



Survival and Complications of Vascular Access in Elderly Patients above 65 Years: Multicenter Study

Alaoui Mhammedi Saad, Hamdi Fathia, Benabdelhak Mohammed, Haddiya Intissar and Bentata Yassamine
Centre Hospitalier Universitaire Mohammed VI Oujda.

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ABSTRACT

The placement of a patient undergoing chronic hemodialysis needs a double blood access[1]. This could be permanent (arteriovenous fistula, vascular prosthesis) or non permanent (short term catheter, long term catheter...) We have thus led a survey whose objective is to identify the survival factors and risk complicated ones especially for aged people. The multicenter study was conducted in December 2013 in six hemodialysis centers in the Oriental region. 102 patients have been under observation. The incidence of aged people in comparison with the whole hemodialysed people was 24%. The average age was 72 ± 5.5 years. The sex ratio male/female was 1.04. 83% had a maintained physical autonomy. Only 14.7% of our patients had health insurance: a weak rate in comparison with the national average. High blood pressure and diabetes were the underlying etiologies behind dialysis. 31% of nephropathies were of unknown origin. Toxic habits, tuberculosis, embolic stroke constituted the most antecedents in our patients. Renal failure was found uncontrolled in 55.9% of our observed patients and consequently urgent intervention was recommended for 54.9%. Half of our patients benefited from 2 dialysis sessions per week. The other half underwent three sessions a week. Renal failure was associated to a positive hepatitis C serology in 6.9% of our patients and only 1% had hepatitis B serology. 85% of our patients had anemia among whom 56.9% were under erythropoietine EPO. 33% of our patients suffered from heart disease. The average number of vascular approaches was 1.5 and 59.9% were held the team of vascular surgery in Oujda. The catheters were the most used as a first vascular access (55.9%), then came arteriovenous fistula for 44.1% of our patients. 33.9% of the patients benefited from a second vascular approach that was for 85% of arteriovenous fistula, whereas, the remaining 15% used catheters. Only 17 patients benefited from a third vascular approach, that is say 16%, most of whom were arteriovenous fistula. That is say. A fourth vascular approach was held for 4 patients having exclusively arteriovenous fistula. 31.4% of patients reported complications: Dysfunction was the most frequent immediate complication (5.9%), followed by thrombosis (3.9%), then comes hemorrhage (2.9%). Aneurysm was the most frequent tardive complication (13.7%) followed by dysfunction found in 5.9%. Thrombosis was found only in 2.9% of patients. Finally, only one patient had infection of the vascular approach. On the basis of this one targetted research, we have come to notice that : Age, dialysis term, number of sessions per week, viral status B/C are predictive factors of complications for aged people. The optimal dialysis treatment at this age, not only involves nephrologists but also recommends a convenient surgical access.

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Introduction

Recently, the number of elderly people undergoing chronic hemodialysis (CHD), has considerably increased [2]: if the native arteriovenous fistula (AVF) remains the optimal choice of vascular access in chronic hemodialysis, it is not usually easy to get a good and ever lasting AVF for elderly people suffering from kidney failure [3]. This vascular access is more difficult to achieve when elderly patients suffer some associated pathologies which may prevent the initial confection, the maturity or the long term functioning of this vascular access. Among these diseases, the cardiovascular pathologies are the main factors. The complications of vascular access for hemodialysis constitute the main cause of CHD morbidity 15-25% of hospitalizations [4].

Hence, CHD in the remains a real challenge because of [5]:
-increased prevalence of associated pathologies (dementia, diabetes, stroke, heart failure...)
-shorter life expectancy and
-confection and maintaining of an optimal vascular access.
The objective of the present study was to:
-determine the type, complications and survival of these vascular access for older patients aged more than 65 and undergoing CHD & -to identify the risky factors of the vascular access complications in this particular population.

Methods and materials

The multicenter study was conducted in December 2013 in six hemodialysis centers situated in the east of Morocco: three belonging to the private and three to the public sector.

Inclusion criteria:

-Old patients aged more than 65, undergoing CHD, with a 3 months minimal duration.

An exploitation grid was established to allow data collection

All data was analysed and seized via SPSS20.0 software program.

Results

102 patients were included in the study. The elderly represented 24% of patients undergoing CHD, the medium age ratio was 72 ± 5.5 years old. The gender ratio (M/F) was equal to 1.04. In our study, kidney diseases related to old high blood pressure was the most frequent cause behind chronic kidney failure. Other cases were related to diabetes and glomerular nephropathy. However, the nephropathy was be of undetermined causes for the third of our patients. Toxic habits were the main remarkable history in our patients (23.5%). 4.9% suffered tuberculosis, and two of our patients had had embolic stroke. 4.9% of the patients reported: cataract treatment, cholecystectomy, irritable bowel syndrome...

The mean BMI (body mass index) was 22.69 ± 4.43 kg/m². The initial hemodialysis treatment was carried out in emergency for 54.9% of the cases. More than half of the patients had an unknown chronic kidney disease. Our patients underwent hemodialysis for 66.7 ± 5.7 months. 72.5% of them started their treatment after the age of 65. 50% of our patients had three sessions per week, four hours each, and 50% of them had two HD sessions per week, five hours each.

7% of them had positive hepatitis serology C. One patient had positive hepatitis serology B. 37.3% had hyperparathyroidism. 85.3% of the patients had hemoglobin inferior to 10g/dl, and 56.9% of them were under erythropoietin 40% had high blood pressure. 33.3% had documented cardiopathies.

The average number of vascular access was 1.5 per patient. 45% of the patients received femoral short term catheter, and 44% had native arteriovenous fistula. 39.2% of the patients had a supplementary access. Among them, 85% with arteriovenous fistula and 15% with catheters. The actual vascular access were essentially arteriovenous fistula AVF for 97% of the patients. Only 3% had catheters. The average survival of the vascular access was 49 ± 7 months.

Immediate and tardive complications were observed in 32 patients. The immediate complications are reported in chart 1.

The tardive complications are cited in chart 2.

The puncture deadline of the AVF was 25 ± 7 days.

The univariate analysis of complications risky of the native AVF for the elderly patients undergoing CHD identified the age, dialysis duration, the number of sessions and the viral status as complications risk factors. (chart 3)

The multivariate analysis identified only the age as a complications risky factor of native AVF's in elderly patients undergoing CHD. (Chart 4)

Chart 1. The Immediate Complications.

Complications (n=13)	N (%)
Dysfunction	6(5.9%)
Thrombosis	4(3.9%)
Hemorrhage	3(2.9%)
Infection	0(0%)

Chart 2. The Tardive Complications.

Tardive complications (n=24)	N (%)
Aneurysm	14(13.7%)
Dysfonction	6(5.9%)
Thrombosis	3(2.9%)
Infection	1(1%)

Chart 3. The Univariate Analysis.

Parametres	Odds Ratio	Confidence interval 95 %	P
Age, years	1.08	1.01 - 1.16	0.02
gender, n(%)	0.54	0.23 - 1.30	0.17
Dialysis duration, months	1.01	1.00 - 1.02	0.006
Number of sessions, three time a week, n(%)	0.38	0.15 - 0.94	0.03
Diabetes, n(%)	0.42	0.13 - 1.36	0.15
Initial emergency treatment, n(%)	0.39	0.15 - 0.97	0.04
Viral hepatitis B, n(%)	1.03	0.81 - 1.32	0.77
Body mass index(BMI), Kg/m ²	0.94	0.84 - 1.05	0.34
High blood pressure, n (%)	1.84	0.77 - 4.37	0.16
Hyperparathyroidism, n (%)	1.00	0.99 - 1.00	0.28
Viral hepatitis B (B et/or C)	4.53	1.00 - 20.37	0.04
Puncture deadline of AVF, days	0.99	0.98 - 1.0	0.63

Chart 4. The Multivariate Analysis.

Parametres	Odd Ratio	Confidence interval 95 %	P
Age/years	1.11	1.03 - 1.22	0.02
Dialyse duration/months	1.01	1.00 - 1.03	1.004
Initial emergency treatment, n (%)	0.28	0.07 - 1.05	0.06
Viral hepatitis B and/or C	0.80	0.07 - 1.05	0.84
Number of sessions, 3 times a week n (%)	0.85	0.26 - 2.73	0.79

Discussion

The incidence of elderly patients undergoing hemodialysis considerably varies in terms of studies. In our survey, the incidence was 24% in France and Great Britain, the most prevailing age category is that of the elderly people on account of the early screening of kidney problem. In Europe, the incidence was 22% in 1980 versus 55% in 2005 concerning old patients of over 65 years old [6]. This incidence varies from a country to another. The terminal kidney failure is more frequent for men with a gender ratio that varies from a study to another [7]. In our study, we've noted a masculine predominance. Same result found in two English series where the gender ratio was 1.64 and 1.5 [8]. In our study, the nephropathy related to high blood pressure was the dominant cause behind terminal chronic kidney failure, followed by diabetic nephropathy and glomerular nephropathy. One third of the patients represent nephropathies with undetermined causes. The results published in the MAREMAR study showed a predominance of diabetic nephropathies followed by high blood pressure nephropathies [2]. The epidemiologic study of chronic kidney failure in France had also shown a predominance of diabetic causes over high blood pressure causes [9]. In hemodialysis, there are three types of vascular access :

* The native AVF.

* Arteriovenous bypass.

* Short and long catheters. These could be used longer from 6 months up to two years or more [10].

In our study, among the created vascular access, AVFs constituted only 44.1%, whereas the 55.9% started their dialysis via catheters. We also noted the native AVF was chosen by 95% of the patients aged in HDC.

In North America, venous catheters are more frequently used by old patients compared to young patients. The prevalence of using venous catheters in these countries for patients over 75 years old reached 28%[8]. In Canada, 79% of old patients aged between 75 to 84 years old start their dialysis through a central venous catheter. Meanwhile, in Australia, it's done through central venous catheter (CVC) 7]. In Europe, the resort to CVC is of 24% versus 1% in Japan[10]. The resort to arteriovenous prosthesis is also important for old people who find it difficult to use native AVF of high quality. For those who are more than 75 years old, the incidence of using arteriovenous bypass is 7.1% in Europe, 23% in North America and 10% in Australia[8].

In our series, 31.4% of patients developed complications related to vascular access including precocious and tardive complications. This rate remains almost the same to that found in the series of London.

Dysfunction:

Often involving catheter, rarely AVF. In our study, the dysfunction was observed in 11.8% of patients. In a study led in United Kingdom, we have compared this dysfunction in two groups of patients : The first having used the AVF for vascular access, and the second a catheter. The dysfunction was observed in 10% of patients from the 1st group and 15% from the second. However, the association between the type of vascular access x the occurrence of this complication was not statistically significant ($p=0.407$)[11]. While, in another study led in UK, we have shown that being aged was a predictive factor for the occurrence of this complication ($p=0.002$)[2].

Thrombosis:

It's the major complication of permanent vascular access. The KDOQI present 0.25 patient/year for a native access, and 0.5 patient/year for prosthetic bypass[12]. Thrombosis often constitutes the consequence of a stenosis or an infection. It can be precocious or tardive. In our study, 3.9% of patients developed precocious thrombosis and 2.9% tardive one. In the study led in UK, thrombosis was observed in 13% of the elderly. Age was not a predictive factor of this complication ($p=0.2$)[2].

Hemorrhage:

The moderate and precocious hemorrhage is generally related to hemostasis defect of a small vein that reveals after the arterialization or the bleeding caused by anastomosis. Abundant and precocious hemorrhage are related to a leakage over the anastomosis or over one of the collaterals of the vein[13]. In our serie, this complication was only observed in 2.9% of the patients.

Infection:

The prevalence is of 0.02 episod /patient/year in case of AVF versus 1.2 episod in case of CVC[13]. The short term CVC case more infections than long term ones. Infection remains one of the main causes behind mortality for hemodialysis patients. In case of AVF, the infections occurring in puncture points are in general benign, and accessible to antibiotic treatment. Concerning the infections of catheters, they often begin by local infection then develop to septicemia . They could, consequently, damage the vital prognostic of patients causing septic metastasis namely those touching the bones and the heart. Many germs are in cause with a varied incidence depending on the series[14][15][16][17].

Aneurysm:

The aneurysmic degeneracy is very constant in the evolution of vascular access, and more frequent in the use of

native AVF than that of prosthesis[18]. In our serie, this complication occurred in 13.9% of patients versus 0% in the serie of UK.

Stenosis:

It represents the more frequent tardive complication of vascular access[19]. In the English serie, it was observed in 7.8% of patients under 65 years old and in 4.4% of old ones. However, the association of age and the occurrence of this complication was not statistically significant [2].

Maturation delay:

Theoretically, AVF knows a maturation delay when it is not used for hemodialysis in expected delay. We then speak about maturation defect after three months, and thus no AVF should be punctured before 6 weeks. In some particular cases, especially are different in terms of implantation sites [20]. In the same serie of UK, this complication was observed in 1.1 % of patients aged under 65 years old and in 6.1% of old ones . The association of age and the occurrence of this complication was statistically significant ($p=0.03$)². In our study, the time allotted to the puncture of AVF was on an average of 21 days, and no maturation delay case was present.

Overflow:

The direct AVF situated in the elbow fold are the most predisposed to overflow. The latter is measured through many methods in dialysis and through the ultrasonography a(Doppler). However, the overflow was poorly explored in our study because of many financial and organizational constraints .

Cutaneous Ischemia:

It's a very frequent complication of AVF. However, no case of ischemia was reported in our study. According to the results of (Kidney disease 2005) the medium survival rate was of 0.6 years for catheters Vs 3.1 years of AVF (all age categories included). In the UK serie that focused only on elderly patients, the rate of survival was 446 day for AVF, and 176 days for catheters. The association between the survival and the type of vascular access was very significant ($p=0.0001$) [11]. A meta-analysis, involving 13 cohorts, has compared the survival at 12 months and 24 months between two groups: patients aged under 65 years and the elderly patients. The analysts have observed the vascular access survival decreases with age ($p= 0.0001$ at 12 months and $p= 0.001$ at 24 months) [21]

Conclusion

-The KDOQI 2006 recommendations:

>65% of native AVF.

<10% of catheters.

-Pragmatic approach :

-Native AVF: First intention vascular access even for 65 years old patients.

- AV puncture: life expectancy of 1 to 2 years + many comorbidities .

-CVT: life expectancy inferior to one year+many comorbidities.

*The optimal dialysis treatment at this age, not only involves nephrologists but also recommends a convenient surgical access.

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