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DYNAMIC DUO: THE CHAIRSIDE PERSPECTIVE OF THE BUTTONHOLE METHOD AND SELF-CANNULATION

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My 30-year career as a Nephrology nurse was born from a familial diagnosis of Polycystic Kidney Disease (PKD). In 1972, during my senior year of nursing school, my Dad was diagnosed with PKD. I can still remember feeling fear of the unknown when his family physician was not able to offer us information on this disease process and my medical textbook held a one-paragraph description ending with the words "prognosis is poor". In 1974 I was also diagnosed with PKD. As fate would have it, the hospital where I was working, Moses Taylor Hospital in Scranton, Pa had an opening for a RN in the newly opened Renal Unit. It made perfect sense for me to apply for and accept this position, in order to prepare for whatever our family's future should hold. I have never once regretted this decision. I have been asked to share my perspective as both nephrology nurse and Chronic Kidney Disease (CKD) patient regarding vascular access issues.

A Blast from the Past: Home Hemodialysis and Self Care

For those of us who lived through the days of the 70's and 80's we saw the interest in modality options of both in-center self care and home hemodialysis. I had the

pleasure of being a Home Training nurse helping several families to complete a 3-month training period including mastering the skill of cannulation. Although the majority of times the training partner would be the cannulator, two of my patients self cannulated. Looking back, these patients had virtually problem-free fistulae with little to no access problems. At least in our experience we saw that no infiltrations and little to no interventions were required. What was the secret to success? I truly believe the key was having the same cannulator, the "expert" performing the venipunctures. To further illustrate this point is the case of one of our patients, "Diane", who began home hemodialysis in 1973, self cannulated her fistula, and continued to self-cannulate upon returning in-center due to changes in stability. Diane's original fistula of 25 years never had a single intervention, not a revision, access study, infection nor aneurysm. Diane was passionate about patients having the choice to take an active role in care, whether home or in-center. As I followed her success throughout the years, I realized the influence that Diane had on me, encouraging my patients to learn as much about his or her care, especially access care in all stages of kidney disease.

When Peritoneal Dialysis became the new home therapy of choice in the mid 80's we saw a major decline in interest for performing home hemodialysis or in-center self care. Unfortunately, we also became complacent about encouraging self-care and self-cannulation to continue within the dialysis unit.

Access Observations

Unfortunately, the decline in native arteriovenous fistula creation and the increase in graft placement became trend. This caused the staff to reach a comfort level with graft cannulation, and as exposure diminished, the art of fistula cannulation suffered. In a 1998 study it was shown that although nephrologists preferred fistulae because of a lower incidence of infection and thrombus, staff preferred forearm grafts because of easier cannulation and better flow.[1] If this poll were repeated in 2004 I would hope that nurses would prefer a fistula as the first permanent access.

In my experience, we have always recognized that the expert cannulators, or as we say, "the sharpshooters", must be called upon to perform venipuncture. We reflect a statement in the medical record such as: ***Experienced Staff Only to Cannulate.*** Sometimes, however, altered perception interferes with this plan! When a staff member perceives herself or himself as the "experienced person" to cannulate and isn't the best candidate, often an infiltration or unnecessary needle puncture occurs. This is one of my pet peeves, observing this as a nephrology nurse and even more so from the chair side. The other pet peeve was hearing, as a CKD patient, the commonality of these words... "I'll stick you today". Imagine how frightening this initially sounds to a new patient. There becomes an immediate implication and expectation for pain! Simply rephrasing to: "I'll insert your needles today", is a much softer, less traumatizing, sounding statement.

Patient Issues

Fear of painful needle insertions, worry about inability to access sites, disfigurement and the need for additional surgical procedures can all be patient concerns.

When cannulation of a fistula or graft presents as a problem, naturally this can be stressful and anxiety producing for the patient. I have seen a variety of reactions from the patient praying aloud for staff success, becoming extremely angered to the point of threatening to notify the renal administrator, filing a Network grievance or simply refusing to stay for the treatment. A patient may begin to refuse certain staff the opportunity to cannulate and request another staff person. Reasons might include having a previous bad experience with that particular individual or just the fear of seeing a new face approach. Initially, this might be a cause for resentment or hard feelings depending on the staff person's level of maturity. Then, there is the passive unaffected patient, or the person who apologizes to the staff member(s) having difficulty performing the venipuncture, and continues to offer his or her arm to anyone requiring cannulation experience. These patients who willingly volunteer his or her access for "experience" purposes are truly the unsung heroes.

Patients, sadly, have refused to travel when plagued with access problems, especially if needle insertion difficulties are occurring. I've heard worries stated such as, "What if no one can get in and I can't have a treatment on that day?" Concerns that the family's vacation will be strained because of wasted time, or worse yet, the need for a trip to the hospital for intervention can make the difference in travel decisions. Again, the case for buttonhole sites, or even better, self-cannulation of buttonholes, can become advantageous and provide self-confidence.

Personal Early Decisions

Throughout the years I have become aware of the research of Dr. Zyblut Twardowski regarding the "constant site" method of needle insertion. Originally, in 1977 Dr. Twardowski published his first article referring to this technique. In 1993 he returned to his homeland of Poland and observed a patient with continued success of 20 years cannulating constant sites of his original native fistula.[2]

I also became aware of a successful long-term home hemodialysis patient, George Harper of Rome, Georgia, USA, who has self-cannulated buttonhole sites since 1980. His mentor was the late Dr. Peter Lundin, a nephrologist and CKD patient for close to 30 years. Dr. Lundin self cannulated his own established buttonhole sites after his mentor, the late Dr. Belding Scribner, introduced him to this cannulation method.[3]

Despite the skepticism from my nephrologist and staff, buttonhole self-cannulation made perfect sense to me and became part of the plan. Validations from Dr. Twardowski, Dr. Lundin, Dr. Scribner and George Harper were enough for me!

Reality

In May 1999 my kidneys failed and hemodialysis became a reality. Although my plans were well intended, having a fistula created in November 1998 at a serum creatinine level of 4.0 and hoping to dialyze via CAPD, this wasn't meant to be. In mid May, during PD catheter insertion my transverse colon was accidentally nicked thus causing peritonitis, bowel repair and removal of the catheter. Due to sepsis, the creatinine peaked to 9.0 and an urgent HD treatment was necessary. Unfortunately, my fistula had not matured correctly and was developing distally into the hand veins. Another trip to the OR was required for a Tesio catheter insertion. This experience opened up my eyes to several issues that our patients' may face. These include the patient's disappointment when a selected modality is not an option, feeling the concerns of additional access surgery and dealing with catheter issues. My fistula eventually required a branch ligation to correct the flow. The lesson I share with others is that sometimes the best plans backfire. We can encourage our patients' to remain hopeful that other options will be available.

Although eager to use my fistula and have the catheter removed, I could honestly understand the absolute need for catheters to be only a bridge device and not the initial first access. Easy on/off is appealing to a patient and having no delay holding sites post treatment appears to be an advantage. The most obvious reason why catheters are appealing to patients is no needles. If a catheter is the first and only access a security blanket phenomena may occur.

In our experience, we have often had the challenge convincing the patient of the need to begin to access the fistula since the patient has reached such a comfort level with a catheter. Worse yet is the patient refusing fistula or graft creation because the catheter "works fine" in the patient's eyes, yet access infections and adequacy issues were major concerns. All disciplines must collaborate and begin early education, during various stages of CKD, to emphasize that catheters must only be a temporary stepping-stone while the fistula is maturing, or the graft is placed. There are certainly opportunities for the primary care physician, nephrologists, vascular access surgeon, interventionalists and dialysis staff to echo the same messages: save veins, strive for fistula creation with adequate maturation time, and that catheters are not going to be the permanent access. Another strategy to help promote the importance of a fistula versus a catheter is to tap into the expertise and willingness to share success stories from one patient to another. It's a common sense approach to have a good patient advocate, one with a healthy functioning fistula and preferably not a fistula that is frightening in appearance, to meet with the patient fearful of either access surgery or any part of the access concept. One patient becomes the cheerleader and educator, at the same time, and is "listened to" uniquely because each share a common bond through experience. This approach has been very successful in our practice. Patients can be our best resource, and there are so many who would find the opportunity to help another so gratifying, yet this option is often overlooked.

Another eye-opener and complete surprise to me was how protective I became with my fistula. I self cannulated with buttonholes immediately and never once offered my arm to a new staff member to gain cannulation experience. Throughout the years I planned to be supportive by letting new staff cannulate my arm but I never had the courage to do this when the time came. All the same "what if's"

became forefront in my thought process. For this reason I traveled with Buttonhole needles for any transient treatments. I was once initially refused the opportunity to self-cannulate because a particular dialysis facility had never heard of this practice. I patiently waited 45 minutes until the medical director could be notified to get his permission to self-cannulate and my dilemma was resolved.

For the first two years of self-cannulation via buttonhole sites sharp needles were the only needles available. Other than putting up with slight bleeding around the needle puncture sites, there were no infiltrations and no problems. In May 2001 I had the good fortune again, as fate would allow, to meet Pat Peterson RN, CNN. Pat at that time was the Manager of Professional Services, Medisystems Corporation, Seattle, WA. Pat introduced me to dull buttonhole needles, about to be FDA approved and as soon as this product was available to me there was an end to bleeding puncture sites. (Buttonhole™ Needle sets, Medisystems Corporation, Seattle, WA).

My nephrologist was soon convinced that this technique worked and began writing orders to initiate buttonhole sites on several of his patients experiencing cannulation concerns due to either limited sites or fragile fistulae.

The challenge faced, especially in our "seasoned staff" with longevity, was to understand the deviation from rotating sites. After all, this had always been drilled into us, and the American Nephrology Nurses Association (ANNA) text did not discuss buttonhole cannulation and continued to stress site rotation. No new articles were being written about this technique so it was even harder to get "buy in" from our staff despite my success and testimonials. In April 2002 Pat Peterson's article called: ***Fistula Cannulation: The Buttonhole Technique*** was published. Finally, more support for this technique and better yet for nephrology nurses, was published in the ANNA journal for all to read.[4]

Buttonhole Cannulation

In addition to the creation of easily accessible sites, the "constant site" technique provides an essentially pain free venipuncture experience, reduces or may even eliminate infiltrations and helps to promote a long fistula life.

A study performed by G. Kronung demonstrated that needle punctures performed in the same area, also called "one-site-itis", in contrast to the constant site, will cause aneurysmal dilatations and cause stenosis to develop in adjacent areas of the fistula. When the "rope-ladder" puncture technique was used, punctures were equally spaced along the fistulas' entire length. Small dilatations developed over the length of the fistula but not of an aneurysmatic nature. He found that the best technique was the "constant site" method as neither of these problems developed. Kronung renamed the "constant site" method to the "Buttonhole Puncture" technique.[5]

Buttonhole Initiation

Medisystems Corporation has a Buttonhole Starter Kit information pack that includes a complete description of the technique, common questions and answers

and a step-by-step guide to the creation and maintenance of the sites. Initial sites selected should be based on the ease of cannulation (especially if the patient is cannulating) where the venous and arterial pressures are within range limits.

Here are some tips:

1. Sites are cannulated by the same person with a sharp needle for six venipunctures (six treatments)
2. If scheduling does not permit the same person to cannulate for these six treatments, another cannulator can initiate an alternative set of sites. This would allow staff person "A" to develop a set of sites and staff person "B" to develop another set. It is important that the same angle and needle depth is used during establishment of the tunnel, thus the reason for the *same* cannulator during the creation phase.[6] To expedite the process the patient might also select the option of daily cannulation for six days. I regret that I only established one set of buttonholes because during the last few months of dialysis, prior to transplant, I occasionally had difficulty accessing the venous site.
3. The scab that forms as each site heals must be lifted prior to venipuncture in order to visualize and access the exact needle puncture. I found that it helped to gently scrub the sites with a soapy washcloth during bathing. Then at the time of cannulation I used an alcohol wipe and 2x2 gauze to further remove the scab. The use of tweezers is also a recommended practice.
4. At the seventh treatment a Medisystems Dull Needle can be used since the tunnel has formed. I can only describe the feeling by referring to inserting an earring into a pierced ear. The post follows the established tract and slides in. If resistance is met gentle rotation of the needle is required to get the needle to slide through the tunnel, exactly as one would wiggle a pierced earring if there was resistance.

The Universal Wish List

Nephrology nurses share common concerns and hopes to continuously improve the quality of life for our patients. Our wish list directly relates to the vascular access and includes the following:

- There would be early referrals to the nephrologist and vascular access surgeon. More fistulae with adequate maturation periods would be created and a major reduction in bridge accesses would result.
- The vascular access cannulates easily, achieves prescribed blood flow rates, and promotes adequacy.
- The vascular access surgeon is committed to all efforts to create a fistula as the first and permanent access. In the ideal world there would be a relationship of collegiality and collaboration between the vascular access surgeon and the renal staff. The surgeon would not question cannulation skills because skills were at expert level. Proactive monitoring of venous and arterial pressures and early recognition of "trouble signs" would decrease access failure.
- Vascular access education of staff and patients would be ongoing and considered the priority component of staff education.

Fortunately we now have improvement projects of both the National Kidney Foundations' (NKF) Disease Outcomes Quality Initiative Guidelines (K/DOQI) and the National Vascular Access Improvement Initiative (NVAII) Fistula First Project sponsored through the Centers for Medicare and Medicaid Services (CMS). This is definitely another Dynamic Duo.

Lesson Learned

We need to encourage our patients to take an active participation in knowledge of his or her access and protecting this lifeline. This could be as simple as prepping sites to the ultimate, self-cannulation. Talking with the patient about specifics of needle depth or angle of insertion helps to get the patient involved. This also encourages self- confidence. A collaborative multi-disciplinary team and/or a vascular access coordinator are quality practice approaches to vascular access management.

The importance of vascular access education for the dialysis team must never be underestimated and must be considered the most important component of staff education. An outstanding teaching tool for all dialysis staff has been developed by Deborah Brouwer RN and is entitled: ***Cannulation Camp.***[7] Ideally, the concepts of this thorough reference would be incorporated in all phases of staff education, not only during orientation but throughout the ongoing competency reinforcement process.

I can't stress enough how important and necessary it is to identify staff members to be the cheerleader advocates for not only buttonhole cannulation but for self-cannulation. It has taken five years but we now have approximately 12 patients with successful buttonhole sites and three self-cannulation patients. Patient testimonials certainly help to spread the word about the ease of needle insertion and this painless technique. Enthusiasm breeds enthusiasm and good news will travel quickly about this DYNAMIC DUO!

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DISCUSSION

Vascular Access for Hemodialysis IX
May 6–7, 2004
Lake Buena Vista, Florida

May 6, 2004
Faculty Presentations
Lewis

Question for Ms Lewis on the buttonhole technique: We have been trying it at our unit. We have been putting all the new fistula patients on it, our results have not been as good as you have described. About half of the patients have requested stopping, primarily for pain. The nurses were in-serviced by the company before starting, we were waiting three to four weeks before changing from the sharp to the dull needles. But the most common complaint we would get was that it was painful, especially in the older patients. The younger patients seem to do well. It was also somewhat difficult to push the needle through the opening even though we did remove the scab. I was curious if you had any comments on that?

Lewis: We had one patient that complained of pain and she was an elderly patient and she asked us if we would switch back to sharp needles in her buttonhole sites. I do not have any other experience with that phenomena. It seems with everyone we have cannulated they have no problem with pain, and think it is an improvement. As far as the pushing, it is the same phenomenon that occurs with a pierced earing. Sometimes the track just might develop a little resistance in there and you have to rotate the needle a little bit, just gentle wiggling of the needle will make it go in. Not forcefully pushing it. But it did happen in my particular situation a lot where I feel a little resistance in there and just gentle pull back on the needle, reposition it a little bit, and wiggle it a little bit and it would slide right in. So that is a common phenomena that you might have to do that. As far as the pain, I do not have any experience with that.

Question: I noticed that you use the sharp needle yourself for a couple of years. Did you have any problems with bleeding around the needle?

Lewis: Yes, and that is the common problem. There was constant oozing around the needle site because typically you will nick the needle track with the sharp needle. That was the only problem. I just had to deal with the constant oozing. I did not have any other problem with that. As soon as I switched over to the dull needle that oozing stopped completely.

Question: What about the buttonhole technique? I have had some experience where we have tried to establish the buttonhole. In those people where we can establish it works great and no doubt about it. But then there is a fair amount of complications including aneurysms and bleeding from us trying to establish this. So I was wondering whether if someone has looked into it?

Lewis: The last studies that I am aware of it were two studies in 2000 and 2001 and Pat Peterson in ANNA. There are not a lot of recent studies about buttonhole cannulation.