What is the difference between Temporary HD catheter, Tunneled HD catheter, AV fistula, AV Graft, peritoneal Dialysis.

**Temporary HD catheter –** AKA non-tunneled catheters; inserted percutaneously very close to the blood vessel that is being catheterized. Designed for short-term use and are preferred for immediate, emergent vascular access for HD. These should not be used routinely or in home or o/p setting. Many different non-tunneled catheters are available and are composed of materials such as polyurethane, polyethylene, polyvinyl chloride, and medical-grade silicone.

The outer shaft diameter ranges from 8 to 13.5 French (Fr) and provides pump flow rates of 300 to 400 mL/minute. For the same negative inflow pressure, lower hemoglobin (hematocrit) levels produce higher blood flows.

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**Tunneled HD catheter –** used for intermittent or long-term HD vascular access. Emerges from the skin at a site distal to the blood vessel being accessed, hence the term “tunneled”. This can be an alternative for patients who are poor candidates for AV fistula placement (since that is the preferred form of access for long-term HD). Associated with lower rates of infection that temporary/non-tunneled catheters. These are generally double-lumen catheters with a polyester cuff placed just SC from the insertion site.

Tunneled catheters, which are available in a larger size (15.5 or 16 Fr), also allow for greater blood flow rates (>400 cc/minute) compared with non-tunneled catheters (largest 13.5 Fr).

The overall survival of tunneled hemodialysis catheters is highly variable. Almost all catheter losses were due to bacteremia.

A person sitting posing for the camera

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**AV fistula –** generally preferred over AV grafts for long-term HD but takes a long time to successfully establish (process called “maturation”).

The goal is to create an accessible vascular structure with sufficient blood flow that can be cannulated repeatedly to permit adequate dialysis. Several characteristics must be present for an AV fistula to be usable. These include the following:

●The AV fistula must be accessible with the patient in a comfortable sitting position.

●In the forearm, the AV fistula should be on the volar surface.

●In the upper arm, the AV fistula should be on the anterior or lateral surface.

●The AV fistula must be able to be reliably cannulated repeatedly.

●The AV fistula should be within 5 to 6 mm of the skin surface.

●A relatively straight segment 8 to 10 cm long needs to be available for cannulation.

●Blood flow must be adequate to support the dialysis prescription, generally at least 500 to 700 cc/min

***IMPORTANT:*** It takes time to arrive at a successful, usable AV fistula. There are a number of events that must take place, including referral to surgery, surgical evaluation, possible medical workup to ensure safe surgical process, scheduling for surgery, a period of maturation, and the possibility of a need for a salvage procedure to achieve usability, which may be followed by another waiting period before it is finally declared suitable for use. Each of these events takes time. This sequence has been referred to as the ***"fistula hurdles."*** During this sequence, the patient falls into one of two categories: (1) continuing dialysis with a catheter, or (2) the risk of having to start dialysis with a catheter. Both of these are undesirable.

***The minimum time for AV fistula maturation is one month***, but a lead time of 6 to 12 months is recommended since intervention may be required to facilitate maturation of AV fistulas, particularly for patients with small vessels below the accepted thresholds for access creation

AV fistula dysfunction and failure related to failure to mature and stenotic vascular lesions are the most common complications of AV fistulas.

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**AV graft –** The requirements for an AV graft are similar to those of an AV fistula, except that an AV graft does not require maturation. These include the following:

●The AV graft must be accessible with the patient in a sitting position.

●In the forearm, the AV graft should be on the volar surface.

●In the upper arm, the AV graft should be on the anterior or lateral surface.

●The AV graft must be able to be reliably cannulated repeatedly.

●The AV graft should be within 1 cm of the skin surface.

●A relatively straight segment needs to be available for cannulation.

●Blood flow must be adequate to support the dialysis prescription.

For AV grafts, needles need to be placed 3 cm apart and access sites need to be able to be rotated. Ideally, there should be a 6- to 8-cm straight segment of AV graft for this purpose. Adequate blood flow for an AV graft generally means a minimum flow rate in the range of 600 to 700 mL/minute. The actual flow in an AV graft can vary widely based upon where it is placed. Grafts with radial or ulnar inflow have lower flow rates than grafts with brachial or axillary inflow. Tapered grafts limit the inflow, and for this reason they are usually used with brachial or axillary inflow and not in radial or ulnar inflow.

Types of AV grafts: prosthetic, allografts, xenografts, and tissue-engineered grafts

**Peritoneal dialysis –** Another suitable form of renal replacement therapy. Only absolute contraindication is lack of peritoneal membrane. Complications include scaring, adhesions, hernias, or ostomies. Can be performed in a continuous (continuous ambulatory peritoneal dialysis [CAPD]) or an automated form of intermittent dialysis (APD). Most patients on peritoneal dialysis in the United States are on APD. Most peritoneal catheters are tunneled, and a small incision is made for dialysis. Must wait 1 – 2 weeks for catheter tunnel to heal before dialyzing.

**A close up of a map

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**Sources:**

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