



Screening needs and expectations of patients with vascular access due to chronic hemodialysis

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ABSTRACT

There is a lack of data about daily difficulties and life quality, especially among young patients having arteriovenous fistula (AVF) affected by pseudoaneurysm. In this retrospective cohort study, 195 patients with AVF were followed up from May to June 2015. An unstandardized questionnaire was used for the evaluation of patients' screening needs and expectations. Retired married men in their sixties, with completed secondary education, represented the majority of patients with AVF in this study. The patients had a positive attitude towards the disease and AVF, and they received the majority of information related to the care and treatment of AVF from the medical personnel and doctors in selected dialysis centers. Employed, well-educated single men, aged between 21 and 40 years, had the highest interest in having an aesthetic correction of AVF, especially due to the formation of pseudoaneurysm at the AVF site. Establishment of rules for reconstructive procedures of AVF, once circulatory and hemodynamic stability is achieved after renal transplantation, is suggested in addition to establishing criteria for determining vascular access affected by pseudoaneurysm.

Keywords: Chronic kidney disease; hemodialysis; vascular access; data mining model; aesthetic correction

Native arteriovenous fistula (AVF) at the wrist remains the first choice of vascular access for chronic hemodialysis (HD) due to better long-term patient survival and low rates of morbidity and mortality, in comparison to other two types of access, i.e., prosthetic arteriovenous graft (AVG) and central venous catheters (CVCs) (1). For a successful HD outcome, a functional AVF has to be performed; however, several complications

have been reported regarding AVF, including failure to mature (FTM), arterial steal syndrome, dysfunctional hemostasis, stenosis, access-related infection, and the formation of aneurysm. Relatively common complications are true aneurysms and pseudoaneurysm, resulting from the needle puncturing during HD and abnormal hemodynamics, meaning that multidisciplinary team, with patient-centered approach, should be implemented into the daily routine care (2). In the case of true aneurysms and pseudoaneurysms, some patients may request treatment for aesthetic reasons (3), but data on psychological burden of young patients, who have vascular access altered by pseudoaneurysm and linked to daily hassles and their life quality, are lacking.

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The aim of this study was to investigate several points, including: 1) the main factors affecting a patient's request to have an aesthetic procedure of AVF, 2) the profile of a patient with AVF (gender, age, education, employment, and marital status), 3) how a patient obtains the information on AVF procedure, 4) the level of patient satisfaction with information provided by medical personnel managing AVF, and 5) to determine the patient adherence to the given advice.

The study cohort included 227 HD patients (54% male and 46% female patients), aged between 21 and 60 years or more, who voluntarily participated in the study, from May until June 2015. The participants were recruited from an existing database of the Slovenian Renal Replacement Therapy Registry via Slovenian Association of Kidney Patients and regional dialysis centers. Patients treated with peritoneal dialysis were excluded from the study. In total, 32 patients dropped out from the study due to not submitting the questionnaire back. Study design was explained to each patient and written informed consent was obtained prior entering the study. The trial protocol was approved by The National Medical Ethics Committee of the Republic of Slovenia.

An unstandardized, internally developed questionnaire was used after pilot testing among 10 patients with AVF, of both genders, aged between 21 and 60 years or more. Improvements were implemented into the final version of the questionnaire. The final version was distributed to the potential respondents via Slovenian Association of Kidney Patients, available in paper as well as in online form and accompanied with the letter of explanation.

Statistical analysis was performed by *t*-test, non-parametric tests, and analysis of variance (ANOVA) [repeated measure]. Data were processed using IBM SPSS Statistics for Windows, Version 20.0. (IBM Corp, Armonk, NY) and MS Excel with MS SQL Server 2012 Analysis Services. A value of $p < 0.05$ was considered as statistically significant.

Basic sample characteristics such as age, gender, education, employment, and marital structure were observed.

Retired married men in their sixties with completed trade school represented the majority of HD patients.

The majority of patients, who expressed an interest in AVF aesthetic surgery, were employed, well-educated single men, aged between 21 and 40 years (Figure 1). Survey participants aged under 41 were categorized as young. Considering the limited number of units, the Wilcoxon signed-rank test was used, and has shown that the median was greater than the neutral value of 3.

Using Naive-Bayes algorithm (Algorithm Data Mining), the following influential factors in making a decision to have an aesthetic repair of AVF were found (descending order according to the association strength): 1) formation of a pseudoaneurysm at the AVF site; 2) desire for kidney transplantation; 3) concealing vascular access with appropriate wardrobe; 4) disapproving attitude towards disease and HD; and 5) feeling of inferiority due to AVF appearance.

The patient attitude towards kidney disease was analyzed using several questions and the results showed a general positive attitude. The majority of information regarding AVF was received from medical personnel (nurses, technicians) (mean [SD] was 3.30 [0.15]) and doctors (mean [SD] was 3.18 [0.991]) in selected dialysis centers. A post hoc test using Bonferroni correction showed no statistically significant difference between obtaining information from nurses and medical doctors nor between personal physicians (mean [SD] was 1.83 [0.883]), online forums (mean [SD] was 1.62 [1.152]), and Association of Kidney Patients (mean [SD] was 1.78 [1.054]).

The average value for all answers was higher than the neutral value ($p < 0.001$), meaning that patients were satisfied with the level of information received. However, many patients, apart from avoiding lifting, did not treat their AVF according to the recommended guidelines.

In the literature, there is limited data about the needs and expectations of patients with vascular access due to chronic HD, in general population as well as among Slovenian HD patients, despite the importance of life quality improvement of these patients.

In this study, retired married men in their sixties with completed secondary education represented the majority of Slovenian patients with AVF. Our

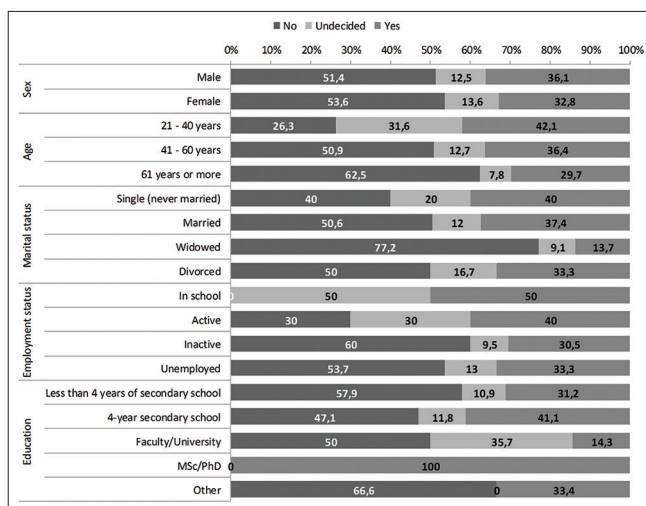


FIGURE 1. The percentage of aesthetic repair of arteriovenous fistula (AVF) affected by pseudoaneurysm in relation to the gender, age, education, employment and marital status of chronic hemodialysis patients.

results on age and educational structure as well as employment status are consistent with the results of other Slovenian-based studies (4,5). It has not been fully elucidated why males have a higher incidence of AVF, regardless of a higher incidence of chronic kidney disease (CKD). In addition, a greater tendency of AVF to thrombosis as well as several technical problems in AVF functioning among females has not been clarified yet, though recent research data have proposed possible explanations (6), including: 1) Differences in adjustments to blood flow, vessel diameter, and tonus, 2) differences in platelet aggregation after endothelial wall injury, and 3) failure of venous dilatation after AVF formation.

In addition to the endogenous, mainly glucocorticoid and hormonal, factors, the impact of chronological age on pathophysiological differences between males and females should not be excluded. Also, these differences can be caused by nutritional status in chronic HD patients, protein, vitamin and trace element supplementation, as well as by the pathophysiological environment involved in the process of healing. Single important factors that play a role in these processes are lean body mass, the level of serum proteins and transthyretin, and importantly, the type of muscle fibre supplementation in CKD, as the patients have lower level of physical activity. The recommendations are well-established by the guidelines but the level of patient adherence is insufficient (7).

Although in the case of no specific objections the patient is free to choose an alternative therapy that fits the best his/her living conditions (8), psychological burden due to malformed veins at an AVF site and the availability of alternative treatment forms can influence this decision.

Our results indicate that the majority of information regarding AVF was received from medical personnel (nurse, technicians) and medical doctors of a selected dialysis centre. Also, the level of information received was high. This all may be the result of a patient-centered communication used to meet the patient needs and expectations and to engage the patient as an active partner in his/her care and treatment. However, most patients, apart from avoiding lifting, did not treat their AVF according to the recommended guidelines. Factors influencing the adherence to the guidelines among these patients could be interpreted by the patient age structure and educational structure, a lack of mutual communication between the patients and medical personnel or physicians of a selected dialysis centre, as well as by the patient negative attitude towards the disease or aversion to the vascular access, as suggested by other studies (9). Nevertheless, our analysis showed that, on average, the patients had a positive attitude towards the disease and AVF. Based on these results, we assume that this could account to predominately older, less educated population in the sample, that

may not be subjected to a high social pressure in order to be a part of a modern society, as it applies to the younger population. In addition, our findings may also account to widely accessible and distributive Slovenian dialysis centers, primary focused to meet the patient individualized needs and thus increase the patient feeling of acceptance in the larger community.

Data mining model was used to identify the formation of malformed veins at the AVF site, as the crucial factor influencing the decision for an aesthetic repair of AVF. Most of the patients that expressed an interest in the AVF aesthetic procedure, were employed, well-educated single men, aged between 21 and 40 years. Little data exist about the psychological burden of young patients having vascular access affected by pseudoaneurysm, linked to daily hassles and their life quality. Therefore, the major source of information were online forums, wherein "shame", "feelings of isolation", "difficult integration into society", "low self-esteem", "struggling to find potential life partners and the resulting constraints in creating families" were the most commonly mentioned. This all significantly lowers the expectations and reduce the quality of life of these individuals. According to our results, a decision for an aesthetic correction of vascular access can be interpreted as a completely rational reaction of the young population to high social, economic and psychological criteria, based on ideals, beliefs and expectations about appearance, and body image standard.

The literature review identified a novel procedure described by Woo et al. (10), enabling salvation and preservation of autogenic vascular access. This procedure has demonstrated the best cosmetic repair due to complete excision of the excess aneurysm wall and excess skin.

According to available Slovenian data, aesthetic procedures for correcting an impaired vascular access have not been explored. It would be highly valuable to establish the criteria for pseudoaneurysm standardization and to explore the possibilities of an aesthetic correction of AVF affected by pseudoaneurysm and AVF with other, clinically significant, complications to improve patient satisfaction and life quality.

Our small study demonstrated the importance of exploring aesthetic correction possibilities of AVF affected by pseudoaneurysm and AVF with other, clinically significant, complications as well as the importance of establishing algorithms for reconstructive procedures of AVF, after renal transplantation, once circulatory and hemodynamic stability is achieved. Standardization of the criteria for vascular access affected by pseudoaneurysm is mandatory to improve the clinical results and reduce complications.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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