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Outcome of Endovascular Salvage of Immature Hemodialysis Arteriovenous Fistulae

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Objectives : To assess the anatomical causes of immature hemodialysis (HD) arteriovenous fistula (AVF) and the outcome of endovascular salvage.

Methods : Anatomical causes, clinical characteristics, and the success rate of endovascular salvage of 110 immature AVF were retrospectively analyzed.

Results : A total of 110 patients included 52 females and 64 diabetics. The mean age was 63±13 years old. The access types were radiocephalic fistulae (n=62), brachiocephalic fistulae (n=45), and transposed brachiobasilic fistulae (n=3). At the time of angiography, 75 patients were maintained on HD using tunneled HD catheters. Mean interval between AVF creation and referral to angiography was 94±69 days in all patients.
Angiography revealed stenoses (n=49; 26 inflow, 9 outflow, and 14 mixed), accessory veins (n=16), and inadequate selection of vessels (n=2) in 62 patients with radiocephalic fistulae.
It revealed stenoses (n=41; 14 inflow, 17 outflow, and 10 mixed), accessory veins (n=11), deeply located cephalic veins (n=2), and inadequate selection of vessels (n=4) in 48 patients with upper arm fistulae.
Endovascular salvage procedures performed in 107 patients included percutaneous transluminal angioplasty (PTA) (n=95) and accessory vein obliteration (n=27; 1 percutaneous ligation, 12 surgical ligation, 14 coil insertion). The number of procedures was once in 83 patients, twice in 17 patients, and three times in 7 patients. The overall technical and clinical success rates were 95.2% and 92.3%, respectively. Mean interval between endovascular procedure and the first successful cannulation of the fistula was 31±38 days in patients on maintenance HD
At 3, 6, 12, and 24 months following the first successful cannulation, the primary patency rates were 84.7%, 71.0%, 57.4%, and 39.7%, respectively. Assisted patency rates of 97.7%, 95.2%, 91.0%, and 79.0% and secondary patency rates of 98.9%, 97.5%, 96.1% and 91.4% at consecutive 3, 6, 12, and 24 months, respectively.
Multivariate Cox regression analyses revealed mixed stenosis to be the only

determinant that affects secondary patency rate of immature AVF. In line with this, immature AVF with mixed stenosis revealed poorer access outcome in terms of secondary patency rate compared with that of no mixed stenosis (either inflow or outflow lesion). ($p < 0.001$)

Conclusions : Immature AVF can be successfully salvaged by aggressive and timely endovascular intervention. Endovascular procedures can salvage the majority of cases with high success rate and patency rate. The presence of mixed stenosis is associated with poor access outcome.

Keywords : Immature arteriovenous fistulae, Primary patency, Secondary patency, Angioplasty