

Creation of Arterio-Venous Fistula in Chronic Renal Failure Patients

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ABSTRACT

Aim: To analyze the method of creating AV fistula and factors affecting its functioning.

Material and methods: The study was carried out between August 2016 and July 2018 on 50 patients with chronic renal failure. They were subjected to side to side AV fistula under local anaesthesia. Various parameter of operative procedure and outcome of procedure were analysed.

Results: Mean operative time of procedure was 46 minutes. The success rate of AV fistula creation was 80%. In those patients with failure 50% had diabetes mellitus and 20 % had ischemic heart disease.

Conclusion: Arteriovenous fistula for haemodialysis has reasonably good success rate with fewer complications.

Keywords: arteriovenous fistula, haemodialysis, chronic renal failure.

INTRODUCTION

An arteriovenous fistula (AV fistula) is connection of a vein and an artery usually in the forearm to access to the vascular system for haemodialysis a procedure that performs the functions of the kidneys which had failed. Once kidney function goes below 10 to 15 percent of normal dialysis treatment or transplantation are necessary to sustain life. Dialysis cannot replace kidneys or restore them but they can prolong life often for years by preventing the build-up of waste products in the body. Haemodialysis cleans blood by removing it from body and passing it through a dialyser or an artificial kidney when an artery and vein are joined together the vein gradually becomes larger and stronger creating the fistula provides vascular access which last longer than other types of access with fewer complications. [1-3]

An Indian population-based study determined the crude and age-adjusted

ESRD incidence rates at 151 and 232 per million populations, respectively. [4]

In present study we analyse various parameters of operative procedure and its outcome.

MATERIALS AND METHODS

The study was performed on 50 patients with chronic renal failure who were presented between August 2016 and July 2018 in our institute. All patients were thoroughly assessed preoperatively by taking detail history and relevant blood investigation.

The cephalic vein and radial artery were examined and upper limb with prominent vein, preferably non-dominant hand was selected for creation of AV fistula. Operative procedure: the procedure was performed in supine position. The hand was 90 degree abducted and was supported on trolley. After painting and draping, local

anaesthesia was given and a 5 cm incision was taken between artery and vein.(Fig 1)



Fig 1. Incision

Small skin flap is elevated and cephalic vein was dissected (Fig 2)

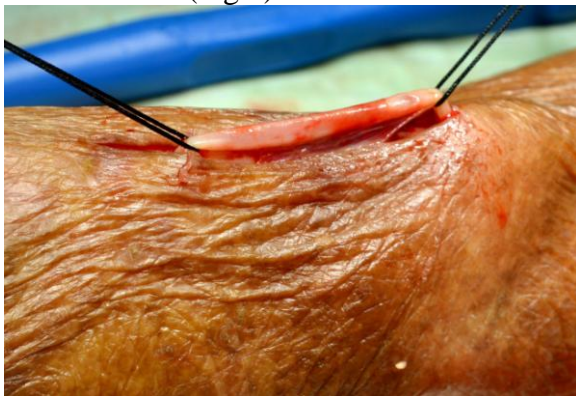


Fig2. Dissection of cephalic vein

After identification of vein, radial nerve was identified and retracted medially to prevent injury (Fig 3).



Fig. 3 Identification of radial nerve

Then radial artery was dissected after incising deep fascia covering it.(Fig 4) . Small branches were occluded by diathermy.

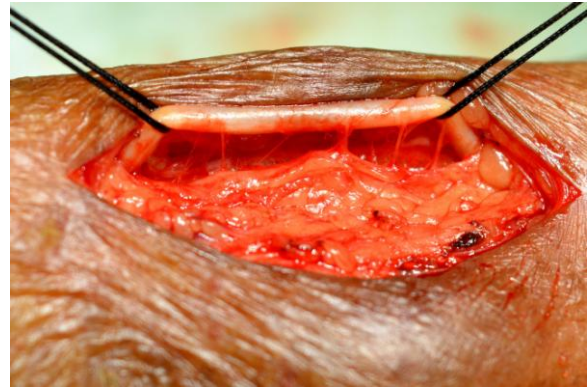


Fig. 4 Isolation of radial artery

Then dissected artery and vein were brought together and bulldog clamp applied over them on both side. (Fig 5)

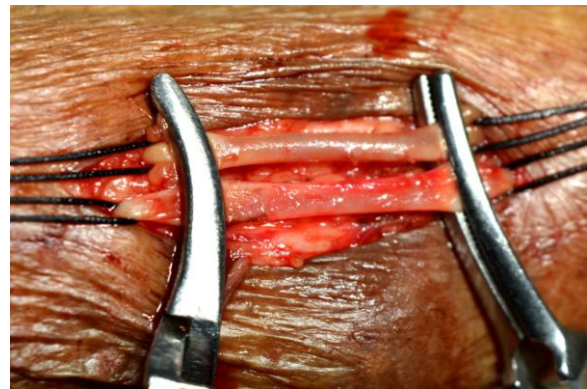


Fig. 5 Bulldog application

Then 1 cm incision was put on artery and vein with stab knife and both lumen flushed with heparinised solution. Then Side to side anastomosis was created by 6-0 prolene with round body needle on both ends. Continuous non locking suture were taken.(Fig 6,7)

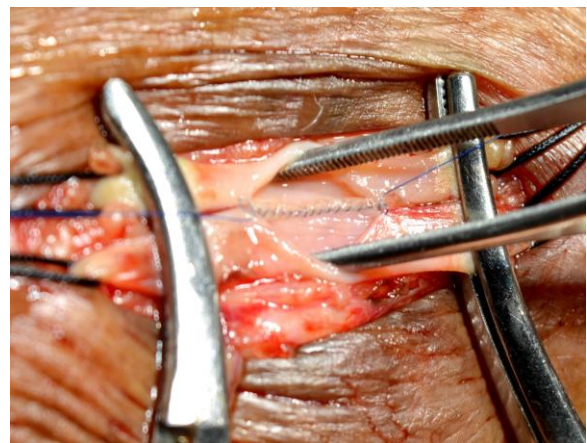


Fig.6 Posterior layer anastomosis

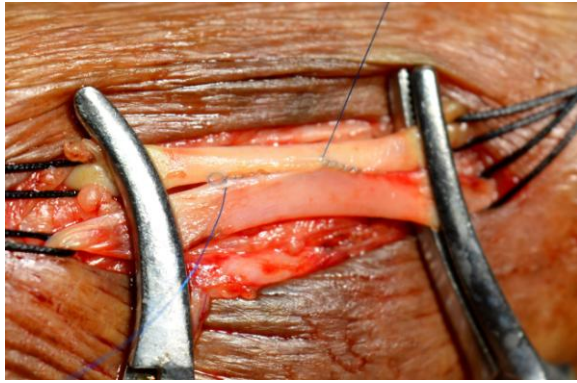


Fig.7 Anterior layer anastomosis

The distal part of vein (facing palmer side) was occluded to prevent venous hypertension in distal part of the limb. Finally skin was closed by interrupted vertical mattress using Ethilone3-0. Post operatively renal safe antibiotic, analgesic and antiplatelet drugs were prescribed to patients. Patients were advised to do palmer exercise with soft ball. Patients were called for follow up on 2nd, 7th and 14th post operative day. The patency of fistula was checked by local auscultation.

RESULTS

In our study, out of 50 patients, 30 (60%) patients were male and 20 (40%) patients were female. 40 (80%) patients had functioning fistula at 14th post operative day. Out of 10 patients who had failure, 5 (50%) patients had diabetes and 2 (20%) had ischaemic heart disease as associated disease. The complications are depicted in table 1:

TABLE-1 COMPLICATIONS

| COMPLICATION | NO OF PATIENTS |
|-----------------|----------------|
| FAILURE | 10 (20%) |
| ANEURYSM | 3(6%) |
| WOUND INFECTION | 2(4%) |
| OEDEMA | 5(10%) |
| MORTALITY | 0 |

Patients who had fistula failure was advised to do refistula at higher site or at opposite limb. In patients where aneurysm developed, fistula was closed and refistula was created at higher site. Wound infection was treated with higher antibiotics. Patients who developed oedema were treated by aggressive management of chronic renal

failure and limb elevation. There was no per operative mortality noted in any patient.

DISCUSSION

CKD (chronic kidney disease) is defined as any condition that causes abnormalities of kidney structure or function for a duration of more than 3 months with notable implications for patient health. [5,6] Globally, CKD is associated with high morbidity and mortality with approximately 735,000 deaths annually. [7] There are various treatment modalities for management of CKD starting from conservative management to peritoneal dialysis, haemodialysis and renal transplantation.

Conservative management includes management of CKD without dialysis or a kidney transplant. Treatment includes preserving kidney function for as long as possible, managing symptoms, such as nausea, poor appetite and managing other health problems caused by kidney failure, such as anaemia and maintaining quality of life for as long as possible.

The decision to initiate maintenance dialysis in patients who choose to do so should be based primarily upon an assessment of signs or symptoms associated with uraemia, evidence of protein-energy wasting, ability to safely manage metabolic abnormalities and volume overload with medical therapy. These patients should be offered either peritoneal dialysis or haemodialysis. [8]

First successful peritoneal dialysis was reported by Fine and colleagues in 1940. [9] There are two forms of peritoneal dialysis, Continuous ambulatory peritoneal dialysis (CAPD) and Continuous cycling peritoneal dialysis (CCPD).

The benefits of PD includes lower decline in residual kidney function compared to HD, Declining risk in PD-related peritonitis over the last decades, technically simple and greater autonomy and independence for patients compared to facility-HD. The limitations of PD include previous major abdominal surgery or

abdominal scarring, Poor lung function, Chronic inflammatory bowel disease, Acute diverticulitis, Diverticulosis, Ischemic gut, bowel cancer, Obesity, abdominal wall hernias, abdominal aortic aneurysm, Documented loss of peritoneal function, Extensive abdominal adhesions limiting dialysate flow and Fresh intra-abdominal foreign bodies and peritonitis. ^[10]

Haemodialysis is the most common type of dialysis. Modern haemodialysis therapy started on 17 March 1943, when William Kolff, treated a 29-year-old housemaid suffering from malignant hypertension and ‘contracted kidneys’. ^[11] The legendary paper ‘Chronic hemodialysis using venipuncture and a surgically created arteriovenous fistula’ was published in 1966 by Brescia, Cimino, Appell and Hurwich. ^[12] Haemodialysis can be done by arteriovenous (AV) fistula, AV graft or vascular access catheter.

Advantages of haemodialysis includes less mortality, decrease chances of infection specifically in arteriovenous fistula, widely available facility, better results in diabetic and older patients with greater comorbidity. Limitations of haemodialysis includes higher cost than peritoneal dialysis, low survival rates in the first and second years of treatment, less flexibility in dialysis schedule. ^[13]

Renal transplantation is definitive management of CKD. In 1939, the first transplantation from a deceased human donor was done by the Russian Yurii Voronoy, the patient survived for only a couple of days, and the organ never worked. In 1954, a milestone was made with the first long-term successful kidney transplantation by Joseph Murray, the transplantation was done between monozygotic twins and the organ survived for 8 years. ^[14] Transplantation improves quality of life as well as life expectancy of patient, it provides huge survival advantage compared to dialysis and obviously it also eliminates the need for dialysis, but has been associated with medical complications that impair the quality of life of transplant

recipients and substantially add to societal health care costs. ^[15] Early complications include acute renal failure, allograft rejection, technical problems, infections, and gastrointestinal disorders. Late complications include de novo and recurrent renal disease, chronic allograft rejection, atherosclerotic cardiovascular disease, chronic liver disease, malignancy, musculoskeletal problems, skin diseases, cataracts, and post transplantation diabetes. ^[16] The barriers to universal transplantation as the therapy for end-stage kidney disease include the economic limitations, technical challenges of surgery, consequences of immunosuppression, shortage of donated organs and the limited medical, surgical, and nursing workforces with the required expertise. ^[17]

It is estimated that in India, 3500 patients undergo renal transplantation, 3000 new patients are put on continuous ambulatory peritoneal dialysis, and more than 15,000 patients begin maintenance haemodialysis in a year. ^[18] In India, today, more than 200 centres are carrying out transplantation that depends heavily on living donors from near relatives. Statistics suggests that about 150,000 people in India are waiting for renal transplantation. Only 1 out of 30 people who need a kidney receives one. Ninety percent of people on the waiting list die without getting an organ. ^[19]

CONCLUSION

Creation of arteriovenous fistula for haemodialysis is simple outpatient procedure. In our study of creation of arteriovenous fistula for haemodialysis reveals that arteriovenous fistula for haemodialysis has reasonably good success rate with fewer complications. Association with diabetes and ischaemic heart disease leads to higher failure rates. Complications of arteriovenous fistula creation if properly treated are not life threatening.

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