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FOREARM LOOP ARTERIOVENOUS FISTULA CREATION – OUR EXPERIENCE WITH 9 CASES

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INTRODUCTION

A good, reliable and long lasting vascular access plays an important role in attaining adequate haemodialysis. The more distal the arteriovenous fistula creation, the more ideal it is for the patient. The sequence of fistula creation starts from the 'snuff box' at the base of the thumb, wrist, forearm and finally the antecubital fossa. However, some of the chronic kidney disease patients with long term diabetes mellitus will have severe atherosclerosis of the distal artery which made it not feasible to be used. Thus, antecubital fistula has to be created and therefore reduced the availability of access for dialysis in future. The aim of the study is to present an alternative for haemodialysis access to preserve the upper arm vasculature of future use – ***the forearm loop arteriovenous fistula*****.**

METHOD

A prospective study was performed from January 2015 to December 2015 in Hospital Universiti Sains Malaysia. 202 patients with chronic kidney disease (CKD) stage 4 and 5 underwent arteriovenous fistula creation. 9 patients who had severe atherosclerosis of the distal artery but satisfactory good veins underwent forearm loop arteriovenous fistula creation (Fig 1.). Patient selection for loop AVF was based on clinical examination and ultrasonography of the artery and vein. Selection of the vein used in this loop AVF was based on its size, minimally 2.5 mm in external diameter. Maturation of the fistula was based on the classification by the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (NKF KDOQI).

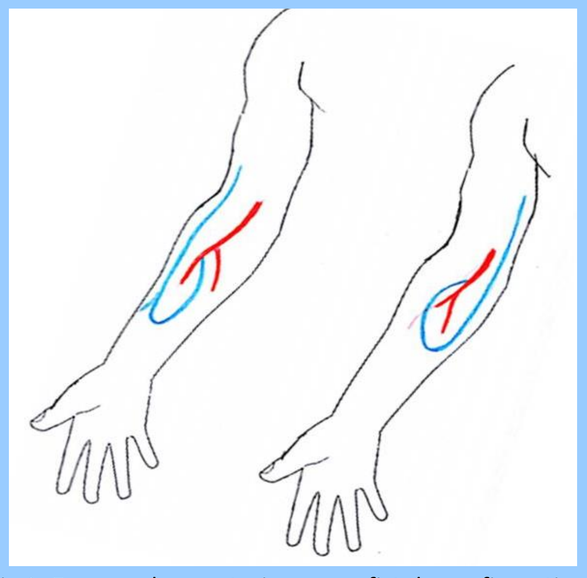

Fig 1. Forearm loop arteriovenous fistula configurations.

CONFIGURATION	n	AVERAGE DIAMETER SIZE (mm)
Brachial artery – cephalic vein	6	Artery = 4.5 Vein = 3.7
Brachial artery – basilic vein	3	Artery = 4.2 Vein = 3

Table 1. Configuration and average diameter of vessel size.

Fig 2.(A) Under brachial block, 3 stab incision were made along the selected forearm vein. (B) Vein was dissected free and branches were ligated and divided. (C) U-shaped subcutaneous tunnelling was constructed on the volar aspect of the proximal forearm to the brachial artery. End to side anastomosis with 9/0 polypropylene was constructed under microscope magnification.

RESULTS

7 out of 9 patients who underwent forearm loop arteriovenous fistula had diabetes mellitus for more than 10 years. The forearm cephalic vein was the popular choice in this series due to its good average size of 3.7mm. 2 of the patients had previous ipsilateral radiocephalic fistula created which failed to mature. Average duration of operative time was 130 minutes which took longer than the conventional AVF creation. Median follow-up was 6 weeks (4-8 weeks) where 88.9% (n=8) of the fistula matured. There was only one created fistula which failed to mature. There were no severe complications or steal syndromes reported till today. However, two arteriovenous fistulas thrombosed at 3 and 5 months, respectively, after commencement of haemodialysis.

CONFIGURATION	MATURATION (n=9)	LONG TERM RESULT (failed)	COMPLICATION
Brachial artery – cephalic vein	6 (100%)	1 (16.7%)	Nil
Brachial artery – basilic vein	2 (67%)	1 (50%)	Nil

Table 2. Results of forearm loop AVF

DISCUSSION

Diabetes mellitus plays a main role in renal failure accounting about 58% in Malaysia. Patients with long standing diabetes mellitus will have atherosclerotic disease of the arteries. The distal artery of the forearm will be more calcified leading to a smaller internal diameter as compared to the proximal arm artery. This condition made it unfavourable to create the gold standard arteriovenous fistula at the distal site of the forearm despite the forearm vein is satisfactory. In 1983, Moris and Kinnaert introduced the technique of brachial artery-forearm vein fistula. Transposed forearm loop fistula is ideally used as it will receive inflow from the larger artery at the antecubital fossa without sacrificing the usage of the forearm vein. The upper arm veins can be preserved for future use if needed and this will give more assurance of availability of access for dialysis in a long run.

Loop arteriovenous fistula creation may reduce the need for arteriovenous graft which is made from polytetrafluoroethlyene (PTFE). Arteriovenous graft is frequently a loop configured access which may be used to connect the forearm vein or upper arm vein to the brachial artery. It has less early failure rate and can be used as early as 2 weeks post-operative. However, loop arteriovenous fistula which is autologous is more beneficial as it is known to have a good long term patency and more cost effective although it carries a high early failure rate. There is less risk of infection in using an autologous vein as comparable to a graft.

Duration of operative time for loop arteriovenous fistula may take a longer time as comparable to the operative time for the conventional arteriovenous fistula. This is due to the need to dissect an adequate length of vein to loop it up to the proximal artery. However duration of the operative time is surgeon dependant. Multiple incision sites will be needed to dissect the whole length of the chosen forearm vein. With evolution, endoscopic vein harvesting may play a role in harvesting the forearm vein which will reduce the amount of incisions, wound problem and inflammatory changes within the forearm.

CONCLUSION

Distal forearm arteries in diabetics are usually severely atherosclerotic. No consensus has been reached in identifying the precise criteria for selection of upper extremity arteries and vein. Forearm loop arteriovenous fistula should be considered in a hostile forearm as the primary access in preserving the upper arm veins for future.

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