

## Which Access is the Most Appropriate for Your Patient?

A. Frederick Schild<sup>1\*</sup> and Rakesh R. Nair<sup>2</sup>

<sup>1</sup>Professor of Surgery, Clerkship Deputy Director, Herbert Wertheim College of Medicine, Florida International University, USA

<sup>2</sup>Research Specialist, Division of Research and Information and Data Coordinating Center, Herbert Wertheim College of Medicine, Florida International University, Biscayne Bay Campus, Academic Ctr I, Rm 240, USA

### Abstract

The main purpose of this paper is to aid nephrologist and vascular access surgeons in the decision "Which Access is the Most Appropriate for your patient?" At the present time there are three types of hemodialysis access, mainly AV Fistula, AV Graft and Double Lumen Central Line Catheter. We would hope to help the physicians determine which is the most appropriate type of access in each patient? We will show that a multi-disciplinary team will go far into helping make this decision. Furthermore it is imperative that a complete work up must be done including vein mapping and arterial evaluation prior to any surgery.

It is well known that long term use of double lumen catheters lead to a very high infection rate as well as stenosis of the major central vessels. Research has shown that after 10 years there is no significant statistical difference in the patency of grafts and fistula.

It is the feeling of most surgeons and nephrologist that a good working AV fistula is a superior conduit for dialysis. With a good multi-disciplinary team and early referral of a patient to a surgeon, he is more likely to be able to create an AV fistula before the veins have been injured by I/V's and blood draws. If there are no veins available for an AV fistula, an early cannulation graft is far superior to a Double lumen catheter.

### Introduction

Chronic hemodialysis came into reality in the early 1960's after the invention of the Scribner shunt by Dr Scribner and his group in Seattle, Washington [1]. Since that time there have been multiple other conduits developed for chronic hemodialysis. In 1966, Dr. Brescia and his coworkers created a primary AV fistula (cephalic vein to radial artery at the wrist), although it's called the Brescia and Cimino fistula, Dr. Appel did all the surgery [2]. In the years going forward bovine graft, PTFE grafts, polyurethaneurea grafts as well as other types of animal vessels were used for hemodialysis access.

Quiton and others perfected a double lumen catheter which could be placed into the central venous system and used immediately for dialysis. Although it has a high infection rate and can cause stenosis of the central vein, it has been a help in giving acute dialysis as well as maintaining chronic hemodialysis until another conduits can become available.

Today basically there are three types of access for hemodialysis: Autologous AV fistula, Non Autologous Graft and Central Venous Catheter. It is very important to make a correct decision as to which access is most appropriate for your patient. We will discuss how best to make this decision.

Since the beginning of chronic hemodialysis for end stage renal disease there has always been a decision as to which was the most appropriate access for the patient. How do we make this decision? In order to facilitate this, we must have a good multi-disciplinary team such as

- Primary care Physician
- Nephrologists and/or Interventional Nephrologists
- Interventional Radiologist
- Surgeon
- Anesthesiologist

The most important part of the team is to have a good Coordinator

who may be a nurse. The Coordinator will be instrumental in the pre-op work up as well as getting patients to all appointments.

It is imperative that the patient be referred to a surgeon early. This will facilitate a better opportunity for a primary AV fistula before the veins have been destroyed with blood draws and I/V treatments.

It is necessary for the patient to have a complete and thorough work up. The Cause of End Stage Renal Disease, Co-morbidities and age of patient should be considered. A Complete vein mapping and arterial evaluation should be done.

After a complete work-up, a decision must be made as to where the access can best be placed and which type of access has the best chance to succeed.

The most common sites are: Bilateral Upper extremity (Upper or Lower arm). Also the access may be placed in the bilateral Lower extremities. In the upper extremity the access should be placed initially as distal as possible. There are reports of exotic placements when neither extremity is available [3].

KDOQI Guidelines in 2006 recommended that 66% of all access should be an autologous AV fistula [4].

Schild et al. [5] published a review of 300 consecutive AV fistulas and found that 31% failed to mature or be able to be used. Since the beginning of FISTULA FIRST there has been a report of an increase in

**\*Corresponding author:** A. Frederick Schild, Herbert Wertheim College of Medicine, Florida International University, 11200 S.W. 8th Street, AHC 2 Rm # 456, Miami, Florida 33199, Tel: 305- 348-0697; E-mail: [afschild@fiu.edu](mailto:afschild@fiu.edu)

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the failure rate of AV fistulas ranging from 40 - 60%. This has happened because surgeons are attempting AV fistulas where there is very little chance for success [6].

KDOQI recommends that the vein should be at least 2.5 mm. However experience has shown that one has a better chance of maturity and success when the vein is 4 mm. Some surgeons will even try to create a fistula when the vein is 1.5-2 mm which is best done with an operating microscope [4].

What type of access should be placed? One should look at the cause of renal failure: Is this Acute or Chronic? Is the need for dialysis immediate? Has the patient had any previous access such as temporary catheters, fistulas or grafts?

When considering whether one should create a Fistula or a Graft, one should always attempt a fistula when the vein is of good size and arterial flow is not compromised. A Graft should be considered when there are no good veins available for an AV Fistula. Lok et al. [7,8] stated that a graft should be considered when the patient is diabetic [7], has peripheral vascular disease, coronary artery disease and is over 65 years of age with a short life expectancy [8].

Catheters should only be considered when absolutely necessary and as the last resort. It has been shown that not only is there a very high incidence of infection but also almost always a stenosis of central veins. When a Fistula or a Graft fails, you should again do a work-up including vein mapping to see if you can revise the present access or create another Fistula or Graft.

If you have a working but immature Fistula, a work-up should be done to determine the cause. Perhaps an interventional procedure or surgical revision might be attempted.

Schild et al. [9] did a retrospective study of over 1700 consecutive cases comparing Fistulas and Grafts. Fistulas had less clotting and infection. However declotted grafts had a statistically significant longer patency than revised fistulas. At 10 years follow up, there was no significant statistical difference in the patency between Fistulas and Grafts [9].

There are new Grafts produced today that can be cannulated safely between 24-72 hours. Therefore if a patient needs dialysis acutely and has no access, one can place this graft and cannulate within 72 hours, therefore alleviating the necessity for a central double lumen catheter. Then a Fistula can be performed at a later date if necessary.

One consideration for placing fistulas that may not mature for 3 months or longer is that the patient will have to have a catheter for a long period of time. An early cannulation Graft would be a better choice in this situation.

The things that one should consider in placing an access is that diabetes, hypertension, female patients or patients who have a short life span have the poorest prognosis of long term use with AV Fistulas. Patients who have hypertension only and those whose renal failure is from a non-diabetic cause have the best results with AV Fistulas [9].

## Conclusion

Successful access surgery should have a good multi-disciplinary team. Early referral to a surgeon should lead to more primary AV Fistulas. It is imperative to do a complete work-up on patients to help

make a decision as to the type of access. One should always attempt an Autologous Fistula when there are good veins and arteries. There are some patients that do not have the anatomy for an AV Fistula and they should have a Graft. In acute situations early cannulation Grafts should be used to prevent catheter use.

If Fistulas or Grafts fail, one should consider a revision of the fistula if possible or a Graft if not. The best place for an access is the upper extremity. One should start as distal as possible. In patients over 65 years of age, one should consider a Graft, if the patient has diabetes, peripheral vascular disease, and coronary artery disease or has a short life span. We should always try a Fistula first but in many circumstances an AV Graft is an excellent alternative compared to a Central venous catheter.

## References

1. Scribner BH, Caner JE, Buri R, Quinton W (1960) The technique of continuous hemodialysis. *Trans Am Soc Artif Intern Organs* 6: 88-103.
2. Brescia MJ, Cimino JE, Appel K, Hurwich BJ (1966) Chronic hemodialysis using venipuncture and a surgically created arteriovenous fistula. *N Engl J Med* 275: 1089-1092.
3. Hallett JW (2009) *Comprehensive vascular and endovascular surgery*. Philadelphia, PA: Mosby/Elsevier.
4. Gilmore J (2006) KDOQI clinical practice guidelines and clinical practice recommendations--2006 updates. *Nephrol Nurs J* 33: 487-488.
5. Schild AF, Prieto J, Glenn M, Livingstone J, Alfieri K, et al. (2004) Maturation and failure rates in a large series of arteriovenous dialysis access fistulas. *Vasc Endovascular Surg* 38: 449-453.
6. Dember LM, Beck GJ, Allon M, Delmez JA, Dixon BS, et al. (2008) Effect of clopidogrel on early failure of arteriovenous fistulas for hemodialysis: a randomized controlled trial. *JAMA* 299: 2164-2171.
7. Lok CE, Bhola C, Croxford R, Richardson RM (2003) Reducing vascular access morbidity: a comparative trial of two vascular access monitoring strategies. *Nephrol Dial Transplant* 18: 1174-1180.
8. Lok CE, Allon M, Moist L, Oliver MJ, Shah H, et al. (2006) Risk Equation Determining Unsuccessful Cannulation and Failure to Maturation in Arteriovenous Fistulas. (REDUCE FTMI) *J Am Soc Nephrol* 17: 3204-3212.
9. Schild AF, Perez E, Gillaspie E, Seaver C, Livingstone J, et al. (2008) Arteriovenous fistulae vs. arteriovenous grafts: a retrospective review of 1,700 consecutive vascular access cases. *J Vasc Access* 9: 231-235.