

Vascular Access- Hemodialysis

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Abstract

Even as we speak chronic kidney failure is taking a huge toll on lakhs of families in India. This is unfortunate because kidney failure is the easiest of all organ failures to manage. We have dialysis which can replace kidney function to a significant extent and kidney is the easiest solid organ to transplant. This sad situation is because of a number of factors, the most important of which is the lack of awareness at all levels of the society. Compared to similar patients in the developed world or even some other developing countries, kidney failure patients have extremely poor outcomes in India. As things today we are not even addressing the tip of the iceberg. In the past, one of the major problems and causes of failure in Hemodialysis (HD) was represented by the lack of good vascular access (VA). Obtaining vascular access is one of the most difficult problems associated with HD. To carry out HD, a very rapid blood flow is required and access to a large blood vessel is essential. After the introduction of the fistula, in the last few decades, the advent of prosthetic Arteriovenous graft (AVG) and central venous catheters (CVCs) has given physicians the opportunity to choose the most appropriate VA for HD patients. However, the native AVF remains the first choice for VA, especially because of the infectious and thrombotic complications more frequently associated with AVGs and CVCs.

Keywords: Dialysis; Hemodialysis; Vascular Access; Arteriovenous Graft.

Introduction

Dialysis is started when the patient develops symptoms of severe fluid overload, high potassium levels, acidosis, pericarditis, vomiting, lethargy, fatigue or uremia that are life threatening. Both peritoneal dialysis and hemodialysis involve the movement and diffusion of particles from an area of high concentration to an area of low concentration through semipermeable membrane [1]. Fluid and electrolyte imbalances can be corrected with dialysis. Kidney failure can affect people of any age group. While in the west, the majority of patients are elderly; in India kidney failure patients are much younger and affect predominantly the working population [2].

Types [2]

- Shunts.

- Arteriovenous fistulas (AVFs) and Grafts (AVGs),

- Temporary and semipermanent catheters

- Subcutaneous ports

Shunts: consists of a U shaped Silastic tube divided at the midpoint and each of the two ends is placed in an artery and a vein. Nowadays these are rarely used.

Internal Arteriovenous fistulas and Grafts: provides for arterial blood flow through vein. Radiocephalic / Brescia- Cimino is anastomosis of radial artery to cephalic vein. It is recommended that the AVF be placed at least 3 months prior to the initiation of hemodialysis.

Arteriovenous grafts (AVG's): are made of synthetic materials polytetrafluoroethylene (PTFE) and form a bridge between the radial and arterial and venous blood supplies. An interval of 2-4 weeks is usually necessary to allow the graft to heal.

Temporary Vascular access: A flexible Teflon, silicone rubber or polyurethane catheter is inserted into large veins (internal jugular/ femoral vein/ subcutaneous vein) and provides access to circulation without surgery. These can be left in place for 1-3 weeks.

Subcutaneous ports: incorporating two silicone

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catheters positioned in the central venous system and connected to a stainless steel-titanium valve implanted in a subcutaneous pocket.

Physical Examination [3]

Inspection: Look for

Aneurysms

Fistula that does not collapse

Palpable strictures

Arm edema

Prolonged bleeding after needle withdrawal

Palpation (Touch) and Auscultation (listen)

Strong pulse is NOT an evidence of good flow.

Palpable Thrill (Buzzing/ Pulsing feel)

Percussion: NOT performed

Nursing Responsibilities [5]

Nursing measures	Rationale
Hand Hygiene is the prime measure	To reduce risk of infection
Dressing change: 24-48 hrs of insertion (if gauze dressing, then change in every 2 days)	To prevent growth of microorganisms
Aseptic techniques to be maintained always	To prevent infection.
Check vital signs	To check deviation from normal parameters
Check thrill/pulse daily	To evaluate proper functioning of fistula.
Assess the site for any redness, swelling, tenderness/ drainage	To detect early signs of infection.

Follow institution protocol for cleaning solution and type of dressing.

Patient teaching [5]

- Report any changes you notice (Bleeding/ reduced circulation/infection) in your access to your nurse, doctor or technician.
- Make and keep appointments to have access checked
- Protect your access. Keep it clean, and do not let anyone other than dialysis-trained personnel use it.
- Make sure your access site is used only for dialysis and that no one puts a blood pressure cuff on your access arm.
- Encourage to perform regular hand exercises to promote maturation of a new fistula. Exercises means squeezing a rubber ball for forearm fistula in order to increase the size of the vessels and thereby to accommodate the large-bore needles used in hemodialysis.
- Be careful not to bump or cut your access site.
- Do not wear tight clothing or jewellery over your access site.
- Do not sleep with your access arm under your body or head.
- Do not lift heavy objects or put pressure on your access arm (i.e., grocery bags, etc.).
- Do not take Blood pressure, use a tourniquet, draw blood/start any intravenous lines in the affected arm. Injections should be avoided if possible.

Conclusion

The bottom line goal of Vascular Access is to improve and promote the quality of care and quality of life for patients living with kidney failure by placing the best access that has the least complications. Fistulas are considered to be the “gold standard” for hemodialysis access. They last longer, need fewer repairs, and are associated with lower rates of infections, hospitalization, and death than other types of accesses.

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