PART II

Symposium **VASCULAR ACCESS FOR SHORT AND LONG TERM HAEMODIALYSIS**

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CIRCULATORY ACCESS – STILL A MAJOR CONCERN

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Introduction

I have been invited to address this meeting and talk about the history and innovations of vascular access. Since my colleagues and I covered this subject in detail earlier this year [1], I have taken the liberty of changing the emphasis somewhat in order to discuss the importance of a lifetime of good vascular access to the patient who is about to begin renal replacement therapy.

When the first A-V shunts were placed in our patients Numbers 1 and 2 in March of 1960 [2], we could not have predicted in our wildest imagination that Patient Number 1 would survive for 11 years and Patient Number 2 would still be alive 23 years later, having received a transplant from his mother in 1968. The longest survivor on dialysis is Patient Number 6, who is now beginning his 22nd year. As discussed elsewhere, this patient still has cannulae in his left forearm [3]. He has not yet used his right arm for circulatory access.

I bring these long term survivors among the earliest dialysis patients to your attention in order to make the following point. Today, most younger patients starting renal replacement therapy, skilfully managed by combinations of dialysis and transplantation, can look forward to three, four or even five decades of life, provided adequate circulatory access can be maintained for that length of time. Of course, hypertension must be controlled even before renal replacement therapy begins [4,5]. Without good blood pressure control, long term survival is most unlikely. In any event, from the very outset of renal replacement therapy, decisions regarding choice of circulatory access can have a profound impact many years later.

Routine intravenous therapy

Let me begin with a brief comment on the seemingly innocuous subject of routine intravenous (i.v.) therapy. I hate to remember how many times I have approached the bedside of a young candidate for renal replacement therapy only

to find a routine i.v. slowly destroying his best forearm vein. How to prevent this occurrence is not easy. Mainly it involves alerting the patients themselves never to let anyone put an i.v. in a forearm or antecubital vein. Use the back of the hands or the lower leg. In most cases routine i.v. usually can be avoided. If all else fails, I believe it usually is better to use a subclavian access rather than a forearm vein.

The access surgeon

Almost everyone world-wide agrees that the native Brescia-Cimino fistula [6] is the gold standard of circulatory access, provided it is properly constructed, which in my view requires enormous skill. Clearly, it is no job for a general surgeon who does an occasional cutdown. Indeed, I believe that access surgery has become so important and so specialised that it should be undertaken only by highly motivated surgeons with special training and long experience in the field. This belief is supported by the success and important exchange of information that took place at the First International Congress on Access Surgery held in The Netherlands last April. The Proceedings of this Congress should prove to be an immensely valuable resource to all who are concerned with problems of vascular access. This includes fields such as parenteral nutrition and cancer chemotherapy.

Buying time

A major drawback of the native Cimino fistula is that it needs time to mature, often one to three months or more. Obviously the best practice is to create the fistula as much as a year prior to use. Unfortunately, this is not always possible and patients often appear who require immediate dialysis, in which case the decision of what to do becomes very important with respect to the need to provide good circulatory access for the next 20–30 years.

If the patient has good forearm veins, it is wrong to insert a PTFE or bovine graft. Sometimes, if the anatomy is just right, a standard A-V shunt can be placed next to the wrist in one arm and a Cimino fistula in the other. Then, when the fistula matures, the shunt can be converted to a second fistula or simply removed, leaving the forearm veins intact for later use.

The use of a low protein diet plus added essential amino acids [7] or keto acids [8] usually can provide adequate opportunity for a Cimino fistula to mature. However, the dialysis programme must have ongoing experience with this dietary approach, since the dietary regimen is difficult to master, complications are common and sudden deterioration can occur.

Perhaps the best way to 'buy time' these days is to use some form of subclavian vein catheter, as first suggested by Erben et al in 1969 [9]. The recently reported favourable experience of Uldall et al [10] and Dorner et al [11] supports this conclusion.

Finally, one can use some form of peritoneal dialysis. Although it is hoped that if CAPD is chosen, the patient will not require his fistula for a long period,

at some point it should be put into place since the drop-out rate with CAPD is considerable in most centres.

Secondary vascular access

If the forearm veins have been destroyed or are anatomically unsuitable to permit construction of a Cimino fistula, some form of secondary heterograft will be needed. Access surgeons seem to be about equally divided on their preference for the bovine or the PTFE graft. Currently, other types are seldom used.

All forms of secondary access have a higher rate of complications than the native Cimino fistula. The most common, and one that often can be prevented by corrective surgery, is clotting due to gradual obstruction at the venous anastomosis. A gradual rise in intragraft pressure, noted during a sequence of dialysis, can provide warning of impending obstruction. Also, the patient can be taught to palpate the graft. In a well-functioning secondary graft the pulse should disappear just beyond the arterial anastomosis. If the pulse becomes palpable near the venous end, obstruction is developing and corrective surgery may be indicated.

Using a constant site for each puncture

Recently we have had excellent success using the same site for each puncture of a Cimino fistula [12]. With this technique the needles are placed in the same holes for each dialysis. After over 10 patient-years of experience with this technique we conclude the following:

1. Contrary to our expectation, and as predicted by others [12], infection has not been a problem, since none has occurred.

2. Using the same site each time renders the puncture virtually painless and makes it much easier. Misses become very infrequent.

3. The same site can be used for months or years, but must be abandoned if bleeding around the needle occurs during dialysis. At that point a new site must be chosen.

Single needle dialysis

Obviously, by using the constant site method the number of sites will be doubled if single needle dialysis is used. A recent check with the centre in Spokane, Washington reveals that, as first proposed by Kopp [13], all of their more than 100 patients are on single needle dialysis either with a cycler or a double lumen needle. Eighty per cent of their patients are at home. All are well dialysed. If single needle dialysis works so well in Spokane, why is it not more widely used? Perhaps all of us should take a closer look, since it should lengthen the life of most types of A-V fistulae; and that is becoming more and more important as the longevity of patients on renal replacement therapy increases with time.

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