

Vascular access for chronic haemodialysis in Lombardy

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ABSTRACT: To evaluate the organisation of vascular access surgery, the techniques used to monitor surgical access and the central catheters, a survey was conducted amongst dialysis Units of Lombardy. A questionnaire was sent out to the 43 dialysis centres in Lombardy, 96% of which replied.

In almost 90% of dialysis units nephrologists perform vascular access albeit in close cooperation with vascular surgeons for the more complex cases.

First choice access is by distal arteriovenous fistula (AVF): 36% end-to-end, 31.7% side-to-end, and 19.5% side-to-side with distal ligation of the vein.

As second choice proximal AVF is more widely used than AV grafts, which are implanted only when all native vessels and related surgical procedures are exhausted.

Central venous catheters offer valid solutions not only as temporary access, but also as an alternative permanent one. In both cases the jugular vein is the most frequent site of insertion. Despite the documented incidence of related episodes of stenosis/obstruction, the subclavian vein is used as a temporary access in quite a high percentage of cases.

Only in selected cases are diagnostic procedures (mainly Venography and Doppler studies) performed prior to permanent access choice. Similarly vascular access is monitored mainly using a recirculation test albeit not routinely. In case of vascular access thrombosis, surgical revision is the most common approach.

KEY WORDS: Vascular access, Haemodialysis, Arteriovenous fistula, Central venous catheters

INTRODUCTION

Evidence suggests that the cost as well as the morbidity associated with the maintenance of haemodialysis access is rapidly increasing. This increase is associated with several epidemiological trends such as long survival on regular replacement treatment, wide admission of old and high risk patients and late patient referral to nephrologists.

In the last few years the problem has been dealt with in several works, which not only describe the different techniques used and their subsequent clinical outcomes, but also analyze the management and organization of vascular access surgery (1-5).

The present study reports on the results of a survey conducted in the Dialysis Units of Lombardy, a northern Italian region with about 8.9 million inhabitants. Our aim was to evaluate how vascular access is organized and what techniques are used to monitor both surgical vascular access and central venous catheters (CVCs).

MATERIALS AND METHODS

A questionnaire was sent to the 43 Lombardy dialysis centres, 96% of which replied (n=41). Table I shows the demographic characteristics of uremic patients on regular replacement treatment in Lom-

bardy as reported by the Regional Dialysis and Transplant Registry (6).

The survey included the following main topics:

- organisation of surgery, particularly whether it was managed by nephrologists or surgeons;
- type and number of vascular accesses carried out in 1998;
- type of vascular access regarded as first and second choice access; the procedures usually followed in case of complications like stenosis or thrombosis;
- additional information on the use of AV grafts and CVCs (both acute and chronic);
- methods used in planning a new access, monitoring its efficiency and the frequency with which these techniques are carried out.

TAB. I - UREMIC PATIENTS ON REGULAR REPLACEMENT TREATMENT IN LOMBARDY: DATA FROM REGIONAL DIALYSIS AND TRANSPLANTATION REGISTRY (6)

Uremic patients on dialysis on 31.12.97	5633
Haemodialysis	4595 (82%)
Peritoneal dialysis	1038 (18 %)
Mean age + SD	63 ± 14 years
Males/Females ratio	0 90
Diabetes (%)	9 4
New patients in 1997	1113
New patients on haemodialysis	779 (70 %)
New patients on peritoneal dialysis	334 (30 %)
Mean age + SD	62 ± 15
Males/Females ratio	1.03
Diabetes (%)	15.1

RESULTS

The total number of permanent vascular accesses (native distal and proximal arteriovenous fistula (AVF), AV grafts, surgical revisions and permanent chronic CVCs placement) was 2200 in 1998 with a mean of 56 procedures per centre (Tab. II). Distal AVF and implant of temporary acute CVCs are currently performed in all units; the percentage is lower for more complex surgical procedures like AV grafts (73%) (Tab. III).

Looking at first choice vascular access, only a few centres use snuff box AVF (7.3%) and distal side-to-side AVF (4.9%). Distal end-to-end AVF is the main type of access performed in Lombardy (36.6%). However, if the percentage of side-to-end AVF (31.7%) is added to that of side-to-side with distal ligation of the vein (19.5%), these haemodynamically similar procedures reach a value of about 50%.

Regarding second choice access, the questionnaire allowed more than one answer, therefore the distribution is much more differentiated (Tab. IV). The percentages reveal a stepwise tendency to use all the available native vessels and related surgical procedures before resorting to AV grafts, mainly composed of PTFE and other synthetic materials (Tab. V).

For acute temporary CVCs, the jugular (36%), subclavian (32%) and femoral veins (32%) are used with similar frequencies. The jugular vein is the elective site of insertion (92%) for permanent Canaud/Tesio (80%) or Permcath/Mahurkar (20%) tunneled cuffed catheters.

The evaluation of these results should also take into account the reported side-effects in the use of the subclavian vein for CVCs placement. Over the last 3 years 83% of the centres have reported at least one case of central vein stenosis or occlusion (total number = 127 cases), 77% of which associated with

TAB. II - SURGICAL PROCEDURES IN LOMBARDY IN 1998

	total	mean	min	max
Distal AVF	1097	28	5	108
Proximal AVF	360	9	1	41
AV graft	139	4	0	16
Surgical revision	431	11	0	43
Temporary CVCs	1590	42	2	241
Permanent CVCs	173	5	0	20

the presence of temporary CVCs.

Fifteen percent of the centres routinely perform imaging diagnostic procedures prior to permanent access selection, whereas 75% use them only in selected cases. Venography and Doppler studies are the most widely used techniques (Tab. VI). All centres in Lombardy monitor vascular access chiefly by means of recirculation test, ultrasound or radiological imaging (Tab. VII), while a regular surveillance program is established only in 22% of the cases.

The questionnaire also focused on the type of procedure commonly employed when occlusive complications occur. In case of thrombosis, 62% of the centres carry out a surgical revision whereas 38% use pharmacological thrombolysis as a first choice approach. When stenosis of the AVF is proven, only 25% of the units rely on interventional radiology, whereas 75% of them refer the patients for surgical revision.

In almost 90% of the dialysis units vascular access is confirmed by a nephrologist; only in 10% of the centres is the problem managed by surgeons. The cooperation rate with vascular surgeons is however very close in 12.2% of the centres for overall procedures and in 80.5% for the most complex cases. Only 7.3% of the dialysis units are completely independent. Anesthesiologists are much less involved in vascular access surgery. They are always present in only 2.4% of the cases, whereas they are present for selected cases in 58.6% of the centres. Cooperation with anesthesiologists is either not chosen or not available in 39% of the renal units.

The implantation of CVCs is mainly carried out by nephrologists (78%). Anesthesiologists (17%) or surgeons (5%) are involved only at a later stage and form permanent cuffed catheters.

DISCUSSION

The high number of surgical procedures related to vascular access management represents an arduous task for dialysis units and has, in turn, important organizational implications. Over 75% of the units in Lombardy regularly perform all types of vascular access. Procedures considered to be absolutely necessary, such as distal AVF and temporary acute CVCs placement, are available in 100% of the centres.

The 173 permanent CVCs implanted in 1998 confirm the interest accorded to this method of access over the last few years at least as a bridge-solution to the problems affecting the current typology of dialysis patients (3, 6). The number of inserted temporary CVCs is high (1590) and can partly be ex-

plained by its use in acute renal failure. As already suggested by other studies (3) we cannot, however, rule out other factors such as the late referral of uremic patients to nephrologists.

Although a close relationship with central vein stenosis or thrombosis has been confirmed, the use of the subclavian vein as a site for temporary CVCs

TAB. III - AVAILABILITY OF DIFFERENT SURGICAL PROCEDURES

	Centres	%
Distal AVF	41	100,0
Proximal AVF	36	87,8
AV graft	30	73,2
Permanent CVCs	33	80,5
Temporary CVCs	41	100,0

TAB. IV - SECOND CHOICE VASCULAR ACCESS (MORE THAN ONE INDICATION ALLOWED)

	N	%
Surgical revision	22	55
Proximalized AVF	19	47
Proximal AVF	16	40
Graft	3	7.5

TAB. V - GRAFT MATERIAL (MORE THAN ONE ANSWER ALLOWED; NUMBER IN ORDER OF PREFERENCE)

	Total	First choice
Standard PTFE	19	18
Stretch PTFE	9	4
Diastat	15	8
Carbo-PTFE	1	1
<i>Artificial</i>	<i>44</i>	<i>31</i>
Autologous safena	8	2
Heterologous safena	6	1
Animal arteries	1	0
Animal veins	3	1
<i>Biologic</i>	<i>18</i>	<i>4</i>
<i>Biosynthetic</i>	<i>3</i>	<i>1</i>

TAB. VI - DIAGNOSTIC PROCEDURES FOR VESSEL EVALUATION PRIOR TO PERMANENT ACCESS SELECTION (MORE THAN ONE ANSWER ALLOWED; NUMBER IN ORDER OF PREFERENCE)

	Total	First choice
Doppler ultrasound	7	4
Colordoppler ultrasound	17	14
Venography	25	14
Other	0	0

TAB. VII - DIAGNOSTIC PROCEDURES USED TO MONITOR VASCULAR ACCESS (MORE THAN ONE ANSWER ALLOWED; NUMBER IN ORDER OF PREFERENCE)

Total	First choice	
Recirculation test	34	30
Static/dynamic pressures	21	8
Flow determination	4	0
Venography	19	2
Other	4	0

cannulation is still frequent.

Instrumental techniques for the initial evaluation and follow-up of vascular access are not routinely performed but are carried out only on the basis of specific clinical indications. Evaluation of the patient's medical history and physical examination have a key role; however, these procedures are not available in all centres and so cannot always be carried out, as it occurs for interventional radiology.

Vascular access is commonly entrusted to a nephrologist even if a vascular surgeon is often involved. This approach ensures a more rational use of native vessels and a limitation in AV graft implants.

PARTICIPATING CENTRES

Bergamo (Marchesi), Zingonia (Lorenz), Ponte S. Pietro (Meterangelis, Cortinovis), Treviglio (Borghi), Trescore Balneario (Faranna), Brescia Spedali Civili (Brunori), Brescia Umberto I (Bassi), Desenzano (Testori), Leno (Brognoli), Como (Martinelli), Crema (Mileti), Cremona (La Russa), Lecco (Bacchini), Lodi (Mandolfo), Mantova (Tarchini, Ferrari), Milano Niguarda (Perrino), Milano Croff (Como), Milano S. Carlo (Luciani), Milano S. Paolo (Gallieni), Milano Sacco (Bertoli), Milano S. Raffaele (Melandri), Milano Fatebenefratelli (Romagnoni), Bollate (Savino, Masi), Cernusco sul Naviglio (Bracchi), Cinisello Balsamo (Saruggia), Desio (Bonforte), Legnano (Renzetti), Magenta (Mereghetti), Vizzolo Predabissi (Bronzieri), Monza (Viganò), Vimercate (Conte), S. Donato Milanese (Frontini), Pavia Fondazione Maugeri (Galli), Pavia Policlinico S. Matteo (Libetta), Vigevano (De Vincenzi), Voghera (Costa) Sondrio (Pedrini), Busto Arsizio (Allaria), Gallarate (Mangano), Varese (Cassani), Tradate (Scalia).

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