

Chapter 21: Vascular Access for Hemodialysis in the Elderly

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All types of hemodialysis access are potentially problematic in elderly persons. Fistulas or grafts can be difficult to initiate because of atherosclerosis and prior vascular damage and additionally pose a risk of causing distal ischemia. In patients with heart failure, the extra cardiac load of an arteriovenous shunt might raise concern. Last, in some cases, the maturity time for a fistula may exceed the lifespan of the patient, and therefore, placing one exposes the patient to a procedure for no benefit. Although catheters are simpler to initiate, elderly patients are also at higher risk of death from infection or other complications associated with them than are younger patients.

EPIDEMIOLOGY AND BACKGROUND

Despite these disadvantages, most elderly patients treated for end-stage kidney disease (ESKD) in the United States are on hemodialysis and therefore require one of these options. This situation has arisen because there are limited alternatives. For one, renal transplantation in patients over 65 is relatively uncommon. Furthermore, peritoneal dialysis is rarely used in the elderly in the United States, representing only about 4% of the dialysis patients over 70. This tiny rate is far less than in other countries and likely represents underuse, but it is nevertheless continuing to decrease.

The vast majority of these accesses are central venous catheters: for patients over 75, the rate of catheter use is nearly 85% at the time of dialysis initiation. One study examining dialysis patients 65 to 75 and >75 yr of age found that even 3 mo after starting dialysis, two thirds were still using a catheter.¹

KDOQI recommendations for vascular access do not differentiate between younger and older patients, so under the current “fistula first” approach—including the advent of quality measures

that promote fistulas—the rate of fistula placement in the elderly has been rising. It is uncertain whether this approach will improve long-term patient survival or morbidity. There is some evidence that more aggressive fistula placement is being accompanied by a greater failure rate.² Despite this general trend, it is important to keep in mind that KDOQI also advises tailoring the vascular access options for the individual patient.³ As will be detailed below, this is particularly important for the elderly patient in whom the risk/benefit balance of interventions may be less well defined.

Before exploring the issues of vascular access for elderly patients in more detail, there is one important caveat. The definition of “elderly” is not consistent among various studies, making comparisons difficult. Most studies have used 65 yr old as a cut-off. However, this is somewhat unsatisfying, because the issues facing a patient in his or her 60s may be quite different from those facing an octogenarian. Only recently have some studies begun to examine differences specifically in the “older old.”

WHAT IS THE PREFERRED ACCESS IN AN OLDER PATIENT?

There are no randomized trials to answer this question definitively. Older patients have shorter life expectancies and more comorbidities, so one might speculate that there is less opportunity to realize a benefit from a fistula. However, the limited data available from observational studies show a mortality pattern that favors fistulas in the elderly, just as in younger patients. Specifically, in patients over 67 yr old, fistulas are associated with lower death rates

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than grafts or catheters, with catheters having by far the worst outcome (HR 1.70).⁴ This implies that fistulas are preferred, but it is difficult to draw firm conclusions because these are observational data. It is likely that fistula placement is also acting as a marker that identifies healthier patients. Furthermore, these data reflect only the situation in which a fistula has already been placed, has matured, and is being used for access. The lack of prospective data makes it difficult to offer definitive practice guidelines. With that as a caveat, however, existing clinical data can still provide guidance to help choose the appropriate access for elderly patients.

WHAT IS THE NATURAL HISTORY OF A NEWLY CREATED FISTULA IN AN OLDER PATIENT?

One approach to better understand this question is to examine the natural history of each kind of access. Some studies suggest that age is a risk factor for a nonmaturing fistula. The REDUCE-FTM I study found that age >65 doubled the risk of nonmaturity within 6 mo of placement,⁵ perhaps not surprisingly given the higher rates of atherosclerotic disease in older patients. A recent large meta-analysis reached similar conclusions, suggesting that elderly patients were 70% more likely to have failure of fistulas at 1 yr compared with younger patients.⁶ This meta-analysis has been criticized for including studies with variable age cut-offs, although in practice these findings do not seem to have been driven by any particular study.

However, other studies suggest that there is no difference in fistula survival in the elderly. A recent large retrospective cohort study of patients referred for fistulas, dividing patients into ages <65, 65 to 79, and ≥80 yr, found no difference between any of the age groups in fistula patency at 1 yr.⁷ It should be noted that the overall fistula success rate in this study was low, with only 50% of patients actually using their access at 1 yr without major revision, but nevertheless, this suggests that age is not an important factor.

How can we resolve these conflicting studies? Because there was no randomization, all of these studies only included patients in whom fistulas were placed. Furthermore, there may have been variable aggressiveness on the part of surgeons and referring physicians that may have affected outcomes. In support of the latter is the observation that the death rates reported were lower than for dialysis patients in general, suggesting some selection bias.

Overall, it seems that under some circumstances fistulas work just as well in selected elderly patients as in younger patients. However, this is not a universal finding, and the balance of the evidence suggests that elderly patients contemplating a fistula should be prepared for a somewhat lower success rate and a longer time to maturity. Independent of differences between age groups, even in the best circumstances there is a moderate likelihood that a fistula will not be working 1 yr after placement, which may affect a recommendation to a patient

who has a short life expectancy or who is averse to invasive procedures.

IF IT IS TO BE PLACED, WHERE SHOULD THE FISTULA BE LOCATED?

This is also a matter of current debate. In younger patients, there is a preference for a distal-to-proximal fistula placement, with the intent being to preserve long-term dialysis options. However, an elderly patient with multiple comorbidities may not live long enough for the exhaustion of dialysis sites to be relevant. Because there have been some studies showing that the most distal location (radiocephalic) has a lower success rate in the elderly than brachiocephalic fistulas (*e.g.*, 81 versus 66% patency at 1 yr), the possibility of starting with an upper-arm fistula has been raised.^{6,8} However, there are conflicting studies that find no difference between locations in elderly patients,⁷ and in the absence of consensus, no firm conclusion can be drawn.

A reasonable approach is to have a low threshold for attempting an upper arm fistula in an elderly patient if the radiocephalic site is complicated and life expectancy is not likely to be limited by the need for multiple dialysis sites.

ARE GRAFTS ASSOCIATED WITH DIFFERENT OUTCOMES THAN FISTULAS?

In the general dialysis population, fistulas are currently preferred over grafts on the basis of patency and complication issues. However, in elderly patients specifically, one observational study failed to find a difference between fistulas and grafts in rates of intervention or mortality.⁹ Another observational study found a modest mortality benefit associated with fistulas over synthetic grafts (mortality HR 1.16) but not over autologous vein grafts.⁴

Therefore, it seems that fistulas are still the first choice in elderly patients but that grafts may be an acceptable alternative when obstacles arise. The combination of an overall shortened expected life survival in elderly compared with younger patients further challenges the notion of fistula before graft. In addition, the ability to use grafts soon after placement minimizes the duration of catheter exposure, potentially decreasing the infectious risks. These considerations might suggest a strategy of a more liberal use of grafts in elderly patients. However, such an approach remains untested.

WHAT MEDICATIONS IMPROVE THE PATENCY RATE OF GRAFTS OR FISTULAS?

There are no trials that address this in elderly patients in particular. In the general population, contrary to what might be assumed, the use of antiplatelet agents or anticoagulants for

other medical purposes has not been found to be associated with improved access patency and is likely applicable to the elderly as well.¹⁰ Furthermore, given the high risks associated with anticoagulation in the elderly, there is little support for anticoagulation solely for maintenance of a vascular access.

IS CONGESTIVE HEART FAILURE A CONTRAINDICATION TO A GRAFT OR FISTULA?

Looking at all patients, the rate of high-output congestive heart failure (CHF) is increased in patients with fistula blood flows >2 L/min, particularly with an upper arm fistula.¹¹ However, in dialysis patients >65 yr old and with diagnosed heart failure, the death rate from cardiac causes was not higher in those with a fistula compared with a catheter. Although this is observational, this suggests that in general the diagnosis of heart failure should not prevent a fistula from being considered.¹²

WHAT IS THE ROLE OF A CENTRAL VENOUS CATHETER?

As noted, catheters are associated with higher mortality in elderly patients, and from a medical standpoint should be avoided when there are alternatives. However, observationally, they are by far the most common access type in this group, indicating a gap between this principle and actual practice. One issue is that there seem to be considerable obstacles in transitioning from catheters to more permanent types of access. One study showed that the chance of graduating from a catheter to a fistula or graft within 90 d is half as great in patients over 70 yr old compared with those under 50.¹

This may be related to the increased difficulty of developing a usable alternative in these patients. However, this could also be driven by provider or patient opinion that there is limited usefulness of placing an arteriovenous fistula in the face of other life issues. Given the clear advantage of the fistula over the catheter even in the elderly, this medical rationale should be reserved for cases where the certainty of short survival is high.

It is important to keep in mind that, from the patient perspective, catheters have the advantage of being the least invasive procedure. This may be relevant to decisions regarding aggressiveness of care. For example, a catheter may be the preferred initial access for an older patient who wishes to have a time-limited trial of dialysis before deciding whether to continue indefinitely.

CONCLUSIONS

A high proportion of elderly persons use catheters rather than grafts or fistulas despite the observation that catheters are associated with worse outcomes in this population. Fistulas may

be assumed to be superior to grafts, although this has not yet been shown definitively in the elderly, and either could be acceptable depending on the individual. There is likely reduced fistula maturity and patency compared with younger populations, but this may not apply to selected patients. Given the lack of randomized trials, there is not—and likely will not be—a consensus on how the algorithm of developing access should be different for elderly patients. The data above suggest some important differences from younger patients but are not yet established enough to make general recommendations. Overall, the most important principle is to keep in mind that individualizing vascular access is also part of the current national recommendations as well.

TAKE HOME POINTS

- No randomized trials exist to definitively resolve the question as to the best type of dialysis access in the elderly
- Choices of dialysis access must be made in consideration of many factors
- In appropriately selected patients, arteriovenous fistulae may be expected to work as well in the elderly as in a younger population
- Given the shorter expected life span in those elderly patients who have multiple comorbidities, arteriovenous grafts may be reasonable
- Anticoagulants and antiplatelet agents are not recommended in the elderly if the sole purpose is to improve access patency

DISCLOSURES

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REVIEW QUESTIONS: VASCULAR ACCESS FOR HEMODIALYSIS IN THE ELDERLY

1. KDOQI guidelines regarding vascular access in the elderly include:
 - a. A recommendation that fistulas be avoided in elderly patients with peripheral vascular disease
 - b. A recommendation that fistulas not be placed in patients with a life expectancy under 1 yr
 - c. An exception to the target goals of fistula placement rates (>65%) for elderly persons
 - d. No specific recommendations
2. Regarding fistula placement in the elderly:
 - a. Radiocephalic fistulas have consistently shown the same outcomes as upper extremity fistulas and should be preferred
 - b. Using a graft rather than a fistula has been universally shown to be associated with higher mortality in elderly persons
 - c. Survival of fistulas has been consistently shown to be shorter in elderly persons
 - d. The use of anticoagulants or antiplatelet agents in this population is not encouraged for the sole purpose of maintaining fistula patency
3. Hemodialysis catheter use in the elderly
 - a. Is associated with an increased risk of infection and hospitalization in this age group, but not mortality, when compared with other access
 - b. Is the most common type of access upon initiation, and transition to other types of access is at lower rates than in younger patients
 - c. Represents the preferred access for patients carrying the diagnosis of heart failure
 - d. Is rarely preferred by patients if all options are explained, because there are few advantages