Lecture Code : DS02-S4
Session Name : Dialysis Specialist Physician Course 2
Session Topic : Vascular Access Essentials for Dialysis Specialist Physician
Date & Time, Place : June 22 (Sun) / 10:40-12:40 / Room 3 (GBR 103)

High Flow Vascular Access: Prevention and Management

Sangeon Gwoo
Lifeline Clinic, Republic of Korea

Treatment and Prevention of High-Flow Hemodialysis Access Arteriovenous (AV) access is essential for maintaining life in hemodialysis patients; however, the non-physiological high blood flow (Qa) can lead to serious complications including cardiopulmonary dysfunction, distal ischemia, and decreased dialysis efficiency. High flow is generally defined as Qa >1500mL/min or exceeding 20% of cardiac output. Brachial artery-based AV fistulas carry a higher risk of developing high flow compared to distal radial artery-based fistulas. Treatment options for high-flow access include precision banding, revision using distal inflow (RUDI), and venous branch ligation. Precision banding has emerged as the standard practice due to its safety and effectiveness, and can be easily adjusted until the desired Qa reduction is achieved. The procedure uses a sizing device placed intraluminally or extraluminally to ensure controlled luminal restriction. Accurate intraoperative Doppler ultrasound flow measurements are considered mandatory for success. The target flow rate is approximately 800mL/min for AV fistulas and 1000mL/min for AV grafts. While treatment success rates exceed 90%, early thrombosis rates range from 3.8-12.1%, with a median time to thrombosis of 5.5 days. Re-banding may be required in approximately 14% of cases, with a median time to re-banding of 134 days. Cardiac complications of high-flow access include eccentric left ventricular hypertrophy, high-output cardiac failure, and pulmonary hypertension. The chronic effects of these changes on the myocardium appear to be primarily due to volume overload, which translates into remodeling of the cardiac muscle characterized by four-chamber dilatation. Other complications include access-induced distal ischemia, decreased dialysis clearance due to cardiopulmonary recirculation, and accelerated venous stenosis. Aneurysmal enlargement of the access can occur over time due to increased wall shear stress and downstream venous stenosis. If allowed to progress unabated, the end result can be a diffusely ectatic, tortuous AV fistula commonly referred to as a "megafistula." Removing the high-flow stimulus does not result in regression but can arrest further advancement. A preventive approach before

the onset of clinical signs of high-flow AV access is crucial. Continuous monitoring should be implemented, and flow reduction should be actively considered when blood flow exceeds 1500mL/min, even in the absence of clinical symptoms. Once vascular deformation progresses, correction becomes difficult and thrombosis risk increases, making early intervention vital for improving long-term patient outcomes. Flow reduction effectively improves or eliminates clinical signs and symptoms associated with high flow, with benefits observed even in asymptomatic patients with cardiac or pulmonary manifestations. For patients with persistent symptoms following flow reduction, access ligation may be required. Prevention is preferred over waiting for disease to occur, as the basic tenet of medicine suggests. By implementing precision banding proactively, complications can be prevented before they develop, potentially improving quality of life and reducing morbidity in hemodialysis patients.

Keywords: High flow AV access, Interventional Nephrology, AV fistula, AV graft, Dialysis