

# A Vascular Access Report for the Year 2010

“You are running out of time with that permacath!!”

Michigan Vascular Access, PC  
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October 21, 2011



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October 22, 2011

Dear Doctor or dialysis professional:

At Michigan Vascular Access PC, we have been honored by your referral of one of more patients for help with their hemodialysis access needs. This annual letter contains a report of our activities for the year 2010, discussions and images.

### **Introduction**

Michigan Vascular Access PC is a professional surgical practice dedicated to providing and maintaining effective vascular access for hemodialysis patients: from initial long-range planning and provision of the optimal first access in new dialysis patients, to maintenance and rescue of dysfunctional or failed accesses. Open surgical and endovascular techniques are employed by a board-certified surgeon in a C-arm fluoroscope-equipped operating room, always with anesthesia support, and always in a JCAHO-accredited hospital.

Michigan Vascular Access PC uses the Dialysis Outcomes Quality Initiative (DOQI) guidelines to help us provide defensible and up-to-date dialysis access care. The DOQI guidelines have been boiled down to three main points: (1) provision of fistulas in all eligible patients, (2) avoiding or limiting catheter usage to avoid damage to the major veins, and (3) monitoring of access performance with pre-emptive intervention to avoid access loss. These three provisions drive much of our decision-making processes.

Michigan Vascular Access PC uses a “case management” approach to the care of the dialysis patient. We follow patients over time as much as possible, including episodic care delivered elsewhere, in order to provide the most logical long-term management. This demands more staff time, and is more expensive to provide, but leads to long term benefits to the patient.

Michigan Vascular Access PC sees patients from over one hundred dialysis units all over Southeast Michigan and extending from Battle Creek and Kalamazoo to Monroe, to Flint and Lapeer, Fowlerville and Fenton, Muskegon and beyond. Michigan Vascular Access is a true regional surgical practice.

In the last ten years of full-time vascular access work I have performed nearly 10,000 vascular access procedures (see chart next page). Every week brings new challenges and new lessons – I am still learning. This work cannot be mastered in 25 cases, or 250, or 2500. It is much more complicated than I ever dreamed when I accepted the assignment at Henry Ford Hospital from Dr. Frank Lewis in 2000.

## **2010 Numbers and statistics**

### **Patients**

In 2010, 326 patients new to our practice were seen: 58 pre-dialysis patients (18%), 124 catheter dependent, new-to-dialysis patients needing first-time access (38%), 79 patients with previous failed access needing new access (24%), and 65 patients with problematic accesses performed elsewhere needing intervention (20%). In addition, over 448 established patient visits were scheduled for problems with existing access. Over 1200 open and endovascular procedures were done in 2010.

Overall, 285 new accesses were placed, with 242 fistulas and 43 grafts, for an overall fistula rate of 85%. 80 revisions were done, and 735 endovascular procedures, including 136 percutaneous thrombectomies.

In the last seven years 6744 procedures have been done at Michigan Vascular Access, including over 1400 fistulas.

<b>Case type</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>total</b>
hematoma/seroma (10140,10180, 24076)	16	21	26	27	23	23	30	166
percutaneous declot	51	88	95	61	71	91	136	593
venoplasty	136	203	269	324	368	400	497	2197
access or branch ligation, banding (37607)	14	44	59	60	77	70	68	392
catheter placement (36588, 36581, 36597)	15	14	3	2	0	0	0	34
permacath removal (36589)	28	44	62	72	92	85	84	467
removal of infected graft (35903)	12	10	7	15	5	18	6	73
fistula, transposed basilic (36819)	40	38	48	75	72	47	76	396
fistula, other complex (36818, '820, '825)	7	13	22	41	32	45	39	199
fistula, simple (36821)	57	100	151	182	141	110	127	868
AV graft placement (36830)	37	78	69	37	66	91	43	421
open thrombectomy w/o revision (36831)	2	2	11	21	12	8	5	61
revisions (36832-4, 35011/13)	41	43	53	46	48	70	74	375
repair of artery (35206/236)	0	5	6	5	2	3	4	25
diagnostic venogram/fistulogram	16	39	61	74	77	109	101	477
<b>Total cases</b>	<b>472</b>	<b>742</b>	<b>942</b>	<b>1042</b>	<b>1086</b>	<b>1170</b>	<b>1290</b>	<b>6744</b>

### **Results on fistulas**

In this last year I have generated some statistics from examining my own practice: (1) a 50-60 percent fistula maturation rate (reported from national studies) can be bettered in a dedicated vascular access practice such as mine – maturation rates vary from 78% (wrist fistulas) to 96% (transposed basilic fistulas); (2) and rather than 6 months, most fistulas can be cleared for use from an average of 62 days (one-stage brachiocephalic fistulas) to 113 days (two-stage transposed basilic fistulas).

The value of these data are threefold: first, that the 50-60% maturation rate of fistulas reported nationally can be bettered in focused surgical practices focusing on dialysis accesses, meaning that a 50/50 success rate should no longer be considered acceptable;

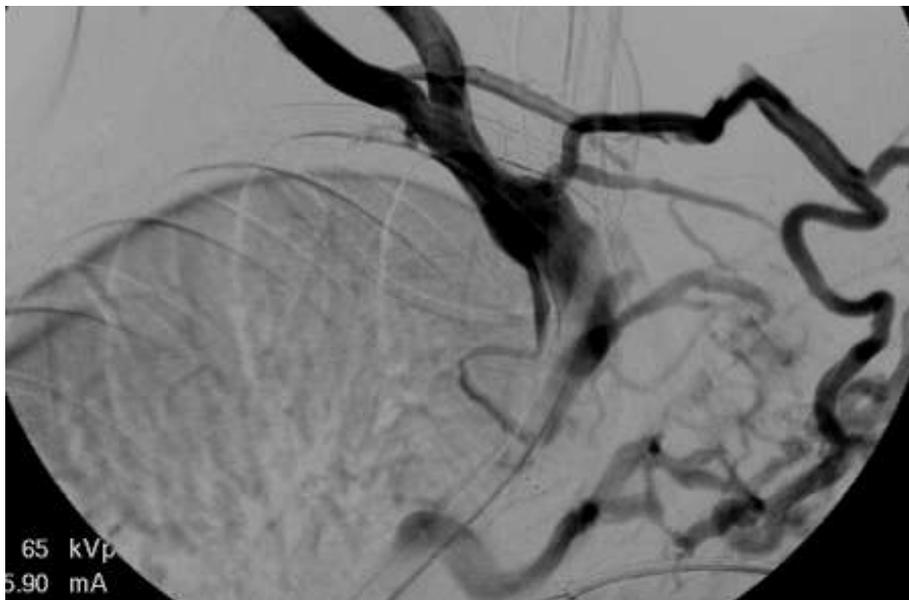
secondly that a 80-95% success rate rather than 50% means that multiple access attempts should be needed less often, getting the catheters out faster; and finally, the fact that normal fistulas can be matured in less than three months means that knowledgeable aggressive follow-up does pay off, and that procrastination does not.

	Percent matured	Time to release
Wrist fistulas	78%	72 days
Forearm fistula	83%	75 days
Antecubital fistulas	85%	varies
Brachiocephalic AVF	85%	62 days
Superficialized BCAVF	95%	102 days
Transposed basilic AVF		
One stage	96%	50 days
Two Stage	98%	113 days

## Discussions

### **(1) The importance of loss of central venous patency**

In my opinion, of the three major DOQI guidelines (see above) avoiding or limiting catheter usage to avoid loss of central venous patency is the most important issue in dialysis access, because *loss of central venous patency limits or eliminates all hemodialysis options*. Catheters can no longer be placed in occluded central veins, and shunts become complicated with unacceptable side effects of venous hypertension. Loss of central venous integrity is caused predominantly by prolonged catheter placement, although pacemakers and AICDs also have major roles, followed distantly by Mediports, PICC lines, common central lines, clavicular trauma and congenital abnormalities.



**Right innominate vein occlusion around a right IJ catheter**

Since central venous stenosis robs our patients of their options, and as little as three months on a catheter can result in significant central venous damage, it follows that we must get the catheters out as soon as possible. *Time on the catheter accumulates with delays in referral or treatment, failures of access creation, delays in maturation to usability, delays due to infiltration or other inability to use an otherwise acceptable access.*

*This is a central and underappreciated issue, and all other issues reflect back on this. Time on the catheter, and thus loss of central patency, are due to delays in achieving adequate access. Thus, all delays in achieving a non-catheter vascular access for dialysis must be identified, evaluated, and corrected or supervised to achieve the best possible results for the patient.* I will discuss the origins of these delays briefly.

**(2) Increased time on the catheter due to: (a) delay in referral of the patient to the access team**

The DOQI guideline for initiating of access planning is when the creatinine clearance is less than 25 ml/min. It is frustrating to be sent a patient who has been considered “not ready” for surgical referral, but then comes precipitously with a GFR of 9, 11 or 13 and a request for an “AV access as soon as possible”. Options that require time may be discarded in favor of a faster graft, or the patient may require a catheter.

Patients are understandably reluctant to have surgery that “I don’t need yet”, but this procrastination can be combated by education, introduction to the access team, and familiarity with the system. In addition to basic education about the realities of life on dialysis, early orientation to venous preservation is a key to maintaining their access options. The patients should be sent for a consultation as soon as possible.

Late referral increases the chance that the patient will need a catheter, and for a longer time.



**Every picture tells a story in the “Wall of Fame” educational tool**

**Increased time on the catheter due to: (b) mistakes in access planning**

Choosing the right access for a patient is a product of information and experience. Pre-operative venous mapping has been identified as a helpful step in identifying access options. Arterial adequacy is an underappreciated factor. In-office ultrasound is also an essential tool for the access surgeon, and I wish it were more commonly employed. Once the size and patency of the available vessels are known, the available options can be discussed with the patient.

Beyond knowing what ingredients are available, the operator must be able to make the most of those options. Being familiar and adept with direct (sometimes misleadingly called “simple fistulas”) and advanced procedures (superficialization and transposition) are key requirements for the access surgeon. Understanding the yield (chance of success), potential requirement for secondary procedures, and time to maturation of each option (wrist fistula versus transposition, for example) are essential if we are to help the patient make an informed choice.

Fistula maturation rates are currently quoted in the 50-60% range. What this means is that 40-50% of fistulas created never become usable. It also means that the patient remains on the catheter all the time that this failed process consumes, and perhaps over and over. It is not unusual for us to be sent a patient with three or four failed access attempts, and with a catheter for a year or more. These patients almost invariably have depleted venous assets, damaged arterial assets, and complicated central venous anatomy.

We see evidence of poorly performed dialysis access operations every week: fistulas created using obviously insufficient arteries, “fistulas to nowhere” in the forearm with no venous outflow, grafts placed under the deep fascia with a good thrill but impossible to cannulate, and poorly performed superficialization and transpositions. Unfortunately, not all bad situations can be remedied.



A good basilic transposition



Not so nice BVT – too short and medial

The experience of the access surgeon is probably the key factor in raising a former 20% prevalence of fistulas to 50 or 60%. Unfortunately, it is a fact that most training programs

– general surgical, vascular surgical and transplant – give short shrift to hemodialysis access creation or maintenance. Most of us have learned on the backs of our early patients, and have generally put the learning curve behind us, but it is clear that with an increasing demand and more new providers entering the field, ***either training must improve, or the burden of the learning curve on the patients will increase.***

My own review has demonstrated that the chances of achieving a fistula diminish with each previous access attempt, and with time on the catheter. ***I have come to the conclusion that the first shot is the best shot, and that first shot should not be wasted.***

Again, I am glad to help, but I will be able to do my best work for you and the patient if I see the patient early.

**Increased time on the catheter due to: (c) delay in maturation of fistulas**

Maturation of fistulas once created is an important means of making fistulas usable more quickly and getting catheters out. In my practice, once created, the fistula is examined with ultrasound at two weeks and generally at three-week intervals thereafter until ready for cannulation or until a corrective procedure is indicated.

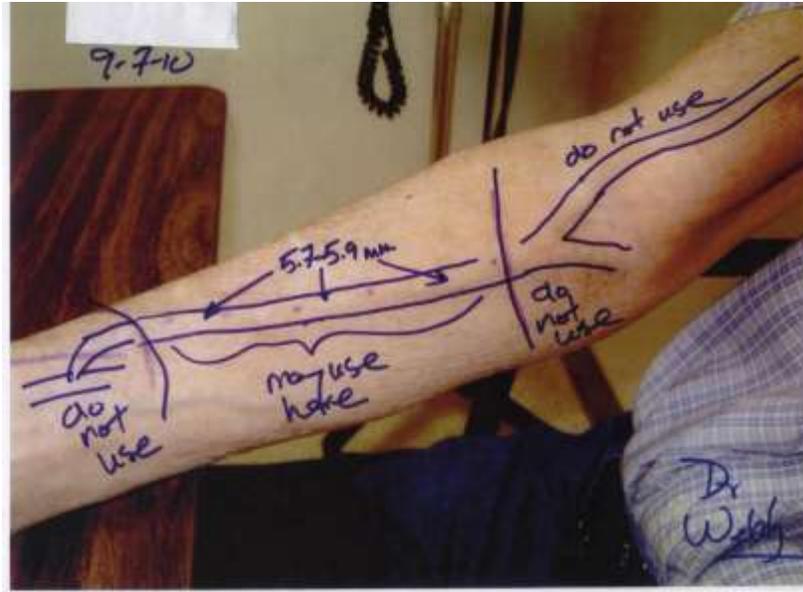
Ultrasound examination by the hands of the surgeon in each and every clinical encounter is key – the ultrasound becomes an extension of the physical examination, and the surgeon can see every variation in size, every stenosis, the depth of the fistula as it courses from the arterial anastomosis to the outflow, branches diverting flow away from the conduit planned for cannulation, the direction of the outflow, and so on.

Steady progress may be tolerable, but delayed maturation in the presence of a dialysis catheter is not. An aggressive follow-up program leading to intervention as indicated may accelerate usability of the fistula, shortening time on the catheter. Procrastination is not a success strategy when the catheter clock is ticking.

Corrective procedures include branch ligation (over sixty cases in 2010), superficialization (39 cases in 2010) or venoplasty (an unknown number of the 497 venoplasties done in 2010).

**Increased time on the catheter due to: (d) delay in using the fistula**

Once fistulas are judged adequate for release in our practice, an ultrasound-assisted digital photo diagram is created to guide cannulation by the dialysis unit (example attached). This “user’s guide” reduces problems with early cannulation that compromise fistula integrity and demoralize the patient, and aids in getting the catheter out.



**Digital photo diagram to guide the unit**

Unfortunately, even with the best planned and executed fistula, user errors can prolong time on the catheter by making the access temporarily unusable (severe infiltration) or hasten deterioration and loss (laceration with expanding hematoma or pseudoaneurysm). In this situation patients become disillusioned, psychologically wed to the catheter, and more prone to long-term complications.



**Same arm two days later**

Initial cannulation, and cannulation of difficult access should be performed by the true experts in each unit. We have heard from unit administrators that “everyone in our unit is

an expert”, but the patients tell a different story - of people who don’t listen, people in a hurry, people with wildly varying levels of skill, and rotating casts of characters. I’m telling you, folks, universal expertise just isn’t the reality in most places.

Please be realistic about who is a real expert, and who is not. Instruct personnel to look at the diagrams provided. Treat each problem cannulation as a reportable event, and track performance in a meaningful way. Re-educate poor performers. Identify problem accesses promptly, and sent the patient back for an ultrasound examination and reevaluation. And get the catheters out!!!

### **(3) Inpatient versus outpatient surgery**

We are frequently asked to see patients for evaluation and placement of dialysis access during their initial hospitalization. *I believe that this is rarely appropriate:* (1) patients and their families are frequently overwhelmed by the unexpected situation and all the new information – a week or two of orientation and an educational office visit can make a big difference; (2) a patient in the acute phase of a serious illness is rarely the best patient for an elective outpatient surgery – two weeks of dialysis and medical optimization can make a big difference; (3) a thorough office ultrasound of a stable patient tends to be better than the bedside exam of an ill patient – I have told patients in the hospital that they had “no fistula options” based on their bedside ultrasound and then found excellent veins for a fistula weeks later in the office; and (4) devoting two hours to driving across town to “meet” a patient is not a good use of my time when patients are clamoring to make appointments in my office – every hospital consult takes the time of four office consultations.

I understand the desire to “get something in” the patient as soon as possible, but offer further points: (1) you will be able to find someone to put that access in, but it’s more important to do something right than to do something right now; (2) the patient who gets a fistula but dies before discharge or withdraws from treatment is not a save; and (3) the non-compliant patient with an IJ permacath, and the non-compliant patient with an IJ permacath and an immature fistula are the same person - still likely to do poorly long-term due to their non-compliance.

### **(4) Venous preservation or loss of access options**

It should be obvious that in order to create a usable fistula, a healthy vein must be available for use. However, there are only so many usable veins in the body, and once these are used up, the options for a fistula dissipate or become much more difficult. Unfortunately, it is the usual case that all medical treatment involves IV access, and anyone who has had significant contact with the medical system has had blood draws, IVs and PICC lines, all contributing to damaged or thrombosed veins.



**PICC line in the cephalic vein – ruining the vein**

A vein once thrombosed will not be usable – a lost option. A damaged vein might be usable, but with difficulty – demanding more experience or skill from the surgeon, or secondary maturation procedures that prolong time on the catheter, increase expense, complicate cannulation, and shorten the life of the access.



**Scarring in an otherwise very nice fistula – due to IV**

Although guidelines for venous preservation are included in the DOQI Guidelines, these are inconsistently followed in the ER or in the hospital. Increasing awareness of this problem and enforcing adherence to the guidelines is essential. *Vigilance is required of those who have the most immediate contact with patients – the nephrologists – to prevent or limit damage to the venous assets.* Early education of the patients is also helpful.

#### **(5) Management of digital ischemia**

The process of creating an arteriovenous shunt for dialysis access involves creating an abnormal situation in the body – a shunt, whether fistula or graft, takes blood destined for the extremity, and diverts it away from the tissues it was supposed to nourish. In most cases, there is enough to go around, but in a significant proportion of patients (2 – 10%) the shortfall of blood to the fingers becomes a problem. Every winter in particular, we ride a wave of patients with complaints of hand weakness, tingling, numbness, or pain in the hand.

Simple medical and lifestyle changes are suggested and may suffice (see attached digital ischemia), but frequently more is required. Options are tailored to findings of abnormal anatomy or physiology: branch ligation or inflow restriction (banding) for patients with obvious ultrasound-demonstrated abnormalities or excessive flows, or additional investigation with an angiogram may be indicated. Revision with proximalization of the inflow to a higher position of the artery may be required.

Patients are rarely counseled to have their accesses sacrificed for digital ischemia without a full investigation of the causes and options for remediation.

#### **(6) Buttonholes in dialysis**

Advances in dialysis care are sometimes hard to distinguish from fads – I have evaluated many “revolutionary” new products and techniques in dialysis access care, including the “stick the next day” Vectra graft, Lifesites, proximal radial cephalic AV fistulas promoted by Dr. William Jennings of Tulsa Oklahoma, the “almost a fistula” Artegraft, Flair stents for venous anastomosis stenosis, and the “stick the next day” Flixene graft. Most have become helpful additions to the “toolbox” without becoming the “answer”.

Buttonholes are now being promoted as a way to allow dialysis patients to have home dialysis without the painful requirement of sharp cannulation six times a week, and we are glad to support the use of buttonholes for appropriate patients. However, every patient who is considered for home dialysis may not be an appropriate candidate for buttonholes.

We believe that buttonholes are not appropriate for: (1) grafts, where the chronic tract down to the graft may become colonized with skin bacteria, leading to a secondary graft infection; (2) stented fistulas, where the chronic tract down to the stent may become colonized with skin bacteria, leading to a secondary stent infection; (3) in cases where

there is insufficient subcutaneous tissue, or thin skin, and where skin erosion may occur, leading to an open vasculocutaneous channel, and the prospect of dangerous bleeding.



**Skin erosion from buttonhole over superficial fistula**

If in doubt, a consult with the surgeon and an ultrasound examination can settle the matter. Avoiding thin-skin areas or stents in the fistula may prevent calamitous bleeding, and allow for defensible buttonholes elsewhere. Correct sites for buttonholes can be identified. And, if the patient is not a candidate for buttonholes, he or she may either learn to sharp cannulate, or return to the safer environment of the dialysis unit.

#### **(7) Maintenance and repair of dialysis access**

Maintenance and repair of existing access is an important focus of the practice. Problems are detected by physical examination or performance parameters (see the “warning signs” sheet included with this letter), and diagnoses may be made with the aid of ultrasound, or by fistulography. Correction of the abnormality is normally indicated to improve performance of the access (clearance), to reduce or eliminate complications (aneurysmal formation, bleeding, rupture, venous hypertension, digital ischemia), and to preclude loss (thrombosis). Treatment may include fistulography and venoplasty with or without stenting, and revisions in dysfunctional accesses to address problems of access performance. These procedures are indicated when clinical abnormalities are noted or when monitoring modalities (venous pressure monitoring, flow measurements, declining clearances) indicate a need to investigate and intervene. Flow measurements may be used to guide and validate interventions, and to provide baseline flow values.

### **Maintenance and repair of dialysis access: (a) Aneurysms in fistulas**

Treatment of aneurysms in fistulas has been increasing as larger numbers of fistulas age and become dilated or otherwise complicated. Many patients are referred for “aneurysms” of their accesses which are not as concerning. They may be unsightly (a leading concern of patients who come for access evaluation, “I don’t want those ‘bumps’ on my arm”), but not all of these are dangerous. All fistulas grow in size irregularly – more in areas of frequent cannulation, more with outflow stenosis and elevated access pressures. A soft fistula with a good thrill and healthy skin is unlikely to rupture.

On the other hand, fistula and grafts do rupture. We preach three danger signs to keep in mind: (1) rapid growth – a fistula with a dilated area growing in size by the week is a concern; (2) pain – localized pain over a dilated area in a fistula is a concern, and (3) thin or unhealthy skin over the fistula is always a risk for rupture. In the extreme, a scab over a fistula should be considered as nothing more than a fibrin plug holding the bodies’ life blood in.



**Aneurysmal fistula – ruptured under the skin – painful, expanding, and with thin inflamed skin – a surgical urgency**

It is amazing how many patients have told us that an ulcer over a fistula was being treated with wet-to-dry dressings, or Neosporin ointment dressings, or that the scab on the fistula would bleed in the shower or whenever it got wet and softened. It surprises me that more patients are not discovered exsanguinated and dead in the shower or bath. These patients should be referred as soon as their problems become apparent.

### **Maintenance and repair of dialysis access: (b) aneurysms in grafts**

Just as fistulas do, grafts become aneurismal with wear and use. In general, dilation of a graft twice its nominal size (e.g., 1 ½ cm dilation in a 7mm PTFE graft) should be considered for replacement. In addition, localized and contained ruptures of grafts are more common than in fistulas, and should be considered for covered stent repair (an “inner tube” stent patching the ruptured spot from within, generally good for six months to a year) or replacement with a new segment of graft. Vectra grafts were long used to replace segments of grafts without having to place a catheter. Flixene grafts are now also available for “next day” cannulation in replaced segments.



**Blown out pseudoaneurysm of graft - before**



**Same blown out pseudoaneurysm after resection and bypass**

### **Maintenance and repair of dialysis access: (c) Treatment of clotted access**

Restoration of access after clotting is an important service of Michigan Vascular Access. Thrombectomies, mostly percutaneous, or combined with open operative techniques (mostly clotted fistulas with aneurysmal areas filled with laminated clot) also rescue lost accesses and extend their useful life. I take pride in the successful rescue of fistulas clotted for as long as two months in several cases, often judged “impossible” in other centers.

In general, grafts are easily declotted, although sclerotic areas of graft used too intensively and scarred to the point of closure may require a stent, as may outflow narrowing or central stenosis. Fistulas are more difficult, due to multiple factors such as diverting branches, valve site stenosis, and dilated areas with big-time clot burden. Open thrombectomy may be required to satisfactorily remove the bulk of the clot burden, but invariably, endovascular examination of inflow and outflow anatomy is required.

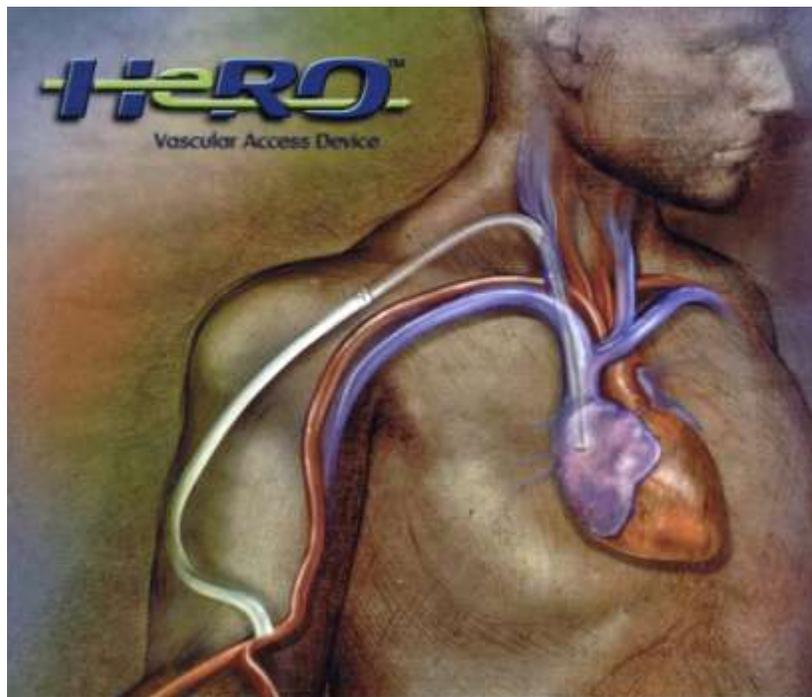
It is frustrating to find that one of my fistula patients has been admitted to a local hospital with an unrelated complaint, but suffered fistula thrombosis in the hospital. Almost invariably, the patient is discharged with a femoral catheter, and instructions to follow-up with me. Almost invariably, the declot is an ordeal, but successful, and worthwhile.

## **(8) The HeRO graft catheter**

Introduced several years ago, the HeRO graft catheter is a solution for placing an access in the arm where good venous runoff does not exist. If any pathway to the atrium is open, the totally subcutaneous catheter portion of the HeRO can be placed, and then the graft placed from an adequate artery to connect to the catheter - again, totally subcutaneously. In theory, if the patient can have an upper body catheter, s/he can have a HeRO graft, and reduce chances of infection along with a better lifestyle.

There are some caveats. First, there must be an artery adequate to support a graft, and this should be checked prior to getting too far into the process. Secondly, severely damaged central veins are difficult to maneuver, and a true expert interventionalist may be required to place the catheter portion. Third, central venous obliteration makes the patient susceptible to all the complications of venous hypertension, including operative and post-operative bleeding, and SVC syndrome. And finally, simpler options may include simple central venous recanalization and stenting along with standard graft placement or fistula creation.

Working with my colleague Dr. Paul Arpasi (Interventional Radiologist, St. Mary Mercy in Livonia), I have started offering the HeRO graft to selected patients. Thorough review of existing venograms by a multi-disciplinary group can lead to a recommendation for the HeRO graft catheter, or some other option.



**The HeRO graft/catheter**

## **(9) Miscellaneous topics**

### **Getting patients seen promptly**

At Michigan Vascular Access we take our responsibilities to the dialysis community seriously. Prompt evaluation, timely communication with the referring nephrologist, and quick service is what we are trying to deliver. Occasionally we are told that “it takes forever to get a patient into your office”, and whenever this might occur we regret falling away from our ideals.

Recently we have increased our staff, and instituted changes in office practice to speed up our service. These changes have allowed us to cut our backlog of unseen patients to less than two weeks, to finalize the plan for surgery to within a week, and to perform needed surgery within two to three weeks. If we are still not meeting your needs, or falling away from these performance goals, please do not hesitate to call to spur us on, or to insure that your patient has not fallen between the cracks.

### **Referrals to other practitioners**

At Michigan Vascular Access we focus on a specific limited area of expertise and provide services that we believe are second to none in the region. If we become convinced that another provider does a better job at a specific task, we may refer the patient (examples: thigh grafts, catheter placement, advanced arterial work, some central venous work from the femoral approach, etc). There is more than enough work to go around, and the best interest of the patient rules.

In particular, we frequently seek the expertise of vascular surgeons (Dr. Iljas of Saint Mary Mercy in Livonia, Providence and Sinai-Grace; or Drs. Bove/Long/Uzieblo and Silver at William Beaumont Hospital), and interventional radiologists (Drs. Arpasi and Eshaki at Saint Mary Mercy Hospital in Livonia)

### **Changing units**

It is no secret that being on dialysis can be difficult, particularly with a problem access. Cannulation problems can result in finger pointing back and forth between the unit and the surgeon's office, yet we must all work together to fulfill our missions – to aid the dialysis patient.

Occasionally I am asked by a patient who has had problems with cannulation whether he or she should go find another unit. We usually advise patients with problem accesses to seek out the most expert cannulators in their unit, and not to accept less. However, we also state that all dialysis units are facing the same financial pressures, the same turnover in staff, and the same difficult task of hitting a 6mm blood vessel with a 15 gauge needle time after time and day after day. Running from unit to unit is probably NOT going to result in greater patient satisfaction, and we do not support it.

We advise patients to become as knowledgeable as they can, to advocate for themselves and for other dialysis patients, and to take as much control of their own care as they are capable of.

**Conclusion**

I look forward to 2012 (now that we are most of the way through 2011). There are questions to answer, progress to make, and patients to serve. Every year we make many friends. Every year we lose a few friends. The living demand that we keep working. As always, our office staff (Lynne, Luba, Ramsis, Shauna and Tina) stand ready to smooth your patient's way toward effective vascular access, and to lessen the access burden on members of the dialysis community. We are ready to try to solve problems.

Thank you for the trust you have placed in us.

Sincerely,

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