# Type of vascular access and location in end-stage renal disease patients under onlinehemodiafiltration and its association with patient's perception of health-related quality of life

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## INTRODUCTION/AIMS

A functional vascular access is required for a successful dialysis procedure. The lack of major advances in the field of vascular access for dialysis explains that vascular access dysfunction is still one of the most important causes of morbidity in dialysis population. Access-related problems are responsible for 50% of the hospitalizations of dialysis patients.

Health-related quality of life (HRQOL) is a multidimensional concept, which includes patient's perspective on physical, mental, and social domains, which has been largely used in different illnesses. Well-being is the main result of the treatment of ESRD patients on dialysis and the assessment of well-being is achieved by evaluating the patient reported HRQOL using a validated instrument .

There is a lack of information about the impact of the type of vascular access on patient's perception of HRQoL, particularly in end-stage renal disease (ESRD) patients under online-hemodiafiltration. Moreover, there are no data the effect of AVF localization on HRQoL. By this reasons, we aimed to evaluate the patient-reported HRQoL, according to the type vascular access (AVF *vs* CVC) and location of AVF.

## METHODS

A descriptive transversal observational study was conducted to assess the HRQOL in ESRD patients undergoing on OL-HDF according to the type vascular access (AVF vs CVC) and location of AVF, by using Kidney Disease Quality of Life-Short Form (KDQOL-SF) instrument.

This work was accomplished in five dialysis units of north of Portugal. A total of 322 patients, of both genders (59,63% males) with a mean (±SD) age of 64,9 ± 14,3 years, were evaluated. Patients were under therapeutic dialysis three times per week for the duration of 3-5 hours. The main causes of renal failure, in our patients, were: diabetic nephropathy (n=116), hypertensive nephrosclerosis (n=45), other diseases and/or uncertain etiology (n=136 ).

For OL-HDF procedure, synthetic high-flux polysulfone dialyzers (Fresenius Medical Care, Bad Hamburg, Germany) were used. Patients were excluded if they: (1) do not accept to participate in the study; (2) under 18 years old; (3) were cognitively impaired; (4) had a severe speech or hearing impairment; (5) in the dialysis program for less than three month; (6) patients with malignancy, autoimmune disease and with inflammatory or infectious diseases.

At starting the study, the patients were clinically evaluated and blood samples were collected for analytical evaluation; moreover, KDQOL-SF was self-administered to all patients. This survey collects data on age, gender, time under dialysis, causes of kidney disease, hematological data, iron status, and dialysis, inflammatory and nutritional markers. Laboratory data were obtained by using standard techniques. Moreover, the type of vascular access was registered in all ESRD patients, and localization of AVF was registered in 229 patients.

## RESULTS

ESRD patients using CVC as vascular access, presented a decreased in four SF-36 domain scores, namely, physical functioning, emotional well-being, role-emotional and energy/fatigue when compared with those using AVF as vascular access. Moreover, these patients also showed significant differences in ESRD target areas, namely, decline in cognitive function and quality of social interactions domains. When comparing the variables according to the localization of the AVF, significant differences were found in three SF-36 domain scores, namely, physical functioning, pain and general health. Moreover, we also found significant differences in ESRD target areas, namely, symptoms/problem list, effects of kidney disease and quality of social interaction domains (Table I).

**Table I** - HRQOL results based on the KDQOL-SF instrument for OL-HDF patients according to the type of vascular access and AVF localization.

| | CVC (n= 70) | AVF (n=252) | *P* value* | Right Forearm (n= 20) | Left Forearm (n=150) | Right Upper arm (n=16) | Left Upper arm (n=43) | *P* value** |
|---|---|---|---|---|---|---|---|---|
| **ESRD – targeted Areas** | | | | | | | | |
| Symptoms/problem list | 74,46 (13,76) | 76,47 (17,11) | 0,098 | 70,83 (14,35) | 79,06 (16,77) | 74,34 (16,98) | 71,85 (18,26) | **0,031** |
| Effects of kidney disease | 67,44 (17,55) | 66,22 (22,02) | 0,979 | 56,25 (22,26) | 69,08 (21,7) | 56,0 (18,41) | 61,85 (21,25) | **0,013** |
| Burden of kidney disease | 21,92 (22,91) | 26,13 (24,88) | 0,228 | 17,81 (17,94) | 28,27 (25,2) | 19,53 (26,60) | 25,44 (25,20) | 0,214 |
| Work status | 7,35 (19,82) | 14,02 (30,24) | 0,163 | 10,52 (26,76) | 16,21 (33,10) | 12,50 (28,86) | 10,46 (20,58) | 0,654 |
| Cognitive function | 73,23 (21,86) | 78,94 (19,36) | **0,050** | 76,07 (18,58) | 79,20 (20,00) | 73,58 (17,57) | 81,30 (17,81) | 0,522 |
| Quality of social interaction | 77,01 (21,79) | 82,80 (18,29) | **0,044** | 79,23 (18,67) | 85,57 (16,38) | 79,95 (21,98) | 77,69 (21,40) | **0,049** |
| Sexual function | 71,88 (31,87) | 79,07 (26,18) | 0,469 | 79,16 (27,95) | 79,09 (25,69) | 56,25 (33,07) | 75,00 (28,50) | 0,418 |
| Sleep | 42,38 (14,41) | 39,35 (15,52) | 0,103 | 39,97 (14,67) | 39,6 (16,25) | 40,68 (12,72) | 37,93 (15,68) | 0,919 |
| Social support | 80,43 (29,84) | 81,38 (28,23) | 0,934 | 82,5 (30,160) | 80,77 (27,83) | 82,29 (28,84) | 82,14 (28,36) | 0,987 |
| **Dialysis care** | | | | | | | | |
| Staff encouragement | 56,67 (22,41) | 60,15 (23,45) | 0,387 | 92,10 (12,64) | 89,81 (20,76) | 85,15 (27,46) | 89,88 (20,33) | 0,792 |
| Patient satisfaction | 86,58 (23,39) | 90,23 (20,00) | 0,171 | 69,16 (24,34) | 59,73 (24,05) | 59,37 (22,46) | 55,42 (24,04) | 0,217 |
| **36-item health survey (SF-36)** | | | | | | | | |
| Physical functioning | 30,79 (28,91) | 48,34 (30,22) | **<0,001** | 49,50 (28,51) | 52,61 (30,16) | 35,93 (30,39) | 40,00 (40,00) | **0,027** |
| Role-physical | 22,15 (29,60) | 28,29 (33,41) | 0,161 | 28,75 (33,77) | 31,00 (34,04) | 25,00 (32,27) | 22,321 (31,39) | 0,488 |
| Pain | 57,37 (33,13) | 64,66 (28,61) | 0,127 | 68,40 (28,18) | 68,17 (26,97) | 59,68 (30,78) | 53,23 (31,60) | **0,019** |
| General health | 33,74 (22,69) | 35,48 (21,70) | 0,657 | 28,3 (19,48) | 38,24 (21,18) | 20,25 (19,55) | 35,7 (21,88) | **0,005** |
| Emotional well-being | 55,22 (27,31) | 63,21 (24,02) | **0,029** | 53,75 (26,99) | 65,13 (23,99) | 62,81 (23,30) | 60,11 (22,61) | 0,192 |
| Role-emotional | 36,72 (32,63) | 47,62 (31,15) | **0,008** | 43,6 (32,69) | 49,47 (29,94) | 45,41 (35,37) | 44,03 (32,95) | 0,684 |
| Social function | 66,25 (35,06) | 68,90 (34,35) | 0,415 | 68,75 (30,21) | 68,91 (34,28) | 65,62 (37,77) | 64,53 (36,69 | 0,893 |
| Energy/ Fatigue | 43,26 (19,55) | 49,68 (19,65) | **0,014** | 42,0 (19,01) | 51,11 (19,54) | 49,93 (16,55) | 48,60 (18,55) | 0,192 |

* p-value for differences between CVC and AVF; **p-value for differences between AVF localization. Results are presented as median (SD).

## CONCLUSIONS

Anxiety, loss of control, body image and sexual problems, social support, and unemployment are all factors that strongly influence QoL in HD patients. In this work, we showed that the type of vascular access for dialysis is also an important factor for HRQOL in dialysis patients, been lower in those patients using CVC.

To our knowledge, our study is the first to report differences in HRQOL by AVF localization. OL-HDF patients with AVF in the left forearm presented an increased HRQOL when compared with those using AVF in other localizations. OL-HDF patients using AVF in the left forearm showed significant increase in symptoms/problem list, effects of kidney disease and quality of social interaction in ESRD targeted areas, and an increased in physical functioning, pain and general health in SF-36 domains, suggesting that the left forearm are the best choice for AVF placement. In fact, most of our AVF patients (65.5%) have their vascular access in left forearm, reflecting the clinical practice, in which the first choice for AVF placement is the left forearm. In fact, the dominant arm is usually the right and the placement of an AVF in this arm could be highly limiting most of the daily activities of the patients.

Our results showed that the ESRD patients under OL-HDF using AVF as vascular access had higher HRQoL scores in several domains when compared with those using CVC. Additionally, we also found that dialysis patients using AVF in left forearm presented higher HRQoL scores. These results suggests that the best choice for vascular access in dialysis patients, namely in those under OL-HDF was AVF in the left forearm, in order to increase the HRQoL of dialysis patients.

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Vascular access

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