OUTCOME COMPARISON OF TWO SURGICAL METHODS USED FOR THE TREATMENT OF ACUTE THROMBOSIS OF ARTERIOVENOUS FISTULAS: THROMBECTOMY VERSUS DE NOVO CREATION OF ARTERIOVENOUS FISTULA

Nedžad Rustempašić*, Emir Solaković

Clinic for Vascular Surgery, University of Sarajevo Clinics Centre,
Čekaluša 88, 71000 Sarajevo, Bosnia and Herzegovina

* Corresponding author

Abstract

The aim of this study was to evaluate efficacy of two surgical methods used for the treatment of acute arteriovenous fistula (AVF) thrombosis. Twenty two out of twenty five patients that were admitted at the Clinic for vascular surgery in Sarajevo received successful surgical treatment for the salvage of acutely thromboses AVF from 2007-2009. They were included in retrospective, descriptive clinical study. Based on the type of surgical procedures performed, 22 patients were divided into two groups. The first group included 10 patients and they had successful thrombectomy of thromboses AVF while 12 patients in second group underwent de novo creation of AVF using blood vessels already exploited for construction of thromboses AVF. Patency rate of salvaged AVF in analyzed groups was compared one month and 6 months after intervention. In the postoperative follow up there was no statistically significant difference in patency rate of salvaged AVF between analyzed groups after one month, (80% vs 100%, Fisher exact test value =2,520, p= 0,195). Patency rate of salvaged AVF after six months of the follow up was significantly better in group that received de novo construction of AVF when compared to thrombectomy group (25% vs. 91%, Fisher exact test value = 1,062, p=0,002). De novo construction of AVF in case of acutely thrombosed AVF offered better patency rate of salvaged AVF when compared to surgical thrombectomy in the follow up period of six months.

KEY WORDS: AVF thrombosis, thrombectomy, de novo creation of AVF, patency rate

Introduction

Although interventional radiology has become increasingly more present in the management of acute thrombosis of vascular access (arteriovenous fistula), conventional surgical treatment nevertheless plays significant role in its treatment in many hospitals. Surgical thrombectomy of recently thrombosed arteriovenous fistula (AVF) is one method for AVF salvage but its successful outcome is significantly jeopardized if it is performed 24 hours after occlusion (1). Surgical thrombectomy may present itself as challenging procedure in terms of ability to remove occluding thrombus completely and that is the very reason why some authors make decision to create new vascular access (2).

The aim of this study was to evaluate the efficacy of two surgical methods in salvage of thrombosed AVF - thrombectomy of AVF with Fogarty catheter versus newly created AVF (de novo AVF) from the blood vessels that were used for the construction of mature and functional AVF until it failed due to acute thrombosis.

Materials and Methods

Twenty two out of twenty five patients admitted to the Clinic for vascular surgery in Sarajevo, received successful surgical treatment for the salvage of acutely thromboses AVF from 2007-2009. They were included in retrospective, descriptive clinical study. All of 22 patients included in the study had matured and functional AVF until it became occluded. Based on the type of surgical procedures performed, 22 patients were divided into two groups. The first group comprised 10 patients (9 radio cephalic AVF and 1 cubit cephalic AVF) and they had successful thrombectomy of AVF in the period less than 24 hours from the moment of occlusion of AFV. Thrombectomy of AVF was performed with Fogarty catheter. All operations were performed in local anesthesia (2% lidocaine). Operations were performed by specialist surgeon or by the resident under supervision of the specialist. For the purpose of thrombectomy, occluded AVF was dissected in scar tissue and venous limb of AVF was opened with transverse venotomy of sufficient size to allow passage of catheter and extraction of thrombus. If it was necessary, additional arteriotomy was created and repositioning of Fogarty catheter was made in order to remove extensive thrombus from arterial side. Patency of venous limb was confirmed by unimpeded passage of heparins saline into the vein after removal of thrombus. Procedure was pronounced successful if thrill was palpated on venous limb of AVF. In the second group (12 patients with radio cephalic AVF) de novo creation of AVF was performed in the period less than 48 hours after thrombosis of AVF using blood vessels already exploited for construction of thromboses AVF but approximately 2-4 cm proximal to the site of previous anastomosis. Patency of AVF created in previously defined groups was compared one month and 6 months after intervention. Two patients with AVFs that were not salvaged with thrombectomy procedure and one patient from the second group whose AVF functionality was not salvaged with de novo creation of AVF were not included in study.

Results

Ten out of twelve AVF that underwent thrombectomy procedure were salvaged in the first group of patients while 12 out of 13 AVFs were functional again after de novo creation of AVF. Patency of three AVF could not be restored surgically due to intensive proximal vein fibrosis changes and those AVF were not included in the study. 54% of surgical interventions consisted of de novo construction of AVF and thrombectomy contributed to 46% of total operations (Figure 1). Twenty one radio cephalic AVF and one cubit cephalic AVF were salvaged (Figure 2). Patency of salvaged AVF, one month after intervention, was 80% in the first group and 100% in the second group of patients (Figure 3). Patency of AVF six months after performed procedure was 25% in the first group of patients and 91% in the second group of patients (Figure 4). There was no statistically significant difference regarding obtained results between analyzed groups one month after intervention (Table 1, Fisher exact test value=2,520, p=0,195). The difference in patency rates of AVF between analyzed groups 6 months after the procedure was statistically significant (Table 2, Fisher exact test value=1,062, p=0,002) in favor of better patency with "de novo" constructed AVF.

Analyzed group	Number of functional AVF after 1 month	Percentage of functional AVF after 1 month	Fisher exact test	p value
Thrombectomy	8	80%	2,520	0,195
De novo AVF	12	100%		

(Level of significance <0,05)

TABLE 1. Statistical significance (Fisher exact test and p value) of obtained results in relation to salvaged AVF patency rate one month after procedure

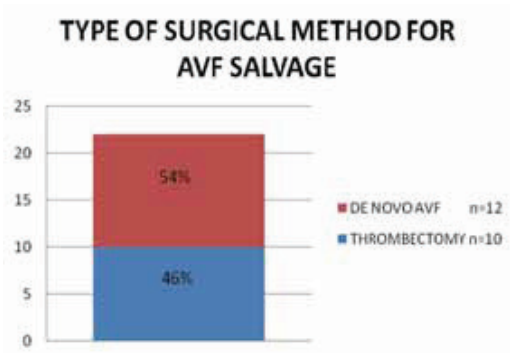

FIGURE 1. Number and percentage of salvaged AVF in analyzed groups

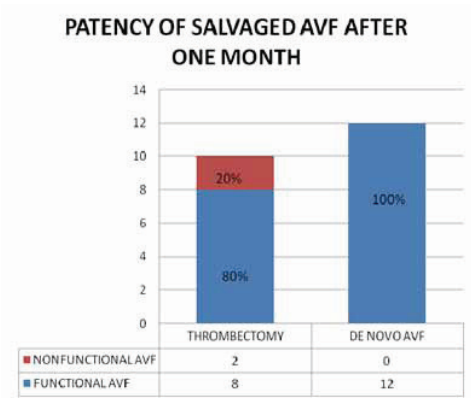

FIGURE 3. Comparison of salvaged AVF patency rate in relation to the type of surgical procedure performed after one month of follow up

Analyzed group	Number of functional AVF after 6 months	Percentage of functional AVF after 6 months	Fisher exact test	p value
Thrombectomy	2	25%	11,062	0,002
De novo AVF	11	91%		

(Level of significance <0,05)

TABLE 2. Statistical significance (Fisher exact test and p value) of obtained results in relation to salvaged AVF patency rate six months after procedure

Discussion

While some authors do not favour surgical thrombectomy of acutely thromboses AVF (2), others on the other hand when comparing surgical thrombectomy with endovascular treatment of this condition have obtained similarly good results with both methods and interestingly enough according to Tordoir et associates (3) primary and secondary patency in their study was even better in case of surgical thrombectomy method until 2002. Thereafter they report almost the same results for both methods (3). Technical success of thrombectomy in our study equals 83% (10/12 thrombectomies) and it

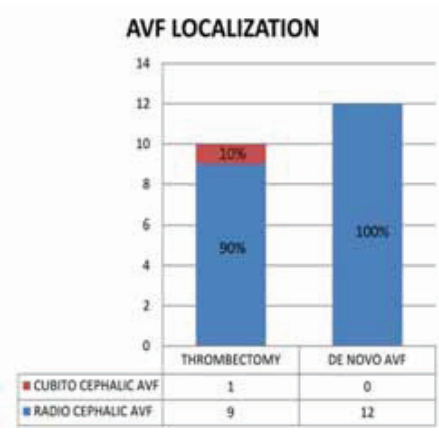

FIGURE 2. Anatomical localization of AVF with correlation to the type of surgical procedure performed for salvage of AVF

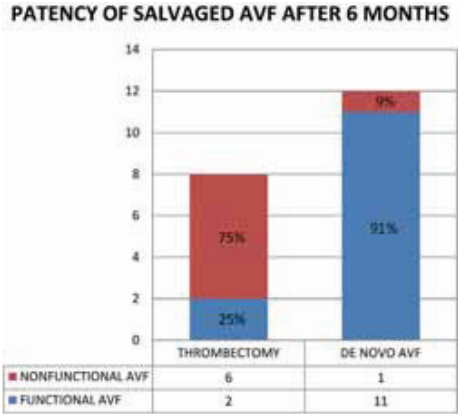

FIGURE 4. Comparison of salvaged AVF patency rate in relation to the type of surgical procedure performed after six months of follow up

positively correlates with results published by Palmer et al (70%) (2). 13 surgical thrombectomies were performed by specialist surgeon (7 patients in group I and 6 patients from group II), while the rest of operations performed physician in the residency program under supervision of the surgeon specialist. According to the study of Gundevia et al. (4) there is no significant difference regarding technical success of the operation when it was performed either by specialist or by the resident who was under supervision of the surgeon specialist (4). Primary patency of thrombectomized AVF in the study of Palmer et al. after 6 months was 51%, while in our study patency of AVF salvaged by the same method was only 25%. Although Palmer reports that thrombectomy may significantly prolong AVF life, our results failed to prove that since after 6 months only 25% of thrombectomized AVF were patent, while de novo constructed AVF prolonged usage of vascular access in case of 91% of patients with statistically significant difference (25% vs. 91%, p=0,002). Our results of patency

of salvaged AVF after one month have shown no difference between AVF salvaged by either methods (80% vs. 100%, p=0,195). Ponikvar in his study also reported superiority of thrombectomy followed by creation of new AVF when compared to mere thrombectomy of AVF for the salvage of thromboses AVF. Difference in patency rate between two methods in his study after one year of follow up was 75% vs. 54% in favor of newly created AVF supposedly by virtue of reduced intima media thickness in case of already remodeled vein (5).

Conclusion

De novo construction of AVF had better patency rate after salvage of thrombosed AVF after 6 months in comparison to surgical thrombectomy. A limitation of the study was the relatively small sample size. For this reason, these findings cannot be generalized based on this study alone.

References

(1) Diskin C.J., Stokes T.J., Panus L.W., Thomas J., Lock S. The importance of timing of surgery for haemodialysis vascular access thrombectomy. Nephron. 1997; 75(2):233-237.

(2 Palmer R.M., Cull D.L., Kalbaugh C., Carsten C.G., Taylor S.M., Snyder B.A., York J.W., Langan E.M., Blackhurst D. Is surgical thrombectomy to salvage failed autogenous arteriovenous fistulae worthwhile? Am. Surg. 2006; 72(12):1231-1233.

(3) Tordoir J.H., Bode A.S., Peppelenbosch N., van der Sande F.M., de Haan M.W. Surgical or endovascular repair of thrombosed dialysis vascular access: is there any evidence? J. Vasc. Surg. 2009; 50(4):953-956.

(4) Gundevia Z., Whalley.H., Ferring M., Claridge M., Smith S., Wilmink. T. Effect of Operating Surgeon on Outcome of Arteriovenous Fistula Formation. Eur. J. Vasc. Endovasc. Surg.2008; 35(5): 614-618.

(5) Ponikvar R. Surgical salvage of thrombosed native arteriovenous fistulas for haemodialysis by interventional nephrologists. Ther. Apher. Dial. 2009; 13(4):340-344.

ACID FREE
CHLORINE ELEMENTARY FREE ECF
NEUTRAL pH

Paper used for pressing:
Binding - FABRIA Bianco 240 gsm
Pages - FABRIA Bianco 100 gsm