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Original Article

Vascular Access for Hemodialysis in Albania: the Past, the Present and Challenges for the Future

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Abstract

Introduction. The hemodialysis treatment in Albania was firstly applied in 1985. Over the 20 years the number of patients was very limited and only 45 were treated in Tirana. Since 2005 due to the positive health policies, the number of patients in HD has been increasing rapidly. Unfortunately, these patients are mostly late referral, resulting in other subsequent serious problems with the vascular access complications: catheter infections, arteriovenous fistula failures due to little experience of surgeons, and then inadequate hemodialysis, repeated interventions, increasing hospitalizations, morbidity and mortality, and in the end, higher costs. The aim of this study was to evaluate the present situation of vascular access and to plan the future with a multidisciplinary team.

Methods. We conducted a cross-sectional study in 6 centers which offer hemodialysis in Albania. There were 484 patients enrolled in the study: 300(63%) males, 18(37%) females that were asked for the actual and past history of vascular access since the beginning of HD treatment. The age ranged from 19-78 years (mean 49.9). Diabetes was encountered in 13.8% of them. Duration of HD treatment ranged from 1 month to 22 years (mean 3.8 years).

Results. At the time of the study 83.5% of patients had an A-V native fistula, 2.25% an A-V graft and 14.25% a catheter. The probability of fistula failure seen by chi square test was statistically higher in diabetics ($p<0.05$) and older age (>50 years) ($p<0.05$), starting hemodialysis without a fistula ($p<0.01$), previous subclavian catheter use ($p<0.001$), non use of antiplatelet drugs ($p<0.01$) and if they had hypotension pre or during hemodialysis session ($p<0.02$).

Conclusions. Arteriovenous fistula is the predominant form of vascular access in majority of patients in Albania**.** The main characteristics of our HD population are the low percentage of diabetics and their younger age, which may prolong the use of their vascular access and render HD treatment more effective. Thus, we are satisfied and proud of our results achieved in the majority of HD patients, but we do have a lot of work to do with the incident ones.

Key words: AVF (arteriovenous fistulae), AVG (arteriovenous grafts), catheters, hemodialysis, vascular access, survival

Introduction

Hemodialysis was applied for the first time in Albania in 1985. A couple of nephrologists were sent to Italy to be trained because our political dictator had diabetic nephropathy that was progressing quickly. He died but some patients did not; they were lucky and lived due to hemodialysis. After 1995 some patients that used to be emigrants in Greece and Italy came to Albania following the HD and their permanent vascular access was already performed there. In 2004, having obtained permission from our authorities, most of our patients were sent to Macedonia to be dialysed and they also got there permanent vascular access. During the 20 year-period, the number of patients was very limited, only 45 ones, thus leading to limited vascular access creation, and only one surgeon performed it. Since 2005 due to positive health policies the number of patients in HD has been increasing rapidly reaching 650 and more (Figure 1).

The hemodialysis now is offered both by public and private sector, which work together to improve patients' healthcare and quality of life.

Despite the benefits, this situation also poses great problems, since most of these patients are late referral, mostly presented to us in very serious conditions, and quite often without any permanent

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vascular access. Dialysing ESRD patients in emergency conditions is well related with temporary catheter use, and in the worst case, with subclavian ones.

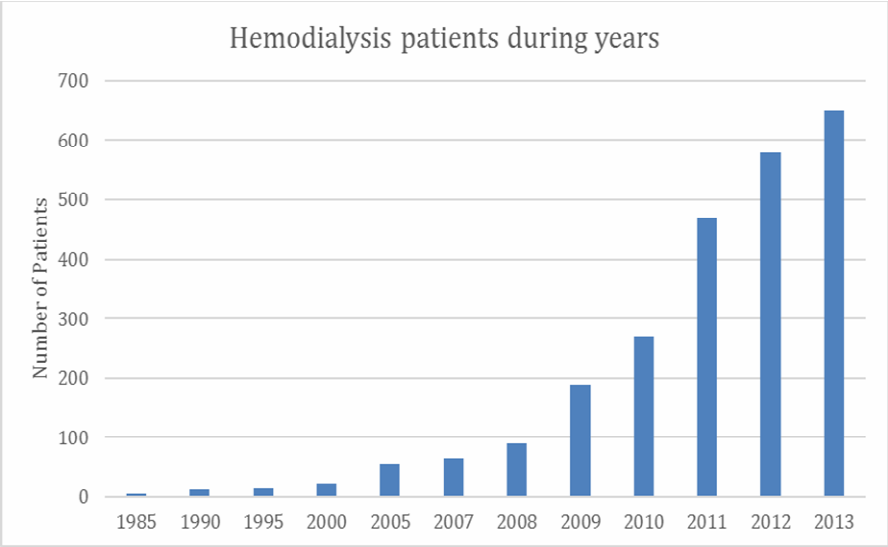

Fig. 1. Growth of hemodialysis patients since the beginning of HD treatment in Albania

Using catheters abundantly in incident patients is hazardous, which leads to many other serious problems of vascular access complications like: catheter infections resulting in increased hospitalizations due to sepsis, lower dialysis adequacy, worse quality of life, higher morbidity, mortality, and, as a result, higher costs [1-6]. Also, during the first steps of this calvary, the initial experience of some surgeons led to arteriovenous fistula failures, and consequently to repeated interventions, longer hospital stays, lowered dialysis adequacy, increased temporary catheter use, all of which created a vicious cycle of problems, which in the end are interpreted into costs and survival. Most of the patients who were known as CKD, and followed-up by nephrologists, were not referred to angiologists for fistula creation, due to many other complex reasons. Patients refuse to accept that dialysis might come soon, and nephrologists are not very alert concerning the proper time of patients' referral to angiologists. However, even if we were more alert, the patients' waiting list is quite long for the simple reason that there is only one surgeon interested and experienced in this field. Thus, here we are with these various and multidisciplinary problems of vascular access, which need to be solved, but the question is then by whom?

The aim of our study was to evaluate the present situation of using vascular access in Albania, factors that contribute to AVF failure and to plan the future with a multidisciplinary team.

Materials and methods

We conducted a cross-sectional study in 6 centers which offer hemodialysis in Albania (three public and three private ones) in May 2013. HD centers of Tirana, Elbasan, Shkodra, American Hospital in Tirana, American Hospital in Durres and Hygeia Hospital were included. The inclusion criteria were: chronic hemodialysis patients over 18 years old, free of any limitations of primary renal disease or time in hemodialysis. The exclusion criteria were metastatic cancer, and severe malnutrition. To accomplish the aims of the study 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 (30.5%), chronic glomerulonephritis (26.5%), nephroangiosclerosis (14%), diabetes mellitus (13.8%), adult polycystic kidney disease (ADPKD) (7.2%) and unknown origin (8%).

The age ranged from 19 to78 years (mean 49.9). Diabetes was encountered in 13.8% of them. Duration of HD treatment ranged from 1 month to 22 years (mean 3.8 years).

Chi square test was used to evaluate the correlation between fistula failure and risk factors. P value below 0.05 was considered significant.

Results

At the time of the study 83.5% of patients had an A-V native fistula, 2.25% an A-V graft and 14.25% a catheter. Data from the questionnaire showed that 84% of patients had begun HD with a catheter although only 37.5% of them were presented as ESRD and 62.5% were known and followed up as having chronic kidney disease (CKD). Only 23.8% of patients with known CKD had a fistula created before initiation of HD. In 65% of patients, a distal native fistula access was firstly applied. The overall failure rate for AVF results was 25.6%.

All factors that contribute to arteriovenous fistula failure are presented in Table 1. The probability of fistula

Table. 1. Factors that contribute to arteriovenous fistula failure

Variable	Total	AVF status		Chi square P-value
		AVF failure	AVF in use	
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 status				
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)	
Subclavia catheters				
Yes	145(43.5)	56(38.6)	89(61.4)	<0.001
No	188(56.5)	32(17.0)	156(83.0)	
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 rate				
≤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)	
Eritropoetin 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).

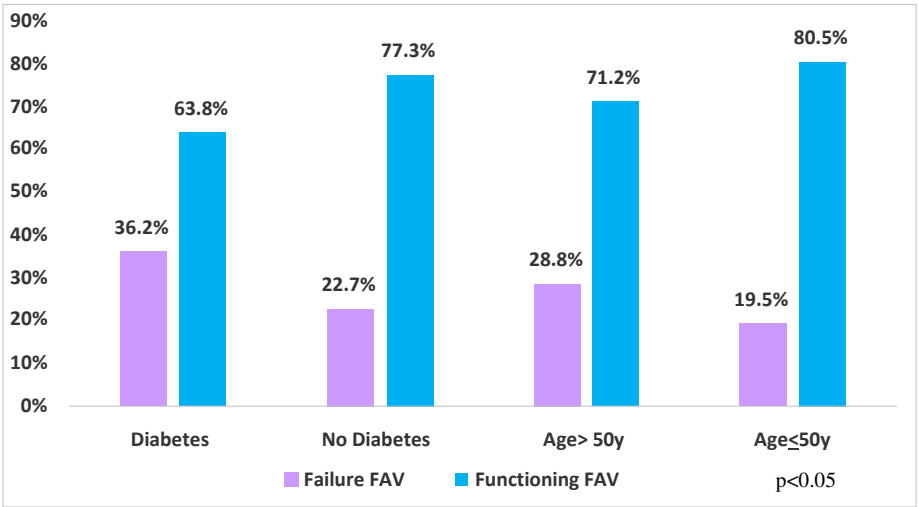

Fig. 2. AVF failure in diabetes and older age patients

failure seen by chi square test was statistically significant in diabetics and patients older than 50 years (p<0.05) (Figure 2). Another expected result was the strong correlation between permanent access failure and the time of fistula construction. It was seen that they failed randomly if were made after initiation of hemodialysis (p<0.01) (Table 1). Usage of subclavian catheter seems to be very harmful for the fistulas survival and the association between their presence and AVF failure was found in our study (p<0.001) (Figure 3). Not receiving antiplatelet drugs (p<0.01) and presence of hypotension prior or during hemodialysis session (p<0.02) were also correlated with AVF failure (Table 1). A tendency of AVF failure was seen in females, although not significant.

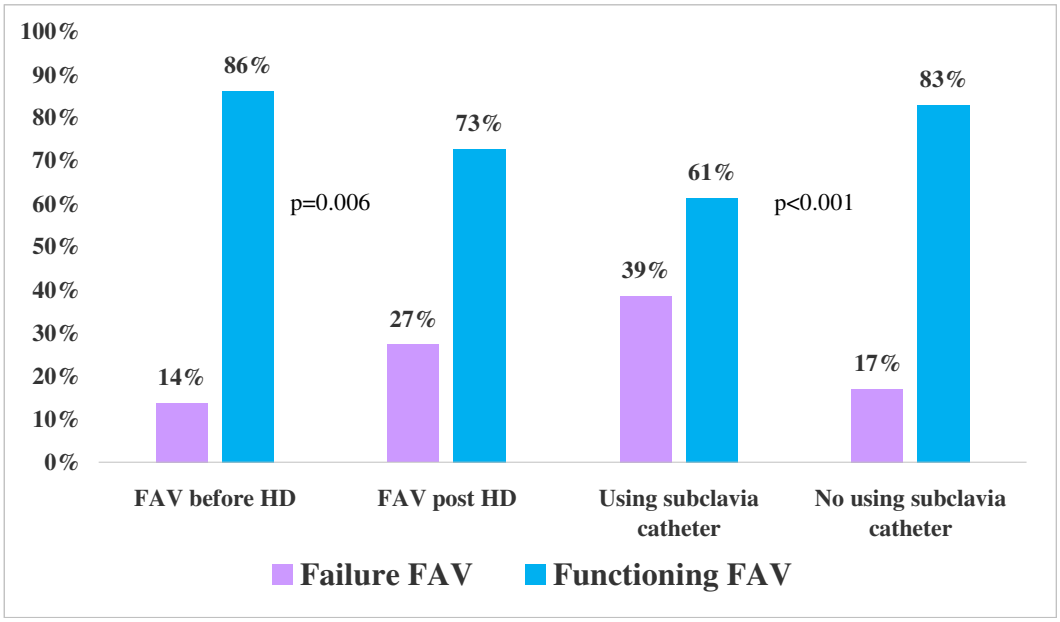

Fig. 3. AVF failure and time of its creation

Discussion

Vascular access morbidity is still high in patients on long-term hemodialysis whose health-related costs are increasing [1-6]. The discussion regarding vascular access in hemodialysis is always open although the guidelines are clearly set and defined [4]. This is most probably due to the wide range of hemodialysis populations all around the world in terms of mean age, primary renal diseases, co-morbidities, percentage of diabetes among them and there is also an evident problem with patients' referral and a different viewpoint of nephrologists in terms of vascular access. Some nephrologists are not convinced 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 develop uremic states, and receive dialysis only in emergency situations. Ideally, every patient would initiate dialysis with a mature fistula suitable for cannulation. Striving for this goal requires a number of intermediate steps, including pre-ESRD care by a nephrologist, pre-ESRD access surgery, adequate fistula maturation, and successful fistula cannulation by the dialysis staff. This sequence is akin to running a hurdle race, in that all steps have to be performed in sequential order, and failure of any step results in a patient who initiates dialysis with a catheter. Fistula use is much higher among hemodialysis patients in Europe and Japan, as compared with those in the United States [7,8]. Similarly, there are marked differences in fistula prevalence among different dialysis networks within the United States, with the highest frequencies observed in the Northeast and the lowest in the Southeast [9]. These analyses highlight 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 [10]. Approximately one third of US patients lack nephrology follow-up before initiation of dialysis (8). Among those with pre-ESRD nephrology follow-up, one third do not have access surgery before starting dialysis [11]. Finally, approximately one third (20-50%) of new fistulas fails to mature [12]. The cumulative effect of not overcoming these successive hurdles is that 60 to 65% of patients in the United States initiate hemodialysis with a catheter [7,12]. Even 60 days after initiation of dialysis, 46% of patients are catheter dependent [12].

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

above, but majority of incident patients (84%) have started hemodialysis with a catheter, even though they were not that late referral, since 62.5% of CKD patients were followed up by nephrologists. Our patients are younger (mean age 49.9 years) compared to European patients, (60.5 years old) [7], and this is a very important clue.
Another point that needs to be highlighted is the lower percentage of diabetes among our patients, only 13.8%. Analyzing the rate of failures and the causes of fistula failure, our results are in agreement with the literature reporting that access failure is seen in diabetic patients and in older patients >50 years (Figure 2). As Hayakawa and colleagues [13] showed 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 the results of Garrancho and his colleagues [14].
Hypotension (pre-dialysis and intra-dialysis hypotension) turned to be also a hazardous parameter for fistula surveillance contributing to access thrombosis, as reported by Chang and his colleagues [15]. In our study patients with presence of hypotension prior or during hemodialysis session have significantly more FAV failure ($p<0.02$) (Table 1). Most importantly, lower BP and intradialitik hypotension are two potentially modifiable risk factors for access thrombosis and may account for at least 20% to 40% of access thrombosis in the absence of obvious structural abnormalities. As a result, higher BP targets may be preferred in patients with identified stenosis in their vascular accesses, recent intervention, or other characteristics of increased access thrombosis risk.
Fistula failure was strongly correlated with the fact of having a fistula after initiation of hemodialysis as it is highlighted in the report of Couto A, *et al*. [16]. This reported finding coincides with our results in which patients with FAV creation after starting of dialysis had significantly more FAV failures ($p=0.006$). 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 occurs in 20-50% of them ($p< 0.001$) (Figure 3).
Not using antiplatelet drugs was also related to permanent access failure. In a study of Hasegawa and his colleagues [17], it was consistently demonstrated that the use of aspirin improved the outcome and the survival of permanent vascular access. We found that patients using antiplatelet drugs have significantly low rate of FAV failure ($p<0.005$), (Table 1). Faced with such results, we have some lessons to learn and challenges to bear in the future, and they are:

- To insist on patients' *early referral*, to train the general practitioners to be alert concerning patients with hypertension, inherited kidney disease, diabetics, patients with reflux and calculosis; to assist them. Enhancing pre-ESRD nephrology follow-up requires raising the awareness by primary care physicians of how to diagnose CKD and when to refer patients to a nephrologist [7,18,19].
- *Nephrologists* should be very attentive to follow CKD patients, and prepare them emotionally and surgically for an arteriovenous fistula at the fourth stage of disease because it needs some time to mature [18,19].
- *A close collaboration among* the members of the multidisciplinary team, consisting of nephrologists, surgeons, radiologists, and dialysis staff, which is required to optimize these efforts. It may also be well arranged by assigning a committed access coordinator to streamline the process [20].
- *Preoperative vascular mapping* provides the surgeon with precise information about the diameter of the artery and vein and the presence of vein stenosis or thrombosis and frequently leads to a change in the intended access [21]. A dramatic increase in fistula placement was observed by several centers after implementation of routine preoperative vascular mapping [22-25].
- *To avoid subclavian catheters;*
- *To preselect committed, skilled, and interested surgeons;*
- *To increase 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 [26]. It is more common in women [27], nonwhite patients, older patients, and those with vascular diseases. Relatively, not much has been published on the natural history about new fistulas, about specific reasons of their failure to mature, or best test to use and time to assess their likelihood of success, and the optimal interventions to promote their maturation [28]. The maximal increase in fistula diameter and blood flow occurs within the first few weeks of their placement [28-30]. A post-operative ultrasound may help in assessing fistula maturation. In one study, fistulas with a diameter >4 mm and blood flow >500 ml/min had a 95% likelihood of successful use for dialysis, whereas those that fell below both thresholds had only a 33% chance of success [30].
- *Antiplatelet drug use.* An ongoing multicenter, double-blind, randomized clinical trial sponsored by the National Institutes of Health is evaluating the clopidogel efficiency and safety to prevent early fistula thrombosis occurrence [31].
- *Dialysis staff training* [32]
- *Surveillance of vascular access*: static venous pressure, dynamic venous pressure, access flow recirculation, color flow Doppler, U/S dilution technique.
- *And most important:* "A rule written on the stone": "SAVE THE VEINS" named cephalic and basic, as they are not trombophyllic for the access [4].

Conclusions

Arteriovenous fistula is the predominant form of vascular access in majority of patients in Albania. The main characteristics of our HD population are the low percentage of diabetics and their young age, which make prolong the use of their vascular access and render HD treatment more effective. Thus, we are satisfied and proud of our results achieved in the majority of HD patients, but we do have a lot of work to do with the incident ones.

Conflict of interest statement. None declared.

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