

High Output Cardiac Failure Associated with a High Flow Arteriovenous Fistula

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Hemodynamic effects of hemodialysis arteriovenous fistulae (AVF) creation are paramount. Immediate effects after AVF creation include 10 to 20% increase of cardiac output with a substantial increase in sympathetic activity and a decrease in peripheral resistance. In a long term, increased left ventricular (LV) end-diastolic volume induces LV hypertrophy, collectively resulting in high-output cardiac failure (HOCF). Here, we introduce a case of HOCF due to a brachiocephalic fistula (BCF) harboring high access flow (AF) which was successfully treated by endovascular banding. A 53-year-old man with hemodialysis vintage for five years complained of exertional dyspnea aggravating few months ago. Physical examination showed blood pressure of 110/65 mmHg, pulse rate of 101 bpm, and respiration rate of 20 per minute. His neck vein was engorged and both extremities were cold without edema. Chest x-ray showed cardiomegaly and ECG showed normal sinus rhythm. Laboratory findings showed no evidence of anemia and cardiac enzymes were elevated prominently with Troponin-T 0.07 ng/ml, and proBNP > 70,000 pg/ml. Echocardiography revealed severe LV systolic dysfunction with ejection fraction of 24% and all chambers were significantly enlarged. There was no evidence of coronary artery disease on angiography. Hemodialysis access history was scrutinized. Right BCF was created two years ago after abandonment of ipsilateral radiocephalic AVF due to thrombosis. Since then, AF measured by ultrasound dilution increased gradually from 1,080 ml/min to 3,080 ml/min. With 12 L/min cardiac output in the presence of high flow hemodialysis access, HOCF was diagnosed. About 1 cm sized cephalic vein diameter proximal to anastomosis was reduced to 3 mm by endovascular banding which decreased AF from 3,080 to 1,150 ml/min. After AVF flow reduction, patient symptoms pertinent to HOCF were immediately relieved. High AF fistulae produce detrimental impact on cardiac indexes contributing to a state of HOCF. AF > 2 L/min, AF/CO > 20%, brachial based fistulae are associated with increased risks for developing HOCF and for those with symptomatic HOCF, IAF reduction may improve clinical outcome.

