Thrombolysis for blocked arterio-venous dialysis shunts.

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Summary

This was a retrospective study that looked at the effectiveness of thrombolytic agents in re-establishing flow in thrombosed Brescia-Cimino shunts for 10 patients on chronic dialysis. The thrombolysis was done in an intensive care setting under monitoring for arrhythmias, hypotension and desaturation of blood. Of the ten patients 6 (60%) of them were male and 4 (40%) were female. The average age of the patients was 53.9 + 5.73 years. Eight (80%) of the patients has internal jugular and 2 (20%) had subclavian central venous lines for the thrombolysis. Eight (80%) of the patients had streptokinase and 2 (20%) had urokinase for the thrombolysis. There was re-established flow in 9 (90%) of the shunts and the mean time for the re-establishment of flow in the A-V shunts was 7.56 + 1.07 hours. Two of the patients who had urokinase had previously been given streptokinase, one for a previous thrombosis of his A-V shunt and the other for myocardial infarction. The commonest complication during the thrombolysis was bleeding (70%) followed by hypotension (50%) and nausea (40%). The hypotension and bleeding from the central venous lines was more common in the patients who were administered streptokinase.

It is concluded that thrombolysis using streptokinase and urokinase is effective in recanalizing Blocked Brescia-Cimino shunts.

Key Words: Thrombolysis - Brescia-cimino shunts - Urokinase - Streptokinase.

Introduction

Arterio-venous shunts are the commonly used access for chronic dialysis for patients with chronic renal impairment. In past the commonest shunt were Scribner shunts but this has been superseded by Brescia-Cimino shunts, which is a native radiocephalic A-V shunt [1]. The success of these native shunts depends on the patency of veins in the forearm. These veins are affected by previous peripheral intravenous cannulations and central venous cannulations which may cause thrombophlebitis and thrombosis of these veins [2]. The next option after the failure of the native shunt is the use of synthetic grafts using polytetrafluoroethylene (PTFE) grafts for the establishment of arterio-venous access [3]. There are many complications associated with the use of A-V shunts for dialysis and the commonest is stenosis and thrombosis of the shunts [4,6]. Various methods have been used to salvage the shunts and these include non-surgical methods like, percutaneous angioplasty thrombectomy and thrombolysis using thrombolytic [6]. We retrospectively looked at results of thrombolysis of patients with blocked Brescia-Cimino shunts who presented at the National Cardiothoracic Centre Dialysis Unit.

Patients and Methods

Using the admission and discharge books in the intensive care unit 10 consecutive patients who were admitted and thrombolysed for blocked A-V shunts from January 1st 2002 till December 31st 2005 were selected for this retrospective study. The patient's records were then retrieved and the age, sex, vascular access used for thrombolysis, thrombolytic used, side-effects and the time to establishment of patency of the shunts were recorded. Return of the thrill in the region of the fistula was taken as a successful thrombolysis.

Monitoring during the thrombolysis was by electrocardiography, pulse oximetry, and non-invasive blood pressure measurements every two minutes and all patients had oxygen administration by nasal prongs. Patients who were given streptokinase were given 500mg of methylprednisolone and 12.5 mg of promethazine intravenously 15 minutes before thrombolysis. Each patient was given either 2,000,000.00 international units (IU) of urokinase or 1,500,000.00 IU of streptokinase over a period of 30 minutes into the central venous lines. After thrombolysis the patients were all put on intravenous heparin infusion of a 1000 IU to run for 12 hours.

Documentation in the patient's notes gave the probable cause of the thrombosis in two of the patients. All the patients were discharged to the general ward within 24 hours of the thrombolytic therapy. The records of the centre were also checked to find out the number of patients on chronic dialysis as well as the average age of the shunts. The data was analysed using the SSPS for windows (Microsoft 2001). The means and standard deviations were calculated.

Results

The average age of the patients was 53.9 + 5.73 years with a range of 40-62 years as shown in table I. Six (60.0%) of the patients were male and 4 (40.0%) female. Vascular access for the thrombolysis was through a triple lumen central line inserted in the internal jugular vein in 8 (80.0%) and the subclavian vein in 2 (20.0%) of the cases.

Table I: The age, sex and vascular access

Identity	Age (years)	Sex	Vascular access
OA	49	M	IJ
BK	55	M	IJ
BK	55	M	IJ
MD	54	M	IJ
FA	40	F	SC
JA	56	M	SC
MF	55	F	IJ
OS	53	M	IJ
TT	60	F	IJ
TA	62	F	IJ

M = male, F = female, IJ = internal jugular, SC = subclavian, Age: mean + SD = 53.9 + 5.73 years

Table II: Thrombolytic, time to A-V patency, complications

Thrombolytic	Time to A-V Patency (Hours)	Complications			
		N&V	hypotension	urticaria	bleeding
Strept	7	-	-	-	y
Strept	7	y	y	-	y
Urok	6	-	-	-	y
Strept	6	-	-	-	y
Strept	8	y	y	y	-
Strept	9	y	y	y	-
Strept	9	y	y	-	y
Strept	8	-	y	-	y
Strept	8	-	-	-	y
UrokK	-	-	-	-	-

Strept = streptokinase, Urok = Urokinase, N&V = nausea and vomiting, y = yes
Mean time for recannilisation = 7.65+ 1.07 hours, bleeding = 70%, hypotension = 50%, N&V = 40%

Eighty percent (8) of the patients had streptokinase for their thrombolysis and 20 percent (2) had urokinase. The time to establishment of A-V patency was between 6 - 9 hours with a mean of 7.56 + 1.07. The commonest complication was bleeding (70%) followed by hypotension (50%) and nausea (40%). The cardiothoracic cent-

re had 20 patients currently on chronic dialysis, 13 (65%) being male and 7 (35%) being female. All except one patient have a Brescia-Cimino shunt. The oldest shunt was 8 years old and the second oldest shunt was 5 years old.

Discussion

Reliable vascular access is important for the efficiency of chronic dialysis. Without a good vascular access patients would have an increased morbidity and mortality because dialysis would be infrequent and inefficient [7]. The added socio-economic burden on the patients is also increased. Most patients who are on dialysis in Ghana usually have Brescia-Cimino shunts for chronic dialysis. The mean age (53.9+5.73years) of the patients with blocked shunts may be an indication of the age of the patients with chronic renal failure who are being dialysed. The majority of the patients at the cardiothoracic centre dialysis unit are in their late forties and fifties. The male sex predominance could have been because of the majority of the patients on chronic dialysis are males (65%). Two of the male patients developed diarrhoea, became dehydrated with subsequent thrombosis of their shunts. The other 8 patients could not identify any predisposing factors that may have contributed to the thrombosis of the shunts. All the patients reported to hospital after they realized that there was no thrill on their shunts.

Previous studies have indicated that the main cause of late thrombosis of shunts was stenosis of the venous end of the Brescia-Cimino shunts [8,9]. Stenosis and thrombosis was however more common in PTFE grafted shunts and this is attributed to the damage of the endothelial layer lining these shunts [9]. This complication of thrombosis and stenosis is more common in patients who have used their shunts for many years [10]. The longest lifespan of shunt among the patients in the study was 8 years which indicates that the majority of the shunts were relatively new. Thrombosis of shunts in our unit is even more undesirable because there is no programme for renal transplantation in our environment and good shunts determine the longevity of life among these group of patients. Like other studies, patients in the study were not referred by the neprhologists for dialysis early and suffered from the problem of thrombosed veins from frequent thrombophlebitis after multiple venous punctures [11]. The other problem that may affect these shunts is the current the use of temporary central venous dialysis lines in patients with chronic renal failure instead of the tunneled lines. The tunnelled lines which have a longer life span protects the other patent veins which are therefore available for permanent A-V shunts later on [11,12].

Diagnosis of impending shunt failure is usually suspected when there is poor flow during dialysis increased venous pressures or a reduction in the thrill in the shunts [4,7,11]. Angiography and ultrasonograpy has improved the early diagnosis of thrombosis and stenosis of A-V shunts [9,13]. The use of this advanced technology has used in the hospital for coronary angiography and peripheral arterial occlusion in patients but not for diagnosis of insufficiency in A-V shunts. The added advantage of angiography is in angioplasty which may be employed by interventional radiologists to establish flow in blocked shunts [9,14]. The method employed to re-establish vascular access in this study was by systemic thrombolysis. This method was been used because the authors had some experience of systemic thrombolysis using streptokinase and urokinase in the management of Myocardial infarction and pulmonary embolus. Various workers are now using local thrombolysis with the infusion of the thrombolytics directly into the thrombosed shunt but the use of local infusions need the expertise of interventional radiologists experienced in the management of such cases [15,16]. The added advantage of the local infusion is the use of angiography, angioplasty and insertion of stents in stenosed grafts by the radiologists [16]. The Korle-bu Teaching Hospital, unfortunately does not have radiologists experienced in this technique.

It is gratifying to note however, some centres are still using systemic urokinase, streptokinase and recently tissue plaminogen activator (TPA) for the thrombolysis of A-V shunts [11,15,16]. Local infusion of the thrombolytics reduces the incidence of the systemic side-effects because lower doses of the drugs are used and this has been confirmed in various studies [15,17]. The systemic side-effects of the streptokinase was quite high in our study with 6 (60%) of our patients having hypotension during and 7 (70%) having oozing from the venous sites after the thrombolysis. The hypotension occurred in spite of the administration of methyl prednisolone and promethazine injections before the start of the streptokinase infusions which were to reduce the allergic reactions.

Use of the central venous route may be controversial especially with the concept of preservation of veins in this group of patients [2]. However, the management of the side-effects was more easily done with the good venous access. Re-establishment of the vascular access was successful in 9 (90%) of cases and failure was in one patient who had had a difficult initial operation for establishment of the native shunt due to poor veins. She subsequently had a PTFE graft for establishment of her A-V shunt. The high success rate for re-establishment of the vascular access by thrombolysis alone may have been attributed to the fact that most of the patients may not have had any significant stenosis although this was not tested for. Cooper and Valji et al in their studies had over 90% success after thrombolysis but only 50% of the grafts were patent after 90 days [16,17] . All the grafts in the patients in the current study are patent after 180 days. All the patients reported promptly they suspected that their shunts were blocked and this may have also contributed to the high thrombolytic success rate.

Conclusion

Systemic thrombolysis for blocked A-V shunts is effective in recanalising blocked shunts. However the side-effects are more prevalent as compared to studies where local infusion techniques were used.

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