-0959-C1-044

16th EUROPEAN NEPHROLOGY CONFERENCE

October 02-03, 2017 Barcelona, Spain

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Duplex ultrasound for the prediction of vascular events associated with arteriovenous fistulas in hemodialysis patients

Objective: Aim of this study is to determine if duplex ultrasound (US) for arteriovenous fistulas (AVFs) can predict vascular events (VEs; thrombosis and stenosis).

Methods: Duplex US were performed for vascular access evaluation in 2557 maintenance hemodialysis (HD) patients between October 1, 2013 and March 31, 2016. Of these patients, 2184 patients were finally included in this study. AVF dysfunction was assessed using the brachial artery blood flow volume (Qa; mL/min), arterial blood flow resistance index (RI), and residual diameter of the fistula vein (RD; mm). Proximal, midpoint, and distal aspects of the fistulas were measured. The baseline measurements were the US assessments, and the endpoint was VEs requiring vascular access intervention therapy or vascular surgery. Associations of US findings and VEs were assessed with receiver operating characteristic curve analysis, log-rank analysis, and multivariate cox hazard models.

Results: The mean Qa was 772.8±441.4 mL/min; RI, 0.56±0.1; and RD, 2.37±1.0 mm. The optimal Qa cut-off point was calculated as 581.5 mL/min, RI cut-off as 0.56, and RD cut-off as 1.85 mm. VEs were more frequent in patients with a Qa <581.5 mL/min than in those with a Qa>581.5 mL/min ($p<0.001$). In multivariate analysis, Qa, ferritin, transferrin saturation and warfarin use were significantly associated with VEs.

Conclusions: US evaluation of AVFs in HD patients along with measurement of brachial artery blood flow is a simple method to predict the risks of thrombosis and fistula dysfunction.

Biography

Takeo Ishii has completed his PhD from Jikei University School of Medicine, Tokyo. He is now the Co-director of Yokohama Daiichi Hospital, a central hospital of Zenjinkai Group. Zenjinkai Group is consisting of 51 hemodialysis clinics and health check-up centers. He is also a Research Fellow of Department of Medical Science and Cardio-renal Medicine, Yokohama City University, Graduate School of Medicine. He has received award from Japanese Society of Nephrology.

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