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Ambulatory Surgery 5 (1997) 149–151

Ambulatory Surgery

Ambulatory surgery for PTFE grafts for dialysis

José R Polo *, Jorge Polo, David Pacheco, Ricardo Vázquez, Juan Sanabia, Rosa Romero

Vascular Access Unit, Hospital General Universitario Gregorio Marañón, Area 2.300, Dr Esquerdo 46, 28 007 Madrid, Spain

Accepted 29 June 1997

Abstract

All prosthetic vascular accesses for hemodialysis performed in an ambulatory surgical setting between January 1992 and December 1996 were reviewed retrospectively. During this period, 400 out of the 450 vascular accesses with PTFE grafts (88.9%) were performed as outpatient cases. All operations were under local aesthesia without premedication. There were no postoperative deaths. Early complications were as follows: mild postoperative bleeding (readily controlled by local pressure): three (0.75%); surgical site infection: three (0.75%); early thrombosis (successfully treated with rescue surgery within the first 48 h, also in an ambulatory setting): four (1%). Four patients needed hospital admission (1%), one due to threatening arrhythmia, another because of anaphylactic reaction to cephazoline and two because of severe metabolic disorders. There was no increase in morbidity when the patients travelled long distances from the hospital to their homes immediately after the operation. These results show that prosthetic vascular accesses can be constructed and repaired in patients under local aesthesia and in an ambulatory surgical setting without an increase in morbidity. Delays due to waiting lists can be avoided, less resources are required, and complications associated with the prolonged use of central vein catheters for temporary hemodialysis can be reduced. © 1997 Published by Elsevier Science B.V.

Keywords: Vascular access; PTFE grafts for dialysis; Ambulatory surgery

1. Introduction

Patients with end-stage renal failure needing vascular access for future hemodialysis, as well as those being currently dialyzed who suffer any complication from their angioaccess, require prompt surgical intervention in order to avoid the deletereous complications derived from central venous catheters for hemodialysis [1]. Performance of vascular access procedures in an ambulatory setting would avoid unnecessary delays of surgery. Published experience on ambulatory vascular surgery is restricted to the treatment of varicose veins [2] and the creation of vascular access for hemodialysis [3]. Our group's experience on vascular access in an ambulatory settings up to 1992 has been previously published [4].

The purpose of this study is the retrospective analysis of a 5 year experience of inserting polytetrafluoroethylene (PTFE) prostheses for hemodialysis in an ambulatory surgical setting.

2. Material and methods

2.1. Patients

From January 1992 to December 1996, 450 vascular accesses for hemodialysis using PTFE prostheses were undertaken in the Hospital Gregorio Marañón, Madrid, Spain. Patients came from hemodialysis units in Madrid and other cities located 100–300 km around. The only limitation for day-surgery vascular access during this period was the patient's need of hospital admission for other causes. Depending on their own preferences, patients came to the hospital either by ambulance, taxi, or their own means. Some patients living in Madrid used public transport to return home

* Corresponding author.

PII S0966-6532(97)00046-2

after their operation. The patients were previously informed that they were allowed to have breakfast and take their usual medication on the morning of operation. When the patient was currently included in a hemodialysis program through a temporary catheter, a dialysis session was held the day prior to surgery.

2.2. Surgical strategy

Patient's monitoring included continuous electrocardiogram, pulse oxymetry and noninvasive blood pressure monitoring. Glucose solution (5%) was infused through a peripheral vein. As antibiotic prophylaxis, 2 g of cefazline was given intravenously (500 mg of vancomycin in cases of allergy to penicillin). Heparin was not administered during vessel clamping.

All surgical procedures were carried out under local aesthesia using alkalinized 0.25% bupivacaine solution (maximum dose 300 mg). Anesthesia was injected in all layers of the surgical field (dermal, subcutaneous, subfascial and perineurial) and along the path of the subcutaneous tunnel. No sedative premedication was used but pre and intraoperative psychological support was given.

The subcutaneous tunnel for the prosthesis was formed using a curved tunneller (Gore-tunneller, WL Gore and Associated, Flagstadt AZ). Stretch wall PTFE prosthesis (WL Gore and Associated, Flagstadt, AZ), 6 or 8 mm in diameter was used and anastomosed to the vessels using PTFE or polypropylene sutures. Only the skin was closed, leaving the subcutaneous layers unsutured. Postoperatively patients returned to their homes and were reviewed the following day at their dialysis units. Non-steroidal anti-inflammatory drugs were used for postoperative analgesia. Early and late complications were treated on an ambulatory surgical basis.

3. Results

Of the 450 vascular accesses for hemodialysis, 400 were carried out in an ambulatory surgical setting (substitution index: 88.9%) [5]. The mean age of the patients was 57.6 years and 27% of them were ASA III. The kinds of vascular access are depicted in Table 1. There was no perioperative mortality among patients undergoing ambulatory surgery. Early complications observed within the first 48 hours, are depicted in Table 2. Haemorrhages were self-limited and did not require admission. They only required observation at the center of reference for a few hours. Early thromboses were successfully treated in an ambulatory setting within 48 h of surgery.

Four patients (1%) needed hospital admission from the operating room, one due to cardiac arrythmia, another because of anaphylactic reaction to cefazoline and the remaining two because of several metabolic complications. There were no complications associated with patients travelling home postoperatively, regardless of the distance they had to cover.

Cumulative patency rates are shown in Fig. 1. There were no statistical differences between patency rates of ambulatory and inpatient grafts ($P = 0.6732$).

Table 1
PTFE grafts performed between January 1992 and April 1995

	Total	Amb surg[a]	% Amb surg
Forearm	88	78	88.6
Upper-arm	335	302	90.1
Brachial-jugular	20	16	80
Femoro-femoral	6	4	66.7
Total	450	400	88.9

[a] Amb surg, ambulatory surgical cases.
% Amb surg, substitution index.

Table 2
Early complications observed in 400 PTFE grafts for displays performed in an ambulatory surgical setting

Complication	No.	%
Mild postop. bleeding	3	0.75
Surgical site infection	3	0.75
Early thrombosis	4	1
Hospitalization	4	1
Total	14	3.5

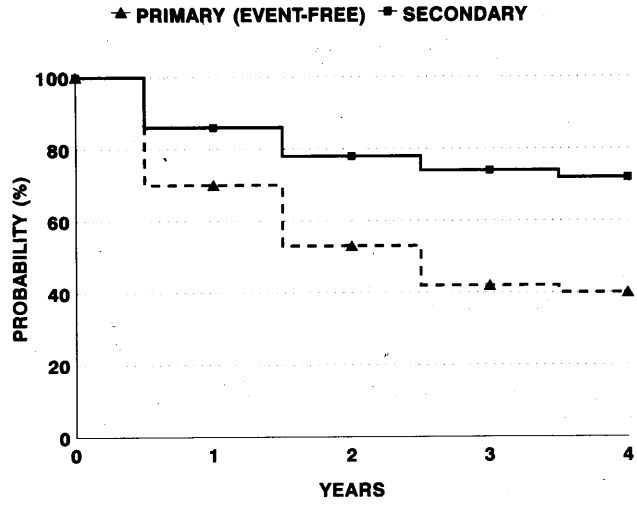

Fig. 1. Cumulative patency rates of 450 PTFE grafts for dialysis. Primary (P) event-free patency. Secondary (S) overall patency. There were no statistical differences between primary curves of inpatients (No = 50) and outpatients grafts (No = 400). $P = 0.6732$.

4. Discussion

Several factors affect the increasing population of patients undergoing hemodialysis: greater survival rates of these patients, lack of an age limit among the criteria for patient selection, small number of kidneys available for transplantation, loss of transplanted kidneys due to rejection, etc. All these factors lead to an increasing number of patients requiring vascular access. Moreover, the complication rate of vascular accesses is directly proportional to the number of patients and the time they have been in a dialysis program. For these reasons, the number of surgical interventions needed for the construction or repair of vascular accesses is also rising.

Due to large number of patients on waiting lists, inpatient surgery may be delayed, leading to undesirable complications from the use of temporary venous catheters for hemodialysis. Ambulatory surgery, must be considered as an effective alternative that avoids this problem.

It has been shown in this and other studies [3,4] that vascular accesses, either autologous or prosthetic, can be created and repaired ambulantly, without increasing complication rates. Our experience of 1482 vascular accesses for hemodialysis up to 1992 yielded a substitution index of 78%. Limitations for ambulatory surgery during this period included: patients hospitalized for other causes, periprosthetic infection, grafts placed in lower limbs, attitude of patients or their nephrologists and night emergencies with temporary admission until the next morning [4]. Since 1992 the only limitation has been hospital admission for other causes while the patient was waiting for access construction. We believe that the main factors favouring ambulatory surgery are: local aesthesia, avoidance of preoperative fasting, the patients ability to take their usual medication before the operation, no need for sedative premedication and no use of perioperative heparin.

Some authors have stated that general or regional anesthesia are the preferred choice for vascular accesses in which the anastomosis of the basilic or humeral veins is located above the middle third of the arm, in forearms previously operated on and when a prosthesis is placed in a lower limb [3]. Our experience is that any location of the prosthesis, including upper-arm grafts [6] brachial-jugular grafts [7] and femoro-femoral grafts, can be achieved using local aesthesia. The use of 0.25% alkalinized bupivacaine, which allows the use of up to 120 ml, aids broad surgical field procedures.

Travelling long distances after surgery does not increase postoperative morbidity, as has already been stated by other authors [8]. Thus, a vehicle with medical support is not essential for this kind of surgery with the exception of patients with femoro-femoral grafts where we currently advise 24 h of bed rest postoperatively. These patients should be sent home by ambulance from the recovery room after 4 h of observation.

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