

From the Society for Clinical Vascular Surgery

The associations of hemodialysis access type and access satisfaction with health-related quality of life

Natalie Domenick Sridharan, MD, MSc,^a Larry Fish, PhD,^a Lan Yu, PhD,^b Steven Weisbord, MD,^c Manisha Jhamb, MD,^c Michel S. Makaroun, MD,^a and Theodore H. Yuo, MD, MSc,^a Pittsburgh, Pa

ABSTRACT

Objective: In addition to age and comorbidities, health-related quality of life (HRQOL) is known to predict mortality in hemodialysis (HD) patients. Understanding the association of vascular access type with HRQOL can help surgeons to provide patient-centered dialysis access recommendations. We sought to understand the impact of HD access type on HRQOL.

Methods: We conducted a cross-sectional prospective study of community-dwelling prevalent HD patients in Pittsburgh, Pennsylvania. We assessed patient satisfaction with their access using the Vascular Access Questionnaire (VAQ) and HRQOL with the Short Form Health Survey. We compared access satisfaction and HRQOL across access types. We used logistic regression modeling to evaluate the association of access type with satisfaction and multivariate analysis of variance to evaluate the association of both of these variables on HRQOL.

Results: We surveyed 77 patients. The mean age was 61.8 ± 15.9 years. Arteriovenous fistula (AVF) was used by 62.3%, tunneled dialysis catheter (TDC) by 23.4%, and arteriovenous graft (AVG) by 14.3%. There was a significant difference in satisfaction by access type with lowest median VAQ score (indicating highest satisfaction) in patients with AVF followed by TDC and AVG (4.5 vs 6.5 vs 7.0; $P = .013$). Defining a VAQ score of <7 to denote satisfaction, AVF patients were more likely to be satisfied with their access, compared with TDC or AVG (77% vs 56% vs 55%; $P = \text{NS}$). Multivariate regression analysis yielded a model that predicted 46% of the variance of VAQ score; important predictors of dissatisfaction included <1 year on dialysis ($\beta = 3.36$; $P < .001$), increasing number of access-related hospital admissions in the last year ($\beta = 1.69$; $P < .001$), and AVG ($\beta = 1.72$; $P = .04$) or TDC ($\beta = 1.67$; $P = .02$) access. Mean physical and mental QOL scores (the composite scores of Short Form Health Survey) were not different by access type ($P = .49$; $P = .41$). In an additive multivariate analysis of variance with the two composite QOL scores as dependent variables, 25.8% of the generalized variance in HRQOL (effect size) was accounted for by access satisfaction with only an additional 3% accounted for by access type.

Conclusions: HD patients experience greatest satisfaction with fistula, and access satisfaction is significantly associated with better HRQOL. Controlling for access satisfaction, there is no significant independent association of access type on HRQOL. Future research should investigate the relationship between access satisfaction, adherence to dialysis regimens, mortality, and the consequent implications for patient-centered care. (J Vasc Surg 2017;■:1-7.)

The preferred access type for hemodialysis (HD) patients has been the arteriovenous fistula (AVF) owing to its association with lower rates of morbidity and mortality compared with arteriovenous graft (AVG) or tunneled dialysis catheter (TDC).¹ Evidence for this led to the creation of the National Vascular Access

Improvement Initiative, also known as the Fistula First initiative, by the Centers for Medicare and Medicaid Services in 2003.² However, emerging evidence has suggested that some patients, specifically elderly patients and patients with significant comorbidities, may derive less benefit from the creation of an AVF, challenging the “fistula-first” dictum.³⁻⁵

While still recognizing that AVF provides the best outcomes in the HD population as a whole, providers have begun to move away from a fistula-first approach in every patient and toward providing more patient-centered recommendations.⁶ For instance, it is reasonable to consider that, in some situations, a poorly functioning AVF that requires multiple admissions and missed dialysis sessions may actually be less effective than a functional AVG or TDC. A key requirement for this more holistic approach is a focus on patient centered outcomes such as health-related quality of life (HRQOL).⁷

In addition to traditional risk factors, such as age and comorbidities, HRQOL is known to be associated with mortality in HD patients.⁸ However, evidence is lacking

From the Division of Vascular Surgery^a and Division of Nephrology,^c University of Pittsburgh Medical Center; and the University of Pittsburgh, Institute for Clinical Research.^b

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Correspondence: Natalie Domenick Sridharan, MD, 200 Lothrop St, Ste A1017, Pittsburgh, PA 15213 (e-mail: domenickna2@upmc.edu).

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for understanding what factors impact HRQOL in HD patients.⁹ The component and possible predictor of HRQOL in which surgeons are most involved is creation and maintenance of the HD access.

Understanding the association of vascular access type with HRQOL can help surgeons to provide more patient-centered dialysis access recommendations. To this end, we sought to understand the impact of HD access type on patient satisfaction with their access and their overall HRQOL. We hypothesized that patient satisfaction and QOL would vary significantly by access type (AVF, AVG, or TDC).

METHODS

The Institutional Review Board at the University of Pittsburgh approved this study protocol. Informed consent was obtained for each patient in this study. We conducted a cross-sectional prospective study of community-dwelling prevalent HD patients using validated questionnaires to assess patient satisfaction with their dialysis access as well as HRQOL. This project was undertaken at three HD centers in Western Pennsylvania. All patients who spoke English, had been on dialysis for ≥ 3 months, and were willing to participate in the study were enrolled.

Four trained research assistants administered questionnaires between April 2016 and July 2016. Patients were interviewed while dialyzing during their regularly scheduled dialysis times. Study data were collected and managed using the REDCap mobile application hosted by the Clinical and Translational Science Institute at the University of Pittsburgh. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies. All patients provided informed consent before enrollment.

Assessment of patient satisfaction with access type. The Short Form-Vascular Access Questionnaire (VAQ) is a 13-item form that estimates the level of HD patients' satisfaction with their vascular access. The VAQ was developed and validated in Toronto, Ontario, Canada, and found to have high test-retest reliability as well as internal consistency on psychometric evaluation.^{10,11} The form takes approximately 10 minutes to administer and assesses four domains of patient access satisfaction: overall satisfaction, physical symptoms, social functioning, and complications. Each item is rated by the patient on a Likert scale of 1 to 7, where 7 indicates the highest level of dissatisfaction. There is single summary score for 12 items. Higher scores indicated greater dissatisfaction. The VAQ score distributions were generally bimodal and not normally distributed, with patients either being highly satisfied or highly dissatisfied. To categorize the high and low satisfaction patients for the purposes of analysis, VAQ scores of < 7 were considered

ARTICLE HIGHLIGHTS

- **Type of Research:** Single-center, prospective, cross-sectional study
- **Take Home Message:** In 77 hemodialysis access patients, an arteriovenous fistula was associated with higher degrees of satisfaction compared with tunneled catheters and grafts, and access satisfaction was associated with improved health-related quality of life.
- **Recommendation:** This study suggests that an arteriovenous fistula, as opposed to other access types, leads to higher degrees of patient satisfaction and improvement in health-related quality of life.

as satisfied and scores of ≥ 7 were considered as dissatisfied.

Assessment of HRQOL. HRQOL was assessed using the Short Form 36 (SF-36) questionnaire. This well-validated QOL questionnaire consists of 36 items and 8 subscales: physical functioning, physical role, pain, general health, vitality, social functioning, emotional role, and mental health. These eight subscales can then be summarized into two primary dimensions of functioning. These are the physical component summary score (PCS) and mental component summary score (MCS). For both summary scores, higher scores indicated increased QOL. The SF-36 has been validated in patients with end-stage renal disease.¹²

Demographic and historical questionnaires. A demographic questionnaire was developed by the study team and included an assessment of basic demographic information as well as patient access history including years on dialysis, prior accesses, number of hospital admissions in the previous year, number of access-related hospital admissions in the last year, number of access revisions, and any history of TDC.

Statistical analysis. Descriptive characteristics are reported as means \pm standard deviations or as number of cases and percentages. Baseline characteristics were compared by chi-squared tests for categorical data and Student *t* tests for continuous data. Owing to a non-normal data distribution, median VAQ scores were compared between the three groups (AVF, AVG, and TDC) using the Kruskal-Wallis test. Mean SF-36 scores were compared using analysis of variance. We used logistic regression modeling to evaluate the association of access type and various other predictors with satisfaction. Multivariate analysis of variance was used to evaluate the association of access type and VAQ score on both component scores of HRQOL (PCS and MCS). We used path analysis to test, directly, our hypothesis that access-related admissions and VAQ score mediated the

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