Hemodialysis vascular access in Albania: Where do we stand in respect to international guidelines?

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Abstract

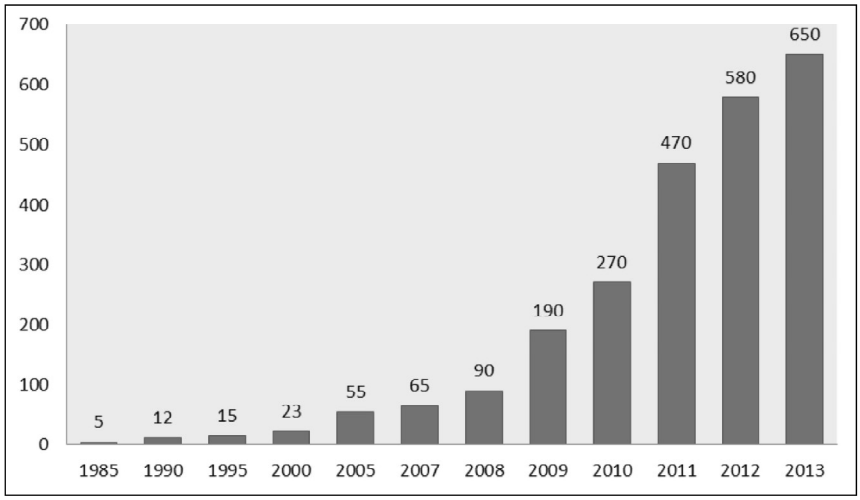
Aim: Vascular access has a major impact on morbidity, survival, quality of life and costs of treatment among dialysis patients. In Albania, vascular access problems have become increasingly prominent. In this context, our aim was to study the actual situation of vascular access and factors that contribute to fistula failure in Albania and compare our data with the European and US data and guidelines in order to achieve a better planning with a multidisciplinary team.
Methods: In May 2013, we conducted a cross sectional study in six hemodialysis centers in Albania. Overall, 484 patients were enrolled (63% males and 37% females; age range: 19-78 years; mean age: 49.9 years). A thorough present and past history of vascular access was retrieved from all participants.
Results: Diabetes was present in 13.8% of participants, whereas time in hemodialysis treatment ranged from 1 month to 22 years (mean value: 3.8 years). At the time of study, 83.5% of the patients had an arteriovenous (AV) native fistula, 2.25% an AV graft and 14.25% a catheter. Fistula failure was significantly more frequent among diabetics, older subjects, those whose fistula was made after initiation of hemodialysis, those with previous subclavian catheters, those who did not use antiaggregants, and in those who had frequently hypotension episodes during hemodialysis sessions.
Conclusions: AV fistula is the predominant form of vascular access used for hemodialysis. Subclavian catheters, diabetic nephropathy, older age, non-use of anticoagulants and starting hemodialysis without a fistula were found to be related to fistula failure, implying considerable challenges for the multidisciplinary team.

Keywords: arteriovenous fistula, arteriovenous graft, central venous catheters, hemodialysis, survival, vascular access.

Introduction

Vascular access for hemodialysis (HD) is frequently considered the "Achilles Heel" of hemodialysis. It has a very serious impact on patient's morbidity, survival, quality of life, and also affects the cost of treatment (1-6). In Albania, during the last years, the vascular access problems have become more frequent, prominent and life-threatening. What is the reason? Hemodialysis in Albania was applied for the first time in 1985. After 1995, some of the patients, who used to be emigrants in Greece and Italy, came to Albania to continue HD treatment and their permanent vascular access was already performed in those countries. In 2004, as agreed by our authorities, most of our patients were sent to Macedonia to be treated and get their permanent vascular access there. During the first 20 years, the number of patients was very limited: only 45 in Tirana. This led to limited experience in vascular access creation. Since 2005, due to positive health policies applied, the number of patients in HD has been increasing rapidly (7) reaching more than 650 patients (Figure 1).

Figure 1. Dynamics of dialysis since the beginning of hemodialytic treatment in Albania



Hemodialysis is actually applied in public and private centers, which work together to improve patients' healthcare and quality of life. Despite the benefits, this situation also poses great problems, as most of such patients are lately referred, mostly in very serious conditions when presented to nephrologists, and quite often without any permanent vascular access. Dialysing end-stage renal disease (ESRD) patients in emergency conditions is well-related with temporary catheter use and, in the worst case, with subclavian ones (8,9). Using catheters abundantly in incident patients is hazardous, as it leads to many other serious complications of vascular access such as: catheter infections that results in increasing hospitalizations due to sepsis, lower dialysis adequacy, worse life quality, higher morbidity, mortality and, consequently, higher costs (1-6). Also, in the first steps of this prolonged "calvary", the limited experience of surgeons causes arterio-venous fistula failures followed by repeated interventions, increased hospitalizations, lower dialysis adequacy, increased use of temporary catheters, all of which created a vicious cycle of problems, which in the end are effectors of costs and survival (6). Most of the patients, who were known as chronic kidney disease (CKD) patients, followed-up by nephrologists, were not referred to the vascular surgeon for fistula creation, due to many other complex reasons. Patients refuse to accept that time of dialysis might come soon and the nephrologists are not alert towards the proper

time to refer patient for arteriovenous fistula (AFV) creation. However, even if we were more alert, the waiting list is quite long for the simple reason that there is only one surgeon experienced in this field. So, vascular access is to be considered a multidisciplinary issue and optimizing vascular access outcomes remains an ongoing challenge for nephrologists and not only. Data are different for Europe and USA. In Europe, the predominant form of vascular access is the AV fistula reaching very good ranges in Italy, Germany, and Spain. In USA, on the contrary, the catheters are unfortunately used in most cases in incident and prevalent patients (10,11).

In this context, our aim was to study the actual situation of vascular access in Albania compared to the European and USA data and guidelines and to study the factors that contribute in fistula failure in order to achieve a better planning for the future with a multidisciplinary team.

Methods

We conducted a cross-sectional study in six centers which apply hemodialysis in Albania (three public and three private ones) in May 2013. Those centers included the public HD centers of Tirana, Elbasan, Shkoder and American Hospital of Tirana, American Hospital of Durres and Hygeia Hospital in Tirana. The inclusion criteria consisted of: chronic hemodialysis patients over 18 years old and being free of any limitations of primary renal disease or time in hemodialysis. The exclusion criteria were: metastatic cancer, severe mineral bone disease and severe malnutrition. All participants who agreed to take part in the study gave their consent after being informed about the aims and procedures of the study.

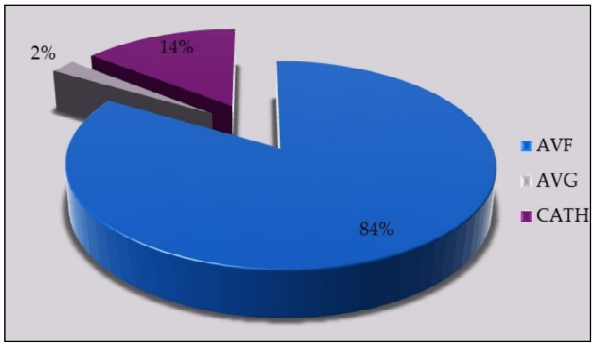
The actual vascular access (VA) was defined as the functioning at the moment of the questionnaire. The three types of VAs are: arteriovenous fistula, arteriovenous graft, permanent or temporary catheters. We used hemodialysis registers and a questionnaire. There were 484 patients enrolled in the study: 300 (63%) males, 184 (37%) females, who were asked for the present and past situation of vascular access since the beginning of HD treatment. The primary renal diseases were: chronic pyelonephritis (30%), chronic glomerulonephritis (27%), nephroangiosclerosis (14%), diabetes mellitus (13.8%), adult policystic kidney disease (ADPKD) (7.2%), and diseases of unknown origin (8%). The patients age ranged from 19-78 years (mean age: 49.9 years). Diabetes was encountered in 13.8% of the patients. Time in HD treatment ranged from 1 month to 22 years (mean: 3.8 years).

Absolute numbers and respective percentages were reported. Chi-square test was used to evaluate the correlation between fistula failure and independent factors.

Results

We found that 83.5% of the patients used an A-V native fistula, 2.25% an A-V graft and 14.25% a catheter as vascular access (Figure 2). It resulted that 84% of the patients started HD with a catheter.

Figure 2. The current vascular access situation in prevalent patients in Albania



In addition, 37.5% of the patients were presented as ESRD and the rest were known and followed up by nephrologists as chronic kidney disease. Only 23.8% of the patients with known CKD started HD with a fistula. For the majority of subjects under study, early referrals started HD treatment with catheter in their first sessions. Despite the actual situation of low AVF use in incident patients, which is in fact recommended as a "gold standard" of

permanent vascular access for hemodialysis, there occurred also fistula failure that added the usage of alternative vascular access. We also analyzed the factors that contribute to fistula failure.

The probability of fistula failure assessed by the chi-square test was statistically significant in diabetics (P<0.05) and among older individuals (>50 years) (P<0.05) (Table 1).

Table 1. Factors that contribute to arteriovenous fistula failure

Variable	Total	AVF status		Chi square
		AVF failure	AVF in use	P-value
Sex				
Female	165 (36.7)*	47 (28.5)†	118 (71.5)†	0.129
Male	285 (63.3)	63 (22.1)	222 (77.9)	
Age-group				
≤50 years	210 (46.7)	41 (19.5)	169 (80.5)	0.023
>50 years	240 (53.3)	69 (28.8)	171 (71.3)	
Diabetes				
Yes	58 (12.9)	21 (36.2)	37 (63.8)	0.026
No	392 (87.1)	89 (22.7)	303 (77.3)	
AVF and HD				
AVF before HD	95 (21.1)	13 (13.7)	82 (86.3)	0.006
AVF after HD	355 (78.9)	97 (27.3)	258 (72.7)	
Referral				
Early	210 (56.9)	47 (22.4)	163 (77.6)	0.370
Late	159 (43.1)	42 (26.4)	117 (73.6)	
Subclavian catheter	145 (43.5)	56 (38.6)	89 (61.4)	<0.001
Yes	188 (56.5)	32 (17.0)	156 (83.0)	
No				
Anticoagulants				
Yes	170 (50.3)	56 (32.9)	114 (67.1)	0.008
No	168 (49.7)	34 (20.2)	134 (79.8)	
Smoking				
Yes	80 (25.6)	20 (25.0)	60 (75.0)	0.601
No	232 (74.4)	65 (28.0)	167 (72.0)	
Hypotension				
Yes	104 (38.4)	36 (34.6)	68 (65.4)	0.018
No	167 (61.6)	36 (21.6)	131 (78.4)	
Ultrafiltration				
≤3 l	62 (19.8)	14 (22.6)	48 (77.4)	
>3-4 l	139 (44.4)	41 (29.5)	98 (70.5)	0.533
>4 l	112 (35.8)	28 (25.0)	84 (75.0)	
Erythropoietin use				
No	61 (23.8)	14 (23.0)	47 (77.0)	0.303
Yes	195 (76.2)	58 (29.7)	137 (70.3)	
Hemoglobin level				
<11 g/dl	139 (45.7)	39 (28.1)	100 (71.9)	0.527
≥11 g/dl	165 (54.3)	41 (24.8)	124 (75.2)	

* Absolute number and column percentage (in parenthesis).

† For FAV status, absolute number and row percentages (in parenthesis).

Another expected result was the association between permanent access failure and the time of fistula construction. It was observed that FAV failure was significantly increased, if constructed after initiation of hemodialysis (P<0.01).

Subclavian catheter use is known to be very harmful for the fistula survival and the association between their use and AVF failure was highly statistically significant (P<0.001). Non-use of anticoagulants (P<0.01) and the presence of hypotension prior or during hemodialysis session (P<0.02) were also associated with arteriovenous fistula failure. It was noted that more females had a tendency for fistula failure, but this finding was not statistically significant (Table 1).

Discussion

Vascular access morbidity is still elevated in hemodialysis patients, resulting in health-related costs increase (1-6). The discussion regarding vascular access in hemodialysis is always open, although the guidelines are clearly set and defined (4). This is because of the wide range of hemodialysis populations all around the world in terms of mean age, primary renal diseases, diabetes and other co-morbidities. There is also an evident problem with patients' referral and lack of nephrologists consensus in terms of the best time for vascular access construction (12,13). Some nephrologists are not sure when to start with the vascular access, and keep treating their patients as much as possible with the "sweet honey" of conservative therapy, until their patients become terminally uremic and need application of dialysis as an emergency (12,13).

Ideally, every patient should start dialysis with a mature fistula suitable for cannulation (14). Striving for this goal requires a number of intermediate steps, including a nephrologist's pre-ESRD care, pre-ESRD access surgery, adequate fistula maturation, and successful fistula cannulation by trained dialysis staff (14). This sequence is akin to running a hurdle race, so that all the required steps have to be performed in sequential order, and failure of any step, will result into starting treatment with a catheter (14). Fistula use is much higher among hemodialysis patients in Europe (Italy and Germany, reaching 86%) and Japan 91%, as compared with those in the USA (with only 24%) (10,11). Similarly, there are marked differences in fistula prevalence among different dialysis networks within the USA, with the highest frequencies observed in the Northeast and the lowest in the Southeast (11). Such analyses highlighted the importance of practice patterns in affecting fistula use and contributed to the 2001 Kidney Disease Outcomes Quality Initiative (K/DOQI) Vascular Access guidelines (4), followed by the "Fistula First" national initiative (15).

Our study showed that, at present, in Albania, 83.5% of prevalent patients make use of an AVF, 2.25% of an AVG and 14.25% of a catheter. This is quite good compared with European and US patients, as mentioned above.

An important issue to mention is that the mean age of our patients (49.9 years old) is younger compared to the European hemodialysis patients (60.5 years old) (10).

Another point that needs to be highlighted is the lower percentage of diabetes among our patients, only 13.8% compared with 46% in US patients and 22% in European patients (10).

Analyzing the rate of failures and the causes of fistula failure, it resulted that vascular access failure is found in diabetic patients and in older patients >50 years, as consistently reported in international studies. As Hayakawa and colleagues (16) reported, the age and diabetes mellitus were risk factors for successful maintenance of the initial permanent hemodialysis VA. Also, diabetes mellitus was associated with a higher frequency of fistula failure. These findings were in compliance with what was reported by Garrancho and his colleagues (17). Hypotension (pre-dialysis and intra-dialysis hypotension) resulted also hazardous for fistula survival contributing to the access thrombosis, as reported by Chang and his

colleagues (18). Most importantly, lower BP and intradialytic hypotension are two potentially modifiable risk factors for access thrombosis and may account for at least some of the 20% to 40% of access thromboses that occur in the absence of obvious structural abnormalities. In our study, it also resulted that if patients used to have subclavian catheters, their access was quite probable to fail in terms of venous stenosis that occured in 20%-50% of them. Fistula failure was significantly associated with the fact of having a fistula after initiation of hemodialysis, as it is highlighted in the report of Couto A. et al (19). Non-use of anti-coagulants was also related to permanent access failure. In a study of Hasegawa and his colleagues (20), it was consistently demonstrated that the use of aspirin improved the outcome and the survival of permanent vascular access. It was observed a tendency of fistula failure in females, but this was not statistically significant. As our study showed, 62.5% of ESRD patients were known, treated and followed up by nephrologists. Although referred timely to nephrologists, the major part of incident patients (84%) started hemodialysis with a temporary catheter (femoral in most of cases).

How to increase fistula use in incident and prevalent patients? Which are our means to do it? The responses and challenges consist of the following issues:

- Working hard on patients' early referral. Enhancing pre-ESRD nephrology follow-up requires raising the awareness of primary care physicians on how to diagnose CKD and when to refer patients to a nephrologist (13,21,22);
- Close collaboration among a multidisciplinary team, consisting of nephrologists, surgeons, radiologists, and dialysis staff, which is required to optimize these efforts;
- Avoiding sub-clavian catheters;
- To preselect committed, skilled and interested surgeons;
- Increasing efforts in fistula maturation. Primary fistula failure, as a result of early thrombosis or failure to mature is a major hurdle which leads to fistula prevalence increase (23);
- Anticoagulant use. An ongoing multicenter, double-blind, randomized clinical trial sponsored by the National Institutes of Health is evaluating the clopidogrel efficiency and safety to prevent early fistula thrombosis occurrence (24);
- Dialysis staff training (25);
- Surveillance of vascular access: static venous pressure, dynamic venous pressure, access flow recirculation, color flow Doppler, U/S dilution technique;
- And, the most important issue: a golden rule referred to as "save the veins", namely cephalic and basic veins, as they are not thrombophilic for the access (4).

Conclusion

Completion of the tasks assigned by international guidelines is difficult not only because it depends on the nephrologists work and availability, but because it is also a multidisciplinary hard work to be done. However, in Tirana, there are all the required capabilities and proper means to accomplish it. Arteriovenous fistula is the predominant form of vascular access used in prevalent patients in Albania in very good ranges. Our main advantages consist of the lower percentage of diabetics among HD patients, their younger age compared with HD patients in Europe and USA, which improves their access and easies our work. Hence, we are happy and proud of our results in prevalent patients, but a substantial improvement is required with incident patients in a multidisciplinary team.

Conflicts of interest: None declared.

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