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*Chronic dialysis fistula thrombosis treatment by means  
of endovascular recanalization with surgical exclusion  
of developed collateral circulation*

Dialysis fistula insufficiency poses a serious problem in kidney substitution therapy with haemodialyses. There are a lot of reasons for A-V fistula failure. The problem grows as the life span is prolonged, patients' mean age increases and new groups of patients become included in the therapy i.e. patients with diabetes, tuberculosis and systemic diseases. The most common mechanism leading to dialysis fistula failure is thrombosis which results from stenosis of the vessels providing vascular access (1,2,5). Balloon angioplasty and endovascular stent placement appear most affective methods of treatment. There are 3 different types of thrombosis: total, chronic and parietal, chronic being the most dangerous one. It occurs when only a small fragment of the efferent vein becomes clotted and this enforces the creation of collateral circulation which prolongs fistula functioning for some time. In time, collateral circulation becomes insufficient and clinical signs of fistula failure which prevents dialysis therapy appear.

#### MATERIAL AND METHODS

Seven chronic thrombosis patients (4 women and 3 men) were subjected to endovascular recanalization treatment. All the fistulas were made from the patients' own vessels in the forearm of non-dominant limb. All vascular anastomoses were made vein end to radial artery side. Ultrasonography (colour Doppler) examination revealed reduced fistula blood flow and all characteristics typical of chronic thrombosis. In all the patients USG results were verified with angiography examination. The impatent vein fragments were 5 to 12 cm long. Physical examination confirmed the absence of palpable hum or pulsation throughout efferent vein, but clear hum and pulsation were detected in developed collateral vessels.

The patent part of efferent vein was punctured 2-3 cm off the anastomosis site towards cephalic area. The punctures were made with 16G and 18G needles. Introduction of contrast medium enabled definite diagnosis verification and evaluation of blood outflow rate beyond subclavian and brachiocephalic veins. The patients received 3000 IU/h i.v. heparin. A straight

guide wire (0.021') was inserted. Then, catheter (4Fv or 5Fv) was introduced. The catheter together with 0.021' guide wire protruding 2–3 cm were then pushed through the stenosis site. During the procedure 1–2 ml of contrast medium was introduced a few times. Then the catheter was removed and balloon catheter (5–8 mm) was introduced. The balloons were 8–12cm long and inflated up to 8–12 atm. for 60 sek.

In all 7 cases the blood flow in treated fistula veins ranged from 260 to 370 ml/min., which was still insufficient to perform the proper haemodialysis, but surgical ligation of incised collateral vessels increased it to over 700 ml/min. On completion of surgical procedure another follow-up USG examination was carried out.

## RESULTS

All the treated fistulas had proper blood flow throughout the fistula vein, which was confirmed by Doppler examination. Surgical ligation of incised collateral vessels considerably increased blood flow rate in the treated fistula vein. All chronic thrombosis patients were successfully treated with endovascular recanalization. In 2 cases small haematomas occurred in puncture sites, but this did not affect the blood flow dynamics. 6 months after the procedure all the patients maintained efficient vascular access. They are dialysed 3 times weekly for 4–4.5h, and regularly checked up. A patient with the longest case record has maintained efficient vascular access for 17 months.

## DISCUSSION

In all 7 cases ultrasonographic diagnostics proved very efficient in detecting chronic thrombosis. Physical examination carried out prior to USG appeared also very helpful in locating numerous tortuous collateral vessels (3,4). One of the leading European centres estimates the efficacy of recanalization of 33 chronic thrombosis at 82% (2,6). In the cases presented in this paper the efficacy mounted to 100%. This perfect outcome may result from relatively small number of patients undergoing the treatment and the fact that they were relatively young, which allowed successful surgical ligation of collateral vessels.

In the previous paper, based on much broader study material, the authors reported 57% efficacy. Fistula patency 6 months after the procedure was 83%, which was considered surprisingly high (2). There was no need to use stent in any of 7 patients whereas in other reports stent placement is described in over half of the case (2,6,7).

## CONCLUSIONS

1. Chronic thrombosis treatment with endovascular recanalization gives satisfactory results after successfully performed surgical procedures.
2. Surgical ligation of collateral vessels significantly increases blood flow rate in the treated fistula vein.

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### SUMMARY

Fistula thrombosis is the most common and dangerous complication resulting in vascular access insufficiency. The most "tricky" lesion of dialysis fistula is chronic thrombosis which occurs when only a short section of efferent vein becomes clotted and collateral circulation enabling further, limited in time functioning of dialysis fistula is created. In 7 chronic thrombosis patients subjected to treatment by means of endovascular recanalization, developed collateral vessels were surgically ligated to obtain single-canal blood flow. The recanalization procedure involved making a puncture, inserting a guide wire and performing balloon angioplasty. Simultaneously, 2 or 3 collateral veins were incised and ligated. The result obtained in all the 7 cases was considered successful as all fistulas remained a 100% patent 6 months after the procedure.

Leczenie przewlekłej zakrzepicy przetoki dializacyjnej metodą wewnątrznaczyniowej rekanalizacji z chirurgicznym zamknięciem rozwiniętego krążenia obocznego

Zakrzepica przetoki jest najczęstszym i jednocześnie najgroźniejszym powikłaniem, prowadzącym do niewydolności dostępu naczyniowego. Najbardziej podstępna zmianą występująca w przetoce dializacyjnej jest zakrzepica przewlekła. Polega ona na zamknięciu tylko części żyły odprowadzającej z wytworzeniem krążenia obocznego, które umożliwia dalsze, ograniczone w czasie, funkcjonowanie przetoki dializacyjnej. Wśród siedmiu przypadków z rozpoznaną przewlekłą zakrzepicą, skierowanych do leczenia metodą wewnątrznaczyniowej rekanalizacji, wykonano także chirurgiczne odsłonięcie i podwiązanie rozwiniętych naczyń krążenia obocznego w celu uzyskania jednokanałowego przepływu krwi. Zabieg rekanalizacji polegał na nakłuciu, przeprowadzeniu przewodnika przez niedrożny odcinek naczynia i wykonaniu angioplastyki balonowej. Jednocześnie, z niewielkich nacięć, podwiązano od 2 do 3 naczyń żylnych rozwiniętego krążenia obocznego. Wszystkie siedem zabiegów rekanalizacji zakończyło się pełnym powodzeniem. Wtórna drożność przetok po 6 miesiącach obserwacji wynosiła 100%.