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Editor:
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Vascular Voice

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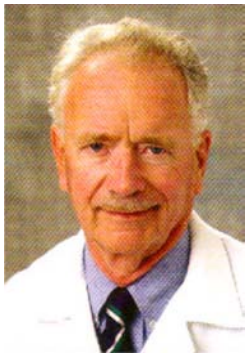
Michigan Vascular Center (MVC) - Mission Statement

MVC exists to improve the quality of life for patients by providing the most comprehensive, innovative and best possible vascular care based on sound principles of treatment.

MVC exists to render that care with compassion, respect, & integrity; exercising the best possible thought and judgment for the patient's benefit.

MVC Dedicates Issue to Dr. Schroeder



Periodically we at ***The Vascular Voice*** will have the privilege to acknowledge and thank colleagues whose dedication in the pursuit of excellence in their specialty and whose loyalty to this community have contributed significantly to improving the health of its citizens. It is with great pleasure that we honor and extend our gratitude to such an individuals who recently retired from active medical practice, Dr. Paul Schroeder.

He has contributed significant building blocks to the medical matrix of this community through years of dedication to his specialty, nephrology, while leaving behind a group he established which will carry on his vision and serve the future needs of the citizens of this community. In countless ways he has contributed to improving the quality of life of those he served along with leaving indelible impressions on those with whom he came in contact.

Dr. Schroeder's interest in renal failure led him to establish the first hemodialysis unit at Hurley Medical Center in 1968. When I first met Dr. Schroeder in 1975, he had already established a three-man group caring for all those with renal failure in need of dialysis. Seemingly a tireless worker, Dr. Schroeder was always there with a ready smile, willing to accept and care for any renal-related problems. His help in the post-op care of patients with renal problems in the early years of aortic aneurysm surgery was particularly appreciated as was his support and willingness to try new and different materials and techniques we periodically introduced into the creation of arterio-venous fistulas for his patients. Always available for a hallway conversation and never rushed or hurried, his kind demeanor and professionalism will be greatly missed.

Thank you seems barely adequate for a career fully exercised. We are fortunate to have had the opportunity to practice together, and it is with appreciation that we dedicate this issue of ***The Vascular Voice*** to Dr. Paul Schroeder.

≈ Carlo A. Dall'Olmo, M.D.

Inside this issue:

MICHIGAN VASCULAR ACCESS CENTER
A ONE-STOP OFFICE FOR RENAL FAILURE PATIENTS

The Michigan Vascular Center opened its first office dedicated to the vascular needs of renal patients, the Michigan Vascular Access Center (MVAC). The center is the first of its kind in the area to offer a comprehensive vascular service to patients with end stage renal disease (ESRD) and is committed to offering the highest standard of comprehensive care at one site. MVAC is a specialized center that evaluates patients for new vascular access; evaluates, repairs and maintains existing access, and is dedicated to renal patients and their vascular access needs.

In the past, patients with access problems would require numerous visits to various locations. This could lead to duplicate testing and delays in appropriate treatment. MVAC has developed a single-center concept. The patients are the focus, enabling them to have all of their access needs addressed and corrected immediately. This single-center approach eliminates the need to travel to multiple destinations for treatments, which translates into an improved quality of life for our patients.

The Center performs a variety of procedures such as diagnostic imaging of fistulas and grafts via duplex imaging and doppler ultrasound. Repairs and/or minimally invasive procedures using catheter-based techniques such as venograms, fistulograms, percutaneous transluminal balloon angioplasty (PTA), side branch coiling, and declots are also done on a daily basis.

MVAC is located at 5202 Miller Rd, Suite B in the lower level of The Surgery Center. Staff employed by MVAC are ACLS certified and have expertise in Cardiac, ER, OR, and dialysis unit nursing. There is a vascular surgeon present at the center Monday through Friday to provide care to our renal patients. Patient safety and quality of care are a continuous daily focus.

MVAC has provided services to over 1350 patients since opening its doors to renal patients on September 19, 2005. Communication with the area dialysis units has indicated that the catheter rate in our area is declining. We at MVAC are proud to join in a team effort with nephrologists and dialysis units in order to deliver comprehensive care that provides excellent and compassionate service to our patients.

≈Kaye Ringler, RN, CNOR, Director

Average Appointment Times @ MVAC

- Waiting Room Time < 10 minutes
- New access < 2 hours, includes H&P, Doppler, Venogram & Surgical discussion w/ Dr.
- Fistulogram < 2.5 hours, includes Nurse visit and Duplex
- Fistulogram w/ PTA or Side branch coiling < 3 hours, includes Nurse visit, and Duplex
- DeClots < 3 hours, patients seen same day or next morning within 24 hours of clotted access
- Pre-Admission Testing on same day if surgery done @ Surgery Center < 45minutes

Duplex Imaging of the Vascular Access Fistula/Graft

Access failure due to complications is one of the major causes of morbidity in hemodialysis patients and can be assessed accurately and non-invasively by duplex imaging.

Duplex or *Realtime* imaging is a non-invasive ultrasound exam in which an image is continuously updated and reviewed as the target changes or moves. Duplex imaging provides an immediate blueprint of the vascular access architecture and functionality. Good flow dynamics of the access, which is a crucial component to optimal dialysis, is only obtainable by duplex. Fistulograms, CT's, MRI's, Venograms, or X-rays are all pictures and cannot capture live flow dynamics within the access.

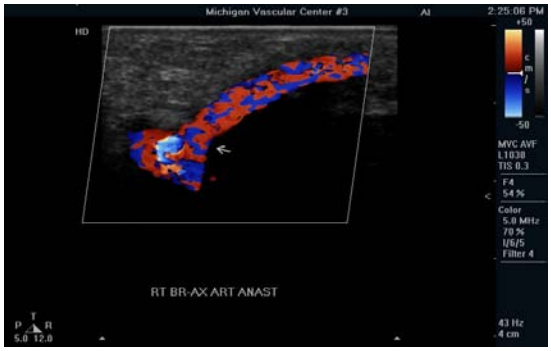


Figure 1
Represents a normal color duplex image of an arterial anastamosis of a brachial-axillary AVG.

This realtime capability provides essential characteristics necessary for monitoring and detecting a dysfunctional access that is at risk of failure. An elective solution/intervention can then be offered, thus avoiding the risk of needing a central venous catheter and the loss of valuable central veins in patients that cannot afford it.

Figure 2
Represents a SEVERE stenosis in a native fistula detected by duplex imaging. (This patient went on to have successful PTA of this area the same day).

Early intervention can significantly increase patency and longevity. With ultrasound and Doppler (duplex) we can visualize patient's vessel anatomy and their vascular access. Duplex can detect stenosis, measure aneurysms, locate side branches, assess vessel size, obtain flow velocities, establish patency, verify occlusions, or check for maturity of a newly placed fistula. There are no needles, injections, or radiation used during this exam. Ultrasound is an amazing tool in the construction and maintenance of the vascular access.

Figure 3
Represents a pseudoaneurysm of a native fistula identified by duplex imaging (This patient was subsequently enrolled in a research study conducted by MVRC and a covered stent was placed to repair the aneurysm)

Ideally, the primary care physician, nephrologist, vascular surgeon, dialysis center, and yes . . . the Vascular Lab should function as a unified *"Access Management Team"*. The surveillance and treatment of a patient's vascular access should be shared, with each specialty providing their own area of expertise. With the combined communication, compassion and care of a multifaceted team we can help make the life of the dialysis patient ***easier*** . . . ***better*** . . . . and . . . ***.longer***. The role of the Vascular Lab is vital in this endeavor.

≈Ann Inskeep, RVT

Timely Referral To Nephrologist is Vital

Early Referral to Nephrology is important to delay End Stage Renal Disease.

Dialysis and transplant: These may be the first words that come to mind when you think of kidney disease, but these therapies are only one end of a spectrum of care for kidney problems – the last stages of treatment for kidneys that have failed.

It is well known that life threatening kidney failure is often preceded by chronic kidney disease, in which the kidney's ability to filter water and waste products from the blood is progressively destroyed over the years. However, this decline can often be significantly slowed or stopped with early intervention. Although there is often no cure for Chronic Kidney Disease (CKD), early intervention and proper treatment can add years to life and help to maintain quality of life.

THE RISK OF ACUTE CARDIAC EVENT OR CVA RISES DRAMATICALLY IN PATIENTS WITH CKD.

CKD can go unnoticed because the kidneys have a lot of still-work capacity. The kidneys may lose more than 75% of their ability to function before it is discovered.

Loss of kidney function has a great impact on your patient's cardiovascular system. The risk of having an acute cardiac event or CVA rises dramatically when a patient has chronic kidney disease.

It is estimated that 10-15 million Americans have some degree of chronic kidney disease. Unfortunately, many of these patients are unaware and about half have an advanced stage of CKD. In addition, the risk of cardiovascular problems rise dramatically in patients with CKD.

It is important to keep checking the kidney function of your patients, especially if:

- ✓ They are over 60 years of age;
- ✓ They have a family history of kidney disease;
- ✓ They have a family history of diabetes mellitus;
- ✓ They have a family history of hypertension.

Unfortunately, kidney disease is often difficult or impossible to prevent and you cannot reverse existing damage. However, controlling what you can, substantially improves the course of the progression, and can delay or prevent End Stage Renal Disease (ESRD). This is why is it important to refer the patient to a nephrologist as early as possible.

Patients are unlikely to have symptoms in the early stages, therefore, periodic testing for signs of disease, especially with high risk factors, is very important. Interventions to slow the disease are most effective in its early stages. Screenings should include BUN, creatinine, creatinine ratio and glomerular filtration rate (GFR), and checking urine for microalbuminuria. These will not only indicate renal damage but will also reflect increased risk for cardiovascular events.

Early treatment goals include:

1. Good control of blood pressure to 130/80 without significant proteinuria & 125/75 with significant proteinuria.
2. Use of ACE inhibitors or ARBs to treat hypertension also have a potential to slow progression of renal disease. However, closely monitor renal function and electrolytes, especially potassium. A sharp change in serum creatinine (more than 30%) might indicate significant renal-vascular disease.
3. Treat anemia using Epogen to maintain the level between 11 and 12. This not only relieves the anemia, it decreases the progression of renal disease and decreases the cardiovascular complications of anemia and left ventricular hypertrophy.
4. Tight control of Diabetes Mellitus with a hemoglobin A1c below 6.5.

- 20 million Americans - 1 in 9 US adults - have CKD and another 20 million more are at increased risk..
- Early detection can help prevent the progression of kidney disease to kidney failure.
- Heart disease is the major cause of death for all people with CKD.
- Hypertension causes CKD and CKD causes hypertension.

Timely Referral, Continued from Page 2

5. Controlling calcium and phosphorus which are usually secondary to hyperparathyroidism. The patient will need to be on a low phosphorus diet with Vitamin D supplements and a close monitoring of calcium and Phosphorus byproducts and parathyroid hormone.
6. Avoid nonsteroidal anti-inflammatory medication, which can have adverse effects on the renal function and aggravate complications of CKD, including fluid retention, hypertension and electrolyte disturbance including hyponatremia and hyperkalemia.
7. Salt and fluid restrictions due to the direct correlation between high salt/fluid intake and progression of renal disease and hypertension. The patient needs to weigh daily and avoid the myth to "drink fluids to flush out the kidneys".
8. Restriction of high protein intake may help limit buildup of urea. Some studies suggest that protein restriction can help slow progression of CKD, particularly in its early stage, especially if there is significant proteinuria or renal stones.
9. Making lifestyle changes, such as stopping smoking, losing weight & getting some exercise, can affect the health of the kidneys. If the patient has high cholesterol & triglyceride levels, taking statins can be beneficial (they also have an anti-inflammatory effect at the level of vascular endothelium, improving endothelium function and decreasing the progression of atherosclerosis). Losing weight & exercising is good for cardiovascular health & CKD. CKD is not only more prevalent in obese people but the disease progresses faster in this group of people.

By early referral to a Nephrologist, these goals may be accomplished and translate into:

1. Slow progression of kidney damage and decreased need for dialysis and transplant.
2. Prevent, reduce or relieve signs and symptoms associated with CKD.
3. Minimize complications and work with the primary care physician to coordinate care.
4. Optimize patient's chances of receiving a Native AVF.

Early referral to a nephrologist can also benefit the patient by planning for replacement therapy, initiating fistulas and planning for transplantation prior to the immediate need. There are fewer cardiovascular events post transplantation for patients who receive their new kidney prior to being on dialysis. If the patient is not a transplantation candidate, or there is no available kidney, early intervention allows time for education and decision making regarding the best types of dialysis for that patient.

For hemodialysis, vascular access is a major issue and a native A-V fistula is the optimum choice. The earlier it is done the better chance of success for its use when it is needed. Advanced vascular calcification and vascular stiffness have a negative effect on the success of the fistula. Hemodialysis through A-V fistula is not only more efficient type of hemodialysis but has fewer complications than using a line which could lead to sepsis.

Remember kidney disease is a common disease and is a silent killer, without symptoms, until the advanced stages. CKD can be slowed and complications can be controlled if early management and close coordination is initiated between the family physician, the nephrologist and the vascular surgeon.

≈ Ali K. Mohammed, MD, FASN

CKD CAN BE CONTROLLED BY CLOSE COORDINATION BETWEEN THE FAMILY PHYSICIAN NEPHROLOGISTS & VASCULAR SURGEON

Chronic Kidney Disease On The Rise!

Fact: Primary care doctors are going to see more patients with chronic kidney disease.

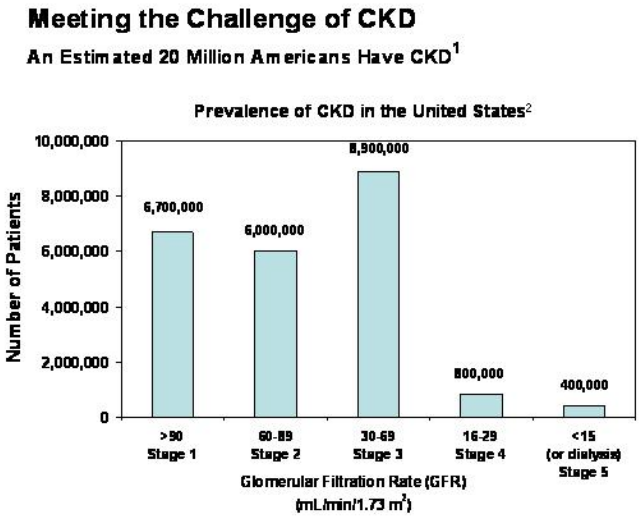
In the United States, there is a rising incidence and prevalence of kidney failure. The number of patients with end stage renal disease (ESRD) undergoing dialysis has increased from 10,000 patients in 1973 to 86,00 patients in 1983 to 431,00 patients in 2002.

Table 1 shows the five stages of Chronic Kidney Disease*:

Stage	Description	GFR (ml/min/1.73m²)	Clinical Action
1	Kidney damage with normal or ⬆ GFR	≥ 90	Diagnosis and treatment with normal or -GFR Treatment of comorbid conditions Slowing progression CVD risk reduction
2	Kidney damage with mild ⬇GFR	60-89	Estimating progression
3	Moderate ⬇GFR	30-59	Evaluating and treating complications
4	Severe ⬇GFR	15-29	Preparation for kidney replacement therapy
5	Kidney failure	≤ 14 (or dialysis)	Replacement (if uremia is present)

*Reference: National Kidney Foundation. AM J Kidney Dis. 2002;39(suppl 1):S1-S266.

In table 2, you can see that there are a large number of patients with Chronic Kidney Disease, stage 1 through stage 4 who are not yet undergoing dialysis. These patients are often cared for by their primary care physicians who will be responsible for prescribing medications, ordering diagnostic testing and management of Chronic Kidney Disease patients.



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2. Data on file, Ortho Biotech Clinical Affairs, LLC.

Chronic Kidney Disease, Continued from Page 5

To be better equipped to care for patients with Chronic Kidney Disease, primary care physicians should ask themselves the following questions:

What is the cause of their renal failure? Is it correctable or reversible?

Examples of reversible causes are obstruction, infection, nephrotoxicity from medications, high blood pressure, vascular renal disease, and uncontrolled diabetes.

What can be done to slow down the progress of Chronic Kidney Disease?

Controlling high blood pressure, specifically with ACE inhibitors, will slow down kidney disease. Appropriate diet is necessary for these patients. Physicians must be aware of any nephrotoxic medications. Early vascular intervention if needed, being aware that appropriate prophylaxis is necessary before dye procedures.

What are the complications of Chronic Kidney Disease and how can they be prevented?

These patients develop malnutrition, anemia, osteodystrophy, acidosis and electrolyte abnormalities. Awareness and early detection will allow the primary care physician to diagnose and prevent these conditions.

What are the co-morbid conditions of Chronic Kidney Disease and how can they be dealt with?

These patients are at higher risk of developing coronary artery disease and peripheral vascular disease. In diabetics, there is also an increased risk of neuropathy and retinopathy. As long as primary care physicians are aware of conditions for which their patients are at increased risk, they can diagnose these conditions early and prevent undesirable outcomes.

When should patients be referred to a specialist?

Nephrologists can help in making the diagnosis and aid in the implementation of management plans with primary care physicians. Studies have shown that early referral may be associated with the following potential benefits: lower morbidity and improved survival, informed selection of dialysis modality, timely placement of appropriate dialysis access and preemptive transplant. **Timely referral optimizes the patient's chances of receiving a native AVF: the preferred access created.**

Primary care physicians and nephrologists should work together as a team to improve the quality of life of patients with Chronic Kidney Disease.

≈Nabil S. Zaki, M.D.

Renovascular Disease: A Correctable Cause of Hypertension & Renal Failure

Interestingly, the kidneys are capable of driving systemic hypertension to hazardous levels in order to sustain their own function. This certainly highlights the importance of renal function. Since Goldblatt's experimental work over 60 years ago relating renal artery stenosis (RAS) and hypertension (HTN) in the dog,[1] many excellent monographs on the pathophysiology of the renin- angiotensin system have been published. This article will instead highlight recent work on the epidemiology of RAS, diagnostic techniques, indications for revascularization, and catheter- based or surgical treatment options in the context of the disease's natural history.

"NO RANDOMIZED TRIAL HAS YET COMPARED MEDICAL, CATHETER-BASED & SURGICAL TREATMENT OF RAS"

One must remember that no randomized trial has yet compared medical, catheter-based and surgical treatment of RAS. Case-series reports form our only guidance. This relative lack of evidence, of course, hasn't dampened the enthusiasm of specialists from many disciplines to identify and treat renovascular lesions with his or her technique of preference. The clinician's challenge is thus twofold: First, one must identify the patient with a *causal* relation between a stenotic renal artery and HTN or renal insufficiency. Secondly, the clinician must make a timely intervention taking into account the safety, efficacy, durability, and even cost of the medical, catheter-based or surgical management.

Epidemiology

The probability of finding clinically significant renal artery disease correlates with a patient's age, the severity of HTN, and the severity of renal insufficiency. Atherosclerotic renovascular disease was identified in 6.8% of a population-based sample of Americans over 65 years of age.[2] Among selected populations with atherosclerosis elsewhere the prevalence is much higher. RAS >50% was identified in 19.2% of patients undergoing cardiac catheterization in a Mayo Clinic series.[3] Prevalence of RAS ranges from 22 to 59% in angiographic series of patients with other peripheral vascular disease.[4] Thus, if you look for renal stenosis, you will find it.

Diagnostic tools

Duplex ultrasonography of the renal arteries is the most effective test for screening and surveillance of renal artery disease. A complete study must visualize the main renal artery from the aorta to the parenchyma. In addition, renal pole-to-pole length is measured. Decreased length reflects cortical apoptosis and advanced disease. In the absence of glomerulosclerosis, this can often be restored with revascularization. An estimate of parenchymal disease, the resistive index, is also calculated.

DUPLEX ULTRASOUND IS THE MOST EFFECTIVE TEST FOR SCREENING & SURVEILLANCE OF RAS

Isotope renograms have been a useful screen for renal artery disease. With adjunctive captopril the sensitivity and specificity of these exams rises to roughly 85 and 95% respectively. The study is limited by azotemia or by bilateral disease. Besides identifying a stenosis, documenting estimates of relative right and left renal function does help with intervention planning.

Anatomic studies include CT, MR and catheter-directed angiography. A complete study must demonstrate the entire abdominal aorta and iliac segment to search for accessory renal arteries. In addition, several oblique images are often necessary to completely demonstrate the ostia as well as branch renal artery disease or aneurysms (which are not treatable by catheter-based methods at this time). Patterns of branching must also be demonstrated to estimate the severity of parenchymal damage. The non-invasive studies have obvious advantages in terms of patient comfort and risk. (Cont)

Renovascular Disease: Continued from page 8

The studies do require specialized protocols and extensive post- processing to obtain useful information. Likewise, catheter angiography is only valuable when performed by an interventionalist who is familiar with the indications and contraindications for revascularization as well as the risks of selectively catheterizing visceral vessels. Performing the study with minimal contrast doses and minimal manipulation of the aortic wall decreases the risk of nephropathy and atheroembolism, respectively.

Renal vein rennin sampling documents true rennin-mediated hypertension in unilateral RAS. It is useful for difficult cases where a causal relation between RAS and HTN isn't clear. The test is minimally invasive and predicts a favorable response to intervention.

Natural History

In general, patients with atherosclerotic RAS and resultant renin-mediated HTN (symptomatic RAS) can expect a gradual increase in their degree of stenosis. Those patients with anatomic progression are subject to a decrease in cortical thickness, renal volume and ipsilateral renal function.[5] The mechanism of this progression is more complicated and less well defined than atherosclerotic disease in other tissue beds.

"INTERVENTION IN THE PATIENT FOUND TO HAVE INCIDENTAL, ASYMPTOMATIC RAS CANNOT BE JUSTIFIED AS A "PREVENTATIVE" PROCEDURE"

The natural history of resultant HTN is certainly well established. Higher rates of cardiac-related morbidity and mortality have been demonstrated in patients with symptomatic RAS. Congestive heart failure without significant ventricular dysfunction, "flash pulmonary edema," and hyponatremia are common presenting symptoms of those with renovascular HTN. In addition, recent work found that a population with incidental RAS had twice the risk of coronary events than those with normal renal arteries by duplex.[6]

Despite this association with coronary events, anatomic progression of stenosis is not well defined in the population with RAS not related to refractory HTN or renal insufficiency (asymptomatic RAS). Intervention in the patient found to have incidental, asymptomatic RAS cannot be justified as a "preventative" procedure.

Indications for Renal Artery Revascularization (percutaneous or surgical)

1. **Severe HTN and fibromuscular dysplasia (FMD)**
2. **Severe HTN with complication and RAS**
   - **Complications include stroke, retinopathy, myocardial ischemia, diastolic**
3. **Severe HTN, bilateral RAS and renal dysfunction**
4. **Severe HTN, RAS with a solitary kidney and renal dysfunction**

Percutaneous revascularization

Angioplasty (PTRA) is the treatment of choice for FMD of the main renal artery not involving branch vessels. Safety in this scenario is well established with cure of HTN in 75% of patients.

Primary stenting (PTRAS) of ostial atherosclerotic renovascular disease has evolved as the primary treatment in these relatively high-risk patients. Roughly 50% of patients should require fewer antihypertensives. Cure of HTN is less common, occurring in about 10% of individuals. Restenosis will occur over time in approximately 20% of patients. This often leads to recurrent disease at a rate that exceeds the rate at which a native stenosis would have progressed. Trials of drug-eluting stents sized for the renal artery are underway.

(Continued)

Renovascular Disease: Continued from page 9

Regarding renal function, PTRAS results are more variable. Most series report "stabilization" of renal function as a successful outcome in 50 – 60%. Roughly 25% will experience improvement of renal function and 20% will get worse.[7] This is possibly due to atherosclerotic debris embolized to the arterioles during the procedure. To combat this, the use of distal embolic protection filters (as we use in the carotid circulation) is an area of active clinical research.[8]

Surgical revascularization

Aortorenal bypass is the most durable method of revascularization. Saphenous vein is the preferred conduit, when available. PTFE is a satisfactory option with similar long-term results. Transaortic endartectomy is useful in bilateral limited ostial stenosis. The technique is also a useful adjunct in patients requiring simultaneous aortic reconstruction.

For patients with a hostile aorta, or with cardiac impairment, an extra-anatomic revascularization is the preferred option. Splenorenal left sided and hepatorenal right-sided bypasses are most common when the celiac axis is without occlusive disease. Iliorenal bypass is possible if the iliac vessels are not too heavily diseased.

Disease involving the branch renal arteries or after failed multiple renal angioplasties often requires more difficult repairs with longer ischemic times. Ex-vivo techniques become necessary which carry a higher risk for renal loss.

Published operative results are generally superior to those for PTRAS both in terms of HTN and renal function response. Roughly 75% of patients were able to decrease their medication requirements, while 12% were removed from all anti-hypertensives. In addition, a >20% improvement in GFR was found in 30 to 60% of carefully selected patients in Wake Forest University's experience. Improvement is more likely in those with higher preoperative serum creatinine and highest in those with rapidly declining renal function or early dialysis dependence. In those with a positive renal function response to surgery, dialysis free survival was significantly better than in those who failed to respond. Operative mortality, primarily related to cardiac events, is roughly 4%. Re-stenosis is very uncommon. In those repairs with a normal intraoperative duplex, 97% were normal at 12-month follow-up, and long-term durability is excellent.[7]

Summary

Renovascular disease is common, and the prevalence will increase with an aging population. Testing is available to identify disease and determine which patients are most likely to benefit from renal artery revascularization. A careful assessment of the patient's risk, expected longevity and preferences will help determine whether medical, catheter- based or surgical management is best for a given individual. The surgeons of Michigan Vascular Center are experienced with all treatment options and are available to consult on your patient at any time.

≈David B. Wilson, M.D., F.A.C.S.

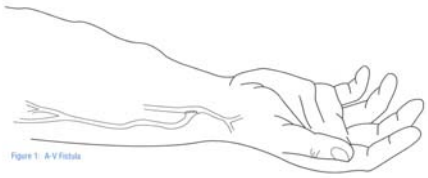
References:

1. Goldblatt J Exp Med 1934; **2**. Hansen JVS 2002; **3**. Weber Eur Heart J 2002; **4**. Scoble 1996 in Renal vascular disease; **5**. Wilson, D.B, 2005, Ch.39 in "Mastery of Vascular & Endovascular Surgery," LWW; **6**. Edwards Arch Int Med 2005; **7**. Wilson, D.B., 2006, Ch.25 in "Vascular Medicine," Elsevier; **8**. Edwards JVS 2006

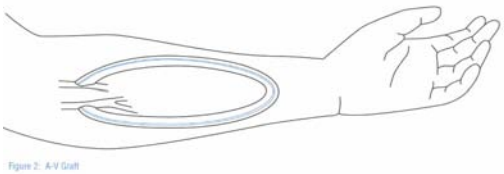
The Ideal Fistula

An arterial venous fistula (AVF) and an arterial venous graft (AVG) are the preferred method of access for hemodialysis. Native AVF's are created by connecting an artery to a vein. In order to create an ideal native AVF, the vein needs to be approximately 2.5mm or greater in diameter. If veins are too small, an access for hemodialysis can still be created by using a synthetic graft in place of the vein. Following the *Fistula First Initiative*, **native AVFs are preferred over AVG's**; however, grafts are necessary for some patients. AVG's have similar characteristics as native AVF's. Over time the vein will dilate or enlarge for easy needle access during hemodialysis.

Characteristics of an ideal fistula are thickened dilated walls, the presence of a "thrill" or buzz which can be felt throughout the fistula, and a bruit heard during an exam with a stethoscope or duplex. The access should have good clearances. A clearance is how well the blood is being cleaned. A proper cleaning will produce a lab value of the KT/V (URRxTime/Volume) ratio of greater than 1.4. A blood flow rate of 500ml/min or greater with a lower arterial and venous pressures during dialysis is desired.



Fistula: a direct connection between an artery and a vein created in the wrist or in the upper arm just above the elbow.



Graft: an implanted tube to which an artery and a vein are attached.

Proper maintenance and close monitoring of an access is essential for keeping the access healthy, working properly, and will increase the lifespan of the access. Together, the MVAC, nephrologists, and dialysis units can provide the best options and care for the patient's needs.

≈Kim Stanley, RN

Open Research Trial: Stenting of Hemodialysis Access

CoSmic Study—Covered **S**tents to Exclude Pseudoaneurys**m**s of Hemod**i**alysisA**c**cess

Patients diagnosed with a pseudoaneurysm of their hemodialysis access site can be evaluated for participation in this study designed to evaluate covered stent repair of access pseudoaneursyms. Traditional repair of hemodialysis access pseudoaneurysms has been to surgically replace the segment that is involved with polytetrafluoroethylene material or autogenous vein. This study will help to understand more about this less invasive procedure, the benefits of excluding pseudoaneurysms and how this new technology affects the patency of hemodialysis access.

Study Sponsor: Michigan Vascular Research Center

≈Brenda Buckle, MSN, ANP-BC

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MVC Core Values

- We are a professional organization –a team– working equally in a common cause: To provide the best possible vascular care for the physicians, patients, and institutions of our community.
- We share a commitment to excellence in the vascular care of patients through the pursuit of knowledge, communication, innovation, and research.
- We value our employees and incorporate them into our team.
- We commit to each other to honor & pursue these values.

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