

# The effect of age on radiocephalic fistula patency

C.G. BURT<sup>1</sup>, J.A. LITTLE<sup>2</sup>, D.A. MOSQUERA<sup>1</sup>

<sup>1</sup>Department of Vascular Surgery, <sup>2</sup>Department of Renal Medicine  
Birmingham Heartlands Hospital, United Kingdom

**ABSTRACT: Background:** Inferior patency rates for radiocephalic fistulae in the elderly have been reported and may explain the increasing use of prosthetic grafts for vascular access. The aim of this study was to assess whether the patency rates of primary radiocephalic fistulae are affected by age.

**Methods:** A retrospective casenote review of 53 consecutive patients undergoing primary fistula formation between 1995 and 1998 under the care of a single consultant vascular surgeon. The setting was a specialist vascular surgical unit where the protocol is to offer all new patients a radiocephalic fistula. Fistula patency was defined as successful use for dialysis.

**Results:** Cumulative patency rates at 2 years were 60% in patients over 60 years (n=27), and 53% in patients under 60 years (n=26). The higher patency rates in the older age group were not significant on log rank testing (p=0.39).

**Conclusion:** Age over 60 years did not influence patency rates of primary radiocephalic fistulae, which should remain the haemodialysis access procedure of choice at all ages. (*The Journal of Vascular Access 2001; 2: 60-63*)

**KEY WORDS:** Arteriovenous fistula, Elderly, Haemodialysis, Vascular access

## INTRODUCTION

The development of the radiocephalic fistula in 1966 by Brescia et al (1) was a milestone in vascular access surgery. Subsequent studies confirmed the lower incidence of thrombosis, stenosis and infection and longer patency rates when compared with fistulae constructed using synthetic material (2, 3). Despite the advantages of fistulae using autogenous vein, implantation of prosthetic materials for vascular access has grown enormously, especially in North America. In one report primary radiocephalic fistulae only constituted 10% of access procedures (4) whereas in our own practice they constitute 56% (personal data) of all access procedures and an attempt at primary fistula formation is made in all patients.

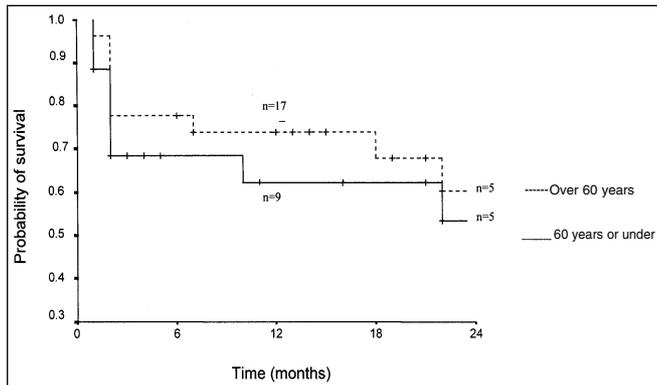
One possible reason for the use of prosthetic materials in vascular access is that increasing numbers of older patients are entering dialysis programmes. Reports on patency rates of primary wrist fistulae in the elderly are confusing. Some studies describe

poorer patency rates for fistulae in the elderly (5-8), possibly due to a higher prevalence of co-existing chronic disease, including peripheral vascular disease, and poor or inadequate veins from repeated venepuncture. Other studies conclude that age is not an important factor with regard to fistula patency (9,10). Although some of these studies have looked at patency rates in primary fistulae alone, the majority have analysed results across a range of access procedures. It is still unclear whether age is an important factor in primary fistula patency.

The aim of this study was to assess in a single surgeon study whether the patency rates for primary radiocephalic fistulae were affected by age.

## METHODS

A retrospective review of all patients undergoing primary radiocephalic arteriovenous fistulae from 1995 to 1998 was undertaken. No patient was refused an attempt at a primary fistula. All patients



**Fig. 1 - Survival curves comparing primary patency of radiocephalic fistulae in patients under 60 years of age to patients over 60 years.**

underwent anastomosis between the end of the cephalic vein and the side of the radial artery using 6/0 prolene. The procedures were performed under one consultant vascular surgeon, who either supervised a vascular trainee or was the operating surgeon.

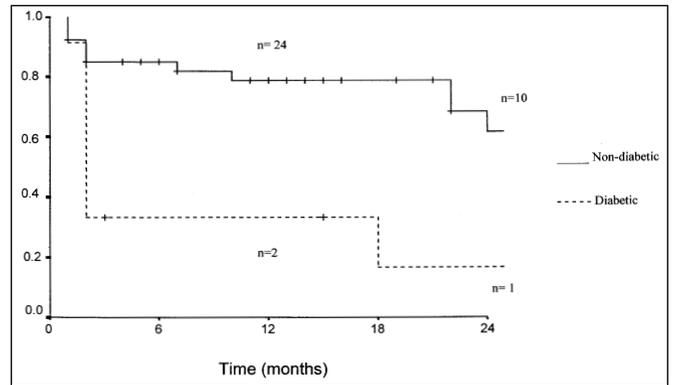
A successful fistula was defined as one that was used for dialysis. The fistulae that had failed had either occluded or did not mature sufficiently to be used for dialysis even though they may have remained patent. Information on fistula patency and suitability for dialysis was obtained by a combination of case note review, patient review and consultation with nephrologists and dialysis nurses.

Using SPSS software, Kaplan-Meier curves were used to calculate patency rates for patients under and over the age of 60 years. The log rank test was used to determine the statistical significance of any differences.

## RESULTS

In 27 patients over 60 years (mean age 71 years, range 61 to 80), cumulative patency rates at one and two years were 74% and 60% respectively. In 26 patients who were 60 years old or less (mean 47 years, range 22 to 60), cumulative patency rates at one and two years were 69% and 53% respectively. The higher patency rates in the older age group were not significant on log rank testing ( $p=0.39$ ) (Fig. 1).

In patients over 60 years we found that 3 fistulae failed to mature and 7 occluded. Five failed fistulae underwent secondary procedures that resulted in continuing function in 4 patients, and improved the cumulative patency rates to 82% and 62% at one and two years. In patients less than 60 years, 2



**Fig. 2 - Survival curves comparing primary patency of radiocephalic fistulae in diabetics and non-diabetics.**

fistulae failed to mature and 8 occluded in follow-up, with 4 salvage procedures, of which 3 were successful. Secondary patency rates in the under 60 age group were 70% at one year and 64% at two years. There was no significant difference between the secondary patency rates in the two age groups. Overall, 12 of the 53 patients died during follow-up, 5 of whom were in the over 60 group and 7 in the under 60 group. Only one patient in the younger age group underwent renal transplantation.

There was no significant difference between the number of diabetic patients in the two groups (5 patients under 60 years versus 7 over 60 years), although the overall patency rates of fistulae in diabetic patients were significantly inferior to those in non-diabetics at 33% versus 79%, ( $p=0.0021$ ) (Fig. 2).

## DISCUSSION

In this study we have demonstrated that there was no significant difference in one and two-year patency rates for primary radiocephalic fistulae in patients above and below the age of 60 years. Overall fistula patency rates in diabetics were significantly inferior to those in non-diabetics.

Our patencies for primary fistulae at one and two years are comparable with other studies (11-14), with early failure rates comparable to those in the literature which range from 11 to 24% (10, 14). Patients in our unit are rarely turned down for an attempt at a primary fistula. Such an unselective policy inevitably means that there will be more early failures and lower overall patency rates when compared with units that only offer primary fistulae to selected patients with good vessels. The fact that our patency rates remain comparable with other

units suggests that an unselective policy is one we should continue to employ. Primary wrist fistulae have been shown to have the best long-term patency rates and the lowest incidence of complications (2, 3), and the importance of reliable vascular access is highlighted in that only one of 53 patients during the three years of the study underwent renal transplantation.

The numbers in each arm of this study are small and could have missed a statistically significant difference in patency rates. However, from a clinical viewpoint this is largely irrelevant because we have demonstrated acceptable patency rates in the elderly group and the majority of patients will still benefit from a primary fistula. Although this study is retrospective, there is unlikely to be any selection bias because an unselective policy with regards to performing primary fistula formation operated in both study groups. Bias on the part of nephrologists when assessing dialysis need in individual patients cannot be excluded, but we have no reason to believe such bias existed.

Uniformity of operating and haemodialysis procedures is guaranteed by analysing results from a single surgeon in one renal unit. Previous studies with large numbers of patients and looking at more than one outcome variable have shown conflicting results on the question of the effect of age (5-7, 12, 15). In several of these studies (5-7, 12) the results were reported for a range of access procedures grouped together and so may not be applicable specifically to primary radiocephalic fistulae. The remaining studies came to different conclusions. Leapman et al (15) found patency rates of only 40% at one year in wrist fistulae in patients over 70 years of age and advised against this form of access in the elderly. One report advocated a selective policy for primary fistulae but this resulted in arteriovenous fistulae being attempted in only 10% of patients over 65 years (16). Another author (17) found higher primary failure rates in the elderly but the difference only became significant in older patients who were also diabetic, when nearly a third of the fistulae in this category failed.

The study from Prischl et al (8) showed that age adversely affected patency rates, but also demonstrated that different surgeons had significantly different patency rates for primary wrist fistulae. It is possible that the other results for age may have been skewed by the variety of surgeons undertaking access surgery. The only other single surgeon series (9) has concluded, like us, that older patients do not have a poorer prognosis than younger patients for primary wrist fistulae. They also found that patency rates in the younger age group ap-

peared to be inferior, although the difference was not significant.

It has been suggested that the reduced life expectancy of older patients in renal failure means that the shorter patency rates of prosthetic fistulae will suffice (4). These reasons have been used as justification for proceeding directly to prosthetic forearm loops (16) without first attempting primary wrist fistulae. In fact, in our study there was no difference between age groups in the number of patients who died during follow up. The older patients were just as much in need of reliable vascular access as the younger patients.

Although we have demonstrated poorer patency rates in diabetic patients with primary fistulae, this is mainly due to a high fistula failure rate in the first two months, after which the survival curves of the diabetic patients and non-diabetics become parallel. Poorer patency rates have also been demonstrated in diabetic patients with prosthetic grafts when compared with non-diabetics with grafts (5,18). In a study comparing diabetic patients with primary fistulae against diabetics with prosthetic grafts, the fistulae functioned longer than the grafts (19), suggesting that diabetic patients should still be offered the benefits of autogenous fistulae.

There are still 20-30% of patients whose primary fistulae fail in the early post-operative period and require secondary intervention. These are the patients who would benefit from proceeding directly to secondary access procedures. We need methods to evaluate patients pre-operatively and determine the likelihood of success of primary fistulae. Research in this area would have important benefits for a substantial minority of patients who could be selected at an early stage for the most appropriate access procedure. Until we have such information, age should be no barrier to the formation of a primary wrist fistula.

Reprint requests to:

*DA Mosquera, MD  
Department of Vascular Surgery  
Heartlands and Solihull NHS Trust  
Bordesley Green East  
Birmingham B9 5SS  
United Kingdom  
e-mail: damienmosquera@hotmail.com*

*Presented at Midlands Vascular Meeting at Leicester Royal Infirmary, 10th March 2000.*

## REFERENCES

1. Brescia MJ, Cimino JE, Appel K, Hurwisch BJ. Chronic hemodialysis using venipuncture and a surgically created arteriovenous fistula. *N Engl J Med* 1966; 275: 1089-92.
2. Kherlakian GM, Roedersheimer LR, Arbaugh JJ, Newmark KJ, King LR. Comparison of autogenous fistula versus expanded polytetrafluoroethylene graft fistula for angioaccess in hemodialysis. *Am J Surg* 1986; 152: 238-43.
3. Windus DW. Permanent Vascular Access: A nephrologist's view. *Am J Kidney Dis* 1993; 21 (5): 457-71.
4. Kaufman JL. The decline of the autogenous hemodialysis access site. *Seminars in Dialysis* 1995; 8, 2: 59-61.
5. Brothers TE, Morgan M, Robison JG et al. Failure of dialysis access: revise or replace? *J Surg Res* 1996; 60: 312-6.
6. Giorcelli G, Tricerri A, Vacha G. 20 years' experience with difficult vascular access. *Minerva Urol Nefrol* 1998; 50: 29-33.
7. Lazarides MK, Iatrou CE, Karanikas ID et al. Factors affecting the lifespan of autologous and synthetic arteriovenous access routes for haemodialysis. *Eur J Surg* 1996; 162: 297-301.
8. Prischl FC, Kirchgatterer A, Brandstatter E et al. Parameters of prognostic relevance to the patency of vascular access in hemodialysis patients. *J Am Soc Nephrol* 1995; 6: 1613-8.
9. Gollege J, Smith CJ, Emery J, Farrington K, Thompson HH. Outcome of primary radiocephalic fistula for hemodialysis. *Br J Surg* 1999; 86: 211-6.
10. Reilly DT, Wood RFM, Bell PRF. Prospective study of dialysis fistulas: problem patients and their treatment. *Br J Surg* 1982; 69: 549-53.
11. Enzler MA, Rajamon T, Lachat M, Largiader F. Long-term function of vascular access for hemodialysis. *Clin Transplant* 1996; 10: 511-5.
12. Hodges TC, Fillinger MF, Zwolak RM, Walsh DB, Bech F, Cronwett JL. Longitudinal comparison of dialysis access methods. *J Vasc Surg* 1997; 26 (6): 1009-19.
13. Kalman PG, Pope M, Bhola C, Richardson R, Sniderman KW. A practical approach to vascular access for hemodialysis and predictors of success. *J Vasc Surg* 1999; 30: 727-33.
14. Palder SB, Kirkman RL, Whittmore AD, Hakim RM, Lazarus JM, Tilney NL. Vascular access for hemodialysis. Patency rates and results of revision. *Ann Surg* 1985; 202: 235-9.
15. Leapman SB, Boyle M, Pescovitz MD, Milgrom ML, Jindal RM, Filo RS. The arteriovenous fistula for hemodialysis access: gold standard or archaic relic? *Am Surg* 1996; 62, 8: 652-7.
16. Hinsdale JG, Lipowitz GS, Hoover EL. Vascular access for hemodialysis in the elderly: results and perspectives in a geriatric population. *Dial Transplant* 1985; 10: 560-5.
17. Lin SL, Huang CH, Hsu WA, Yen CJ, Yen TS. Effects of age and diabetes on blood flow rate and primary outcome of newly created hemodialysis arteriovenous fistulas. *Am J Nephrol* 1998; 18: 96-100.
18. Windus DW, Jendriask MD, Delmez JA. Prosthetic fistula survival and complications in hemodialysis patients: effects of diabetes and age. *Am J Kidney Dis* 1992; 20, 5: 448-52.
19. Chazan JA, London MR, Pono LM. Long-term survival of vascular accesses in a large chronic hemodialysis population. *Nephron* 1995; 69: 228-33.