Vascular access outcomes in patients older than 75 years

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SUMMARY

We report a retrospective study on the results of 132 native fistulas, 12 grafts and 27 tunneled catheters followed during 30 months in 144 patients on hemodialysis. The results were compared according to patient age: 75 years or over (n = 58, 80.3 ± 3.5) vs *below 75 years (n = 86, 59.5 ± 13.3). Gender, presence of diabetes and type of fistula were also included in the analysis.*

Results: *There were no statistically significant differences between both groups in the use of tunneled catheters or grafts (8.6%* vs *5.8% y 5.2%* vs *10.5% respectively), primary failure of native fistulas (7.1% in those aged 75 years or over* vs *25.5% in patients below 75 years), rate of thrombosis (0.03* vs *0.09/patient year at risk respectively) or number of percutaneous or surgical procedures in order to maintain the fistula patency (0.11* vs *0.16/patient year at risk respectively). At the same time no differences were seen in the primary, primary assisted and secondary patency of the native fistulas. The mean age of the patients when the first access fistula was created was different according to the area of surgery (74.9 ± 9.3 for the elbow* vs *64.9 ± 16.2 years for the forearm, p < 0.005). Diabetes was an unfavourable factor for primary (HR Cox 2.08, p < 0.05) or secondary (Log Rank, p < 0.05) patency.*

Conclusion: *The vascular access for hemodialysis in elderly patients presents a similar evolution to that seen in younger populations if the access creation is based on an exhaustive study, including ecodoppler of the vascular map and the use of more proximal fistulas if necessary. Therefore the more frequent use of grafts or catheters in elderly patients is not justified.*

Key words: ***Vascular access. Elderly. Hemodialysis. Aged over 75 years.***

RESULTADOS DEL ACCESO VASCULAR EN MAYORES DE 75 AÑOS

RESUMEN

Estudio retrospectivo de 30 meses sobre las fístulas autólogas (n = 132), prótesis vasculares (n = 12) y catéteres tunelizados (n = 27) de los 144 pacientes tratados en nuestra unidad en dicho periodo, comparando los resultados en función de la edad: mayores de 75 años (n = 58, 80,3 ± 3,5 años) vs *menores de 75 años (n = 86, 59,5 ± 13,3 años) e incluyendo en el análisis las variables sexo, presencia de diabetes mellitus y tipo de fístula.*

Resultados: *No hubo diferencias en las necesidades de uso de catéteres tunelizados o prótesis vasculares como acceso vascular definitivo entre mayores y menores de 75 años (8,6%* vs *5,8% y 5,2%* vs *10,5% respectivamente), tampoco en el fallo primario de fístulas autólogas (7,1%* vs *25,5%), tasa de trombosis (0,03* vs *0,09/paciente y año) ni en*

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los procedimientos percutáneos o quirúrgicos para mantener la permeabilidad de la fístula (0,11 vs *0,16/paciente y año). No hubo diferencias en función de la edad en las permeabilidades primaria, primaria asistida y secundaria de las fístulas autólogas. La edad media de realización de una fístula humerocefálica como primer acceso fue mayor que en las radiocefálicas (74,9 ± 9,3* vs *64,9 ± 16,2 años, p < 0,005). La diabetes fue un factor desfavorable en las permeabilidades primaria (RR Cox 2,08, p < 0,05) y secundaria (Log Rank p = 0,05).*

Conclusiones: *Los accesos vasculares para hemodiálisis de los pacientes ancianos presentan una evolución similar a los de los más jóvenes si su realización se basa en un estudio exhaustivo, incluyendo el ecodoppler, de su árbol vascular y utilizando vasos más proximales si es preciso. Por lo tanto, no está justificado el uso de prótesis vasculares o catéteres con mayor frecuencia que en otros pacientes.*

Palabras clave: ***Acceso vascular. Ancianos. Hemodiálisis. Mayores de 75 años.***

INTRODUCTION

For the last decade, the group of patients aged 75 years and older is the one presenting the greatest increase in both incidence and prevalence of hemodialysis (HD) therapy for chronic renal failure. In the last national registries published, it is the second age group with the highest frequency of HD and it is likely that it will become the largest in the intermediate term[1,2].

Elderly patients present several particular characteristics influencing the design of a renal replacement treatment plan. About the vascular access (VA), age occasionally is reported in the literature as a poor prognosis factor for both maturation and survival of autologous fistula[3,4]. Many times, the nephrologist attitude with these patients differs regarding VA, with a greater tendency to the use of catheters and/or prostheses. In recent years, however, there have been studies showing that age does not account for a worse VA course[5-8].

On the other hand, most of the studies relating to VA in the elderly population use as 65 years as the cut-off age; however, it is nowadays difficult to consider somebody aged 65-70 years, sometimes even occupationally active, as elderly so that , in order to address this issue, it seems necessary to consider a chronological age higher than the one that is being considered nowadays. Recently, some authors have used 75 years as the cut-off age to refer to elderly patients when addressing studies on VA[8,9].

In the present work, we tried to show the vascular access outcomes in elderly patients, considering as so those aged 75 years and older, and treated at the Hemodialysis Unit of «Virgen de los Lirios» Hospital of Alcoy.

MATERIAL AND METHODS

We carried out a retrospective study on vascular accesses used in all patients treated at the Hemodialysis Unit of «Virgen de los Lirios» Hospital of Alcoy, during the period January of 2003 to June of 2005 (30 months).

We differentiated three types of VA: autologous arterial-venous fistulae (AVF), polytetrafluoroethylene (PTFE) prosthetic accesses, and funneled catheters (FC). During the study period, all AVF and PTFE were created by a team of surgeons from the reference hospital 100 km far from our Hospital. The request for VA creation was done by telephone contact with the vascular surgeon that within a week booked the patient of the surgical procedure after evaluating the relevant data from the patients' history given by the nephrologist and after Doppler ultrasound examination of the patients' blood vessels, done by the surgeon himself. Indication for a venogram was reserved for those cases at risk of central vessels stenosis (i.e., previous catheter ate the subclavian vein). In the case of AVF, the surgery was done in an outpatient manner with the exception of AVF with basilic vein transposition; in these cases, and for PTFEs, the patient was hospitalized for 24 hours to be monitored. When the patient needed surgical re-intervention (SRI) of the VA or needed a new access, he/she was always referred to the same surgeon that did the procedure the first time.

FCs (Permcath®) were placed preferably in the right jugular vein, and were revised by the interventional radiology unit from our hospital. At the nephrologist' s request, interventional radiologists were also in charge of assessing dysfunctional VAs by Doppler ultrasound and/or fistulography, and of performing percutaneous procedures, balloon angioplasties (BA), or mechanical thrombectomies. When VA thrombosis was detected, the nephrologist referred the patient to the radiologist who performed a percutaneous mechanical thrombectomy, preferably within the first 24 hours and always within a maximum period of 48 hours; the patient was not hospitalized unless some complication emerged. We did not collected any data on non-funneled catheters since their use is very rare in chronic patients at our Unit, only when their use will be presumably for shorter than three weeks.

Data collected from the patients were age, gender, and the presence of diabetes mellitus (DM) as the only morbidity parameter. Patients were assigned by age at the time of the study beginning (January of 2003 or date of inclusion into HD for incident patients) to one of two groups: «patients younger than 75 years» (< 75) or «patients older than 75 years» (> 75).

VA data collected were type of VA (AVF or PTFE) by their location, creation date, and follow-up months for the study

period for each one of them. All procedures (BA and SRI), thrombosis episodes, and thrombectomies performed during the study period were registered. We considered as primary VA failure all cases in which the VA could not be used within the first three months of its creation due to early thrombosis or lack of development precluding its use.

AVF with primary failure were excluded from the survival analysis; we considered survival time from the VA creation date (taking into account that for prevalent patients at January of 2003, the creation date was earlier than the date of study beginning), and contrary to previous studies, patient's age was not considered at the beginning of the study but at the time of VA creation. We defined non-assisted primary permeability as the time period until the performance of any procedure on the VA; assisted primary permeability as the time period until the VA presented its first thrombosis episode; and secondary permeability the time period until the VA was definitely not longer used because of VA failure due to thrombosis or any other reason[10]. In all cases, those cases exiting the HD program were censored from the analysis.

Data were registered in Excel® Datasheets and analyzed by the G-Stat 2.0 statistical software. Numerical variables are expressed as mean ± SD. Statistical methods used were frequency distributions, the chi squared test to compare qualitative variables, and the Student's t test or the Mann Whitney test for mean comparison of continuous variables, depending on the type of distribution. Survival analysis was done by the Kaplan Meyer, Log Rank and Cox regression tests. Statistical significance was set for a p value < 0.05.

Table I. Demographic data of treated patients during the study period (1/1/2003-6/30/2005). Causes for exiting HD (n = 46): 32 exitus, 10 transplantation, 3 transferred to other centers, 1 switched to peritoneal dialysis

		< 75	> 75	Signif. < 75 *vs* > 75
Total group (n)	144	86	58	
Age (years)	67.9 ± 14.6	59.5 ± 13.3	80.3 ± 3.5	p < 0.001
Gender (M/F)	82 / 62	54 / 32	28 / 30	NS (p = 0.08)
DM (n (%) nº T,1)	37 (25.7%) 7	25 (29.1%) 7	12 (20.7%) 0	NS
Months of the period	20.5 ± 10.0	20.5 ± 9.9	20.5 ± 10.2	NS
Incident (n) during the period	63	39	24	
Age (years)	64.4 ± 16.9	54.9 ± 14.6	79.8 ± 3.6	p < 0.001
Gender (M/F)	36 / 27	25 / 14	11 / 13	NS
DM (nº/%/nº T,1)	23 (36.5%) 6	16 (41.0%) 6	7 (29.2%) 0	NS
Months of the period	14.1 ± 8.7	13.9 ± 8.4	14.5 ± 9.3	NS
Prevalent (n) at the beginning of the period	81	47	34	
Age (years)	70.7 ± 12.0	63.5 ± 10.9	80.6 ± 3.4	p < 0.001
Gender (M/F)	46 / 35	18 / 29	17 / 17	NS
DM (nº/%/nº T,1)	14 (17.3%) 1	9 (19.1%) 1	5 (14.7%) 0	NS
Months on HD at the beginning of the period	61.4 ± 61.8	67.4 ± 63.1	53.6 ± 61.0	NS

RESULTS

For the 30 months of the study, 144 patients included into a chronic hemodialysis program received treatment at our Unit, of which 63 were incident patients during the study period and 81 were prevalent patients at January 1st of 2003; there were 46 patients exiting the program. Table I show the demographic patients data. There were slight differences favoring the female gender in the group > 75 and a greater proportion of diabetics in the group < 75, although they were not significant. There were 32 exitus, accounting for a lethality rate of 22.2%, equivalent to 8.9% per year.

Autologous fistulae

From January of 2003 to June of 2005, 61 new AVFs were created in 48 patients, with 13 (21.3%) primary failures in 7 patients (14.6%). Only one failed AVF occurred in a patient older than 75 years. There were no significant differences by gender, age group, type of fistula (25% radial-cephalic (RC), 16% humeral-cephalic (HC), or 0% humeral-basilic (HB)), or the presence of DM, although 8 primary failures occurred in 4 DM patients (3 of them with type I DM) (table II).

During the study period, 132 AVFs were used in 126 patients, with a cumulated follow-up time of 2823 months (21.4 ± 9.5 months in average): 85 radial-cephalic, 43 humeral-cephalic, and 4 basilic transpositions. In the > 75 group, there were 52 AVFs in 52 patients (follow-up 1139 months, mean 23.1 ± 8.7; 61.5% RC and 38.5% HC) and in the <75 group, 80 AVFs in 74 patients (follow-up 1684 months, mean 20.3 ± 9.0; 66.3% RC, 28.7% HC, and 5.0% HB with transposition).

Of the AVFs studied, 94 were the first patient's VA (65 RC and 29 HC/HB). In 13 (24.5%) patients from the < 75 group and in 16 (39.0%) patients from the group > 75 a proximal fistula (HC/HB) was done as their first VA according to the Doppler ultrasound findings that contraindicated a distal VA (RC) (table III). Although the difference for this proportion was not significant, the age at the time of VA creation surely was significantly different: 64.9 ± 16.2 years for RC vs. 74.9 ± 9.3 years fro HC/HB (p < 0.005).

There were 15 thrombosis episodes in 10 AVFs (rate of 0.06/patient/year) and 14 mechanical thrombectomies were performed with functional recovery of the VA in 8 (57.1%). There were distributed as follows: 3 thrombosis episodes in 2 AVFs in the group > 75 (rate: 0.03/ patient/year) and 12 thrombosis episodes in 8 AVFs in the group < 75 (rate: 0.09/patient/year), in spite of not statistically significant differences.

Forty-one elective procedures used to maintain AVFs function (rate: 41 0.17/patient/year): five surgical re-interventions (3 proximal reconstructions, 1 anastomosis narrowing for treating the ischemia produced by the VA, and 1 PTFE inter-positioning within the drainage vein) and 36 BA (in 8 cases to 2 patients for treating a subclavian vein steno-

Table II. Comparison of frequencies of primary failure of the fistulae performed during the study period by patients characteristics and type of fistula

	< 75 (n = 47)	> 75 (n = 14)	Men (n = 37)	Women (n = 24)	DM YES (n = 25)	DM NO (n = 36)	RC AVF (n = 36)	HC/HB AVF (n = 25)
Primary failure	12 (25.5%)	1 (7.1%)	8 (21.6%)	5 (20.8%)	8 (32.0%)	5 (13.9%)	9 (25.0%)	4 (16.0%)
Funcioning AVF	35 (74.5%)	13 (92.9%)	29 (78.4%)	19 (79.2%)	17 (68.0%)	31 (86.1%)	27 (75.0%)	21 (84.0%)
Significance	NS		NS		NS (p = 0.09)		NS	

sis, and in 2 cases to 2 patients with stent placement). When analyzing the rate of procedures by age, patients < 75 years required 31 procedures that taking off the 8 proximal BAs they accounted for 23 procedures on the AVF itself, with a rate of 0.16/patient/year. Patients > 75 years required 10 procedures, accounting for a rate of 0.11/patient/year. These differences were not statistically significant.

About complications, only three humeral-cephalic AVFs (7% of all HC AVFs) required specific treatment due to occurrence of VA-induced vascular ischemia syndrome presenting as skin lesions on the ipsilateral hand of the arm carrying the AVF. In a DM male patient, younger than 75 years, this syndrome resolved with conservative management, in a DM female patient, older than 75 years, an anastomosis narrowing was performed with good outcome, and a third patient (no-DM, older than 75 years, with known coronary heart disease and peripheral vasculopathy) required AVF emergency closure due to progression of extended necrotic lesions on the his hand, being then treated with FC.

Considering the survival analysis (Figures 1-3), AVF non-assisted primary permeability did not show differences by gender, type of fistula, or age group (< 75: 90% and 79%; > 75: 92% and 74% at 12 and 36 months, respectively); the difference between diabetic and non-diabetic patients was not significant either (DM: 88% and 63%; non-DM: 91% and 83% at 12 and 36 months; p = 0.05). Gender, presence of DM, and age groups did not show differences in assisted primary permeability (< 75: 97% and 93%; > 75: 95% and 92% at 12 and 36 months) but the type of fistula did show differences (RC: 98% and 94%; HC: 93% and 90% at 12 and 36 months; p < 0.01). Finally, secondary permeability did not show differences by gender, type of fistula, or age group (< 75: 98% and 94%; > 75: 95% at 12 and 36 months) but it did so by presence of DM (DM: 94% and 84%; non-DM: 98% at 12 and 36 months; p < 0.05).

Cox regression (studied variables: age, gender, type of AVF, and presence of DM) showed as variables being significantly implicated: DM for non-assisted primary permeability (p < 0.05; RR 2.08), humeral-cephalic AVFs for assisted primary permeability (p < 0.05; RR 4.62) and no significant variable for secondary permeability (DM; p = 0.06) (table IV). The results did not change using age as a continuous

Table III. Proportions by age and mean age of the first access, distal (RC) or proximal (HC/HB)

Group	RC	HC/HB	Total
< 75	40 (75.5%)	13 (24.5%)	53
> 75	25 (61.0%)	16 (39.0%)	41
Total	65	29	94 (NS)
Age	64.9 ± 16.2	74.9 ± 9.3	p < 0.005

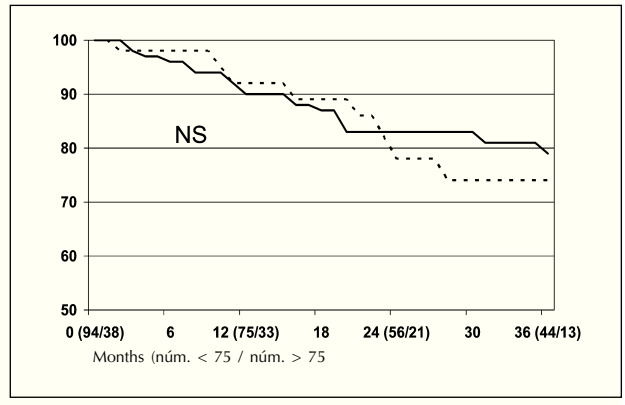

Fig. 1a.—AVF primary permeability by age group (< 75 continuous; > 75 discontinuous).

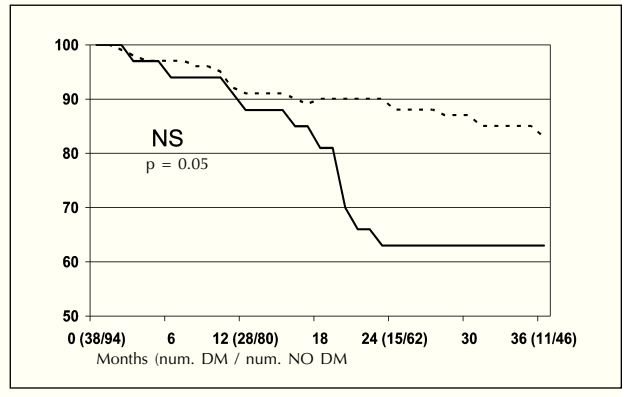

Fig. 1b.—AVF primary permeability by diabetes (YES continuous; NO discontinuous).

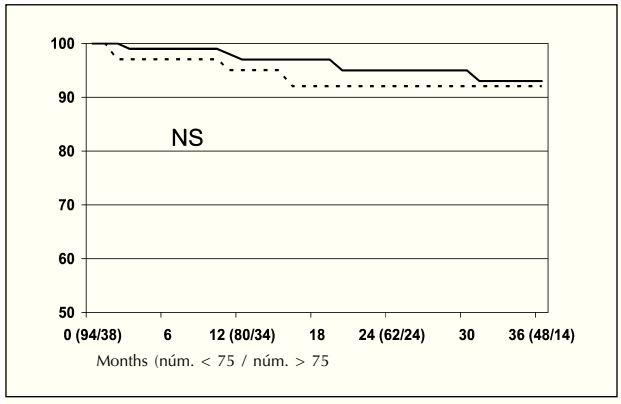

Fig. 2a.—AVF primary assisted permeability by age group (< 75 continuous; > 75 discontinuous).

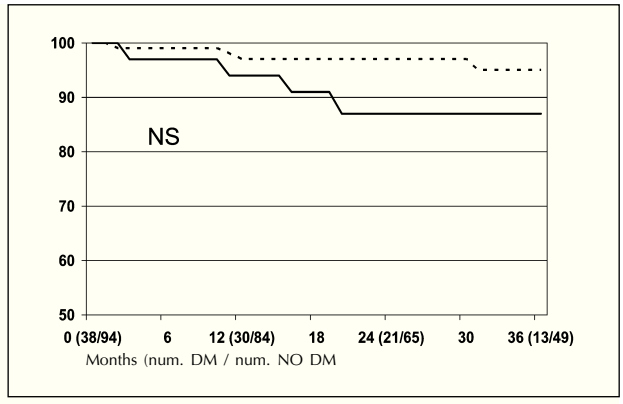

Fig. 2b.—AVF primary assisted permeability by diabetes (YES continuous; NO discontinuous).

quantitative variable or as a categorical variable (lower of higher than 75 years).

Prosthetic accesses

In the sample, only 12 PTFEs were used in 12 patients (6 men and 6 women, mean age 68.9 ± 2.1 years), with a cumulative follow-up time of 242 months (20.2 ± 4.2 months), of which 4 (33.3%) were done during the study period. Of the 12 patients, 3 were > 75 years and this type of access was the first VA only in one patients older than 75 years. The ratio of patients requiring a PTFE for both groups was 10.5% in < 75 and 5.2% in > 75 (NS).

PTFEs required 15 elective procedures in 10 patients (14 BA in 2 cases with central vessels and in one case stent placement, an in another case SRI), accounting for a rate of 0.74/patient/year. Two patients > 75 did not require any kind of elective procedure.

There were 21 thrombosis episodes with PTFEs in 7 patients (12 episodes (57,1%) in 2 patients, one younger and the other one older than 75 years, that finally had to get dialysis through a FC), accounting for a rate of 1.04/patient/year. In all cases, mechanical thrombectomy was tried, being successful in 17 (81.0%), and with stent placement in 6. The thrombosis rate was 0.95/patient/year in the group < 75 and 1.27 in the >75 group (NS).

Funneled catheters

During the study period, 27 (18.8%) patients required dialysis through a FC at any time, with a cumulative follow-up time of 224 months (mean 8.0 ± 7.9 months).

In 10 (6.9%) patients, FC became the definitive VA (in 6 patients because of impossibility of achieving an AVF or PTFE, in 2 cases due to end-stage disease, and in 2 cases because of patient's decision); 5 (5.8%) were younger than 75 years (5.8%) and 5 (8.6%) were older than 75 years (NS). FC represented the first VA at the beginning of the HD program in 16 (25.4%) incident patients.

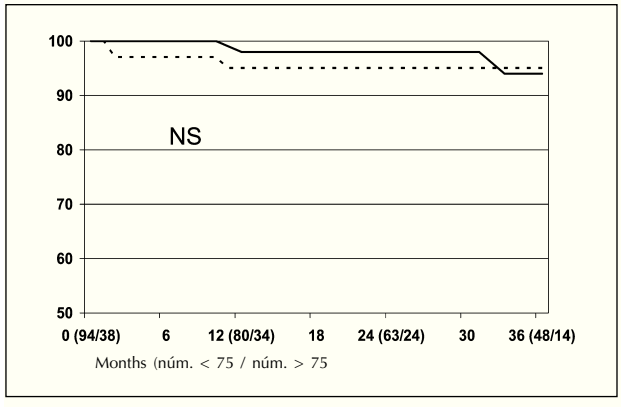

Fig. 3a.—AVF secondary permeability by age group (< 75 continuous; > 75 discontinuous).

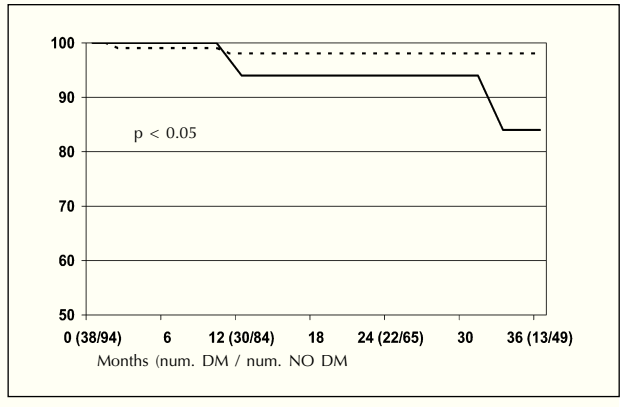

Fig. 3b.—AVF secondary permeability by diabetes (YES continuous; NO discontinuous).

Table IV. Cox regression for non-assisted primary, assisted primary and secondary permeabilities

	Primary permeability			Assisted primary permeability			Secondary permeability		
	Significance	RR	IC 95%	Significance	RR	IC 95%	Significance	RR	IC 95%
Age > 75 years	0.5559	1.2750	0.5680 – 2.8623	0.8148	1.1863	0.2841 – 4.9544	0.9384	1.0695	0.1943 – 5.8865
Female gender	0.3234	0.6857	0.3243 – 1.4500	0.8449	0.8882	0.2706 – 2.9153	0.5942	0.6457	0.1292 – 3.2277
Humeral-cephalic AVF	0.1061	1.8814	0.8740 – 4.0499	0.0189	4.6155	1.2870 – 16.5526	0.1118	3.6654	0.7392 – 18.1759
Presence of DM	0.0489	2.0755	1.0035 – 4.2928	0.1343	2.4785	0.7554 – 8.1326	0.0584	4.4546	0.9483 – 20.9246

DISCUSSION

For the last 30 years, treating elderly patients with chronic renal failure with HD has changed from being an exception (less than 10% of the patients older than 65 years in EDTA registry in 1977) to represent of the largest age group in dialysis units more than 49% of the prevalent patients on HD in the Community of Valencia in 2001 were older than 70 years[2]). This increase is due to both greater survival of the dialysis patient within the last decades[11] and the increase in inclusion of elderly patients, so that patients aged 75 years and older were the age group with the second highest number of incident patients in Spain in the year 2002, the first one being those with 65-74 years[1]. However, most of the works studying these age groups tend to consider as elderly those patients older than 65 years[5,6]. Although this could be valid in the 1970s, demographical, social and occupational changes, and the increase in life expectance in our setting, have rendered outdated this cut-off point; many patients are included in the renal transplantation waiting list or still have an excellent level of autonomy beyond this age.

Patients older than 75 years present differential features with regards to younger population (lower life expectancy, not inclusion into the transplantation waiting list, progressive loss of autonomy, etc.). At our Unit, during the study period, 40% of prevalent patients and 38% of incident patients were older than 75 years. The characteristics of elderly patients, in whom comorbidity from physiologic vascular aging adds, many times condition the attitude towards VA when being included in a HD program[9]. Some studies, essentially from the USA; have observed worse results in VA from older patients[12], either regarding primary fistula failure[3] or survival[4], even making some authors to rule out autologous AVF as the first option for VA in the elderly patient and selecting a prosthetic VA or even a permanent catheter[13]. However, more recent works from European groups[5-7] have not found differences in VA survival between patients younger and older than 65 years, which indicates an important «center effect» in this issue.

Our study presents a series of important limitations: retrospective in nature, short follow-up period, small number of patients, and above all, it gathers data from both prevalent and incident patients, contrary to most of the studies were only the first VA in incident patients is studied. However, we believe that because of considering the whole number of patients from a health care area with an age, gender, and frequency of diabetes mellitus distribution as most of the HD units within our setting, and due to the selection of and age cut-off point of 75 years, with mean ages of both groups approximately 1o years higher than the above-mentioned studies, we may approach the issue.

In our Unit, the percentage of patients requiting a PTFE or an FC as a definitive VA (8.3 and 6.9%, respectively) is low, so that in a small sample as ours, the results are not conclusive; however, it is clear that the need for a prosthetic access or a permanent catheter as the definitive VA is not a common situation in patients older than 75 years (5.2 and 8.6%, respectively). We may point out that our patients carrying a PTFE had a high rate of thrombosis, more than twice the standard rate proposed in the DOQI guidelines;[14] this may be partially explained because more than half of the cases occurred in only two patients that had sustained arterial hypotension.

In our Unit, primary AVF failure, considering as such both early thrombosis and the lack of development preventing its use within three months after its creation, occurred in 21.3% of the VA but only in 14.6% of the patients; the type of fistula with the greatest primary failure rate was the radial-cephalic (25%). There is high variability in the literature by age groups and in the concept used for primary failure[3,5]. In elderly patients, only one primary failure occurred and the highest proportion happened among diabetic patients, although not reaching significant differences (32% vs. 13.9% in non- diabetics, p = 0.09).

About the thrombosis rate, there were no statistically significant differences between patients older an younger than 75 years; in both cases, below the rate of 0.1 episodes/patient/year, which is the usual rate in our country[15]. There were no differences either in the need for percutaneous interventions or surgical re-interventions to maintain AVF permeability between younger and older patients, again the procedures rate being lower in the latter.

The survival analysis of our sample cannot compare to those published in other studies since it does not evaluate only the first access in incident patients, and we only included into the analysis those VA that matured correctly allowing their continuous use. The reason for this was to compare the VA permeability according to the studied variables (age, gender, presence of DM, and type of AVF) and not to do a strict survival analysis of the fistulae.

Both the univariate and the multivariate analyses showed a similar course of AVFs in patients older than 75 years, as compared to those younger than that; this was also the case for gender, failing to show a difference between primary assisted and secondary permeabilities. There were differences for DM in primary permeability: only 63% of AVFs were

free of repairing procedures at 3 years compared to 83% in non-DM patients (Cox RR 2.08, $p < 0.05$); and in secondary permeability: AVF survival at 3 years of 84% for DM vs. 98% in non-DM (log rank $p < 0.01$). However, when analyzing primary assisted permeability, the only variable significantly involved was the type of fistula, with 94% of radial-cephalic fistulae being free from thrombosis at 3 years vs. 90% of humeral-cephalic (Cox RR 4.62, $p < 0.05$).

From the data we have obtained we may deduce that advanced age, considered as older than 75 years, does not imply by itself worse progression of the VA, contrary to what happens with DM. These findings could be due to the individualized criteria of the surgeon before each patient when assessing the type of VA to de done, by using physical examination and especially the findings from the Doppler ultrasound in such a way to ensure that as much as possible that the artery and the vein selected meet the basic criteria for performing a functioning AVF[16]; in fact, this attitude is based on the confronted evidence of outcomes improvement by the pre-operative use of Doppler ultrasound examination[17,18]. Thus, a trend towards performing proximal AVF (humeral-cephalic and humeral-basilic) more frequently in patients older than 75 years is observed (Table III), which although not being significant in terms of proportions, it is in terms of mean age of creation of the first VA at a proximal level. The use of greater vessels in patients with higher risk for cardiovascular pathology (atheromatosis, calcifications, etc.) at distal vessels has been largely discussed in the literature[19-21] and is endorsed by the Guidelines of Vascular Access for Hemodialysis of the Spanish Society of Nephrology (guideline 2.2.3)[22]; moreover, in elderly patients with lower life expectancy, the preservation of the venous network is less important than in younger patients.

On the other hand, although long-term outcomes of radial-cephalic fistulae are better than for humeral-cephalic, the latter present a shorter maturation time and lower rate of primary failure[15,22]; in our experience it has been so, with a greater thrombosis rate for HC vs. RC, but with similar long-term survival. However, the risk for distal ischemia is higher, so that before performing this type of VA the permeability of the distal arterial bed has to be checked as well as limiting the diameter of the anastomosis to less than 6 mm at the arteriotomy[16].

We may conclude that in the population older than 75 years, likely representing the predominant age group at hemodialysis units in the intermediate term, there is no significantly increased risk for vascular access failure by following the same attitude as for other patients provided that this attitude is based on a careful evaluation of the patient's vascular network, and selecting those vessels with the highest likelihood for success and minimizing the risk for complications. Therefore, these patients are not to experience a higher rate of vascular prosthesis and particularly of catheters, with the complications and the high financial burden that this implies[23-25].

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