

Disconnection of the Rubber Tip of Arrow-Trerotola Percutaneous Thrombolytic Device

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A rubber tip disconnection of Arrow-Trerotola percutaneous thrombolytic device (PTD) may occur occasionally. We experienced 5 cases of a rubber tip disconnection among 453 mechanical thrombectomy sessions with the use of PTD. We present a report about these five cases and suggest possible causes for the occurrences.

Index terms: Hemodialysis fistula; Complication; Arrow-Trerotola percutaneous thrombolytic device

INTRODUCTION

Thrombosis of hemodialysis access is a common problem in hemodialysis patients. It can be re-canalized by surgical thrombectomy, thrombolysis, balloon angioplasty, aspiration thrombectomy as well as by a mechanical thrombectomy with dedicated devices or a combination of these methods (1-5). Among them, the mechanical thrombectomy is a method where a variety of tools is utilized with the intention to fragment or cleave and thereafter to remove or aspirate the thrombus. The Arrow-Trerotola percutaneous thrombolytic device (PTD; Arrow, Reading, PA, USA) is known to be a useful tool to remove a thrombus (3-5). Although the PTD procedure is simple and effective in the most cases, we have experienced the disconnection of the

soft rubber tip from the basket of the PTD. This article describes the presumed cause of disconnection and clinical outcomes of this complication.

CASE REPORT

Between January 2006 and December 2012, 1964 sessions of endovascular intervention were performed in 908 patients because of malfunctioning hemodialysis accesses in our institution. A mechanical thrombectomy using PTD was primarily performed in patients with a thrombosed hemodialysis access in our institution. In 453 out of 1964 sessions, a mechanical thrombectomy using PTD was performed for thrombosed hemodialysis grafts (n = 407) and thrombosed native fistulas (n = 46). In five (1.1%) of 453 sessions, the soft rubber tip was disconnected from the PTD catheter. The described patients group consisted of two men and three women and ranged in age from 49 to 75 years (mean age 65 years). These 5 cases were described in Table 1.

Four patients presented thrombosed native fistulas and one presented a thrombosed hemodialysis graft. The soft rubber tip was disconnected in all cases when the basket of PTD was rotating to break the thrombus. Disconnection of the soft rubber tip occurred at the arteriovenous

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The Rubber Tip Disconnection

anastomosis in 4 patients with native fistulas, with an acute angulation in 2 patients (Fig. 1), in 1 patient at the acute angulated transitional zone between the aneurysm

like dilated segment and the normal segment and in 1 patient at the junction of the subclavian and innominate veins with an indwelled stent in the innominate vein. In 1

Table 1. Summary of Clinical and Radiological Findings

Patient Number	Age	Sex	Hemodialysis Access		Speculated Cause of Disconnection	Disconnected Tip
			Type	Anastomosis		
1	63	F	Native	Brachiocephalic	Acute angulation between aneurysmally dilated vein and normal segment	Migration
2	64	F	Native	Radiocephalic	Acute angulation at arteriovenous anastomosis	Retrieved
3	75	F	Native	Radiocephalic	Indwelled stent in innominate vein	Migration
4	49	M	Native	Radiocephalic	Acute angulation at arteriovenous anastomosis	Retrieved
5	74	M	Graft	Brachiobasilic	Reused device	Retrieved



Fig. 1. 49-year-old man with thrombosed radio-cephalic native arteriovenous fistula.

A. Angiography after mechanical thrombectomy using Arrow-Trerotola percutaneous thrombolytic device shows multiple residual thrombi (arrowheads) within cephalic vein. **B.** Mechanical thrombectomy was repeated. Because of acute angle at anastomosis site, soft rubber tip was curved (arrowhead). **C.** While device was working, soft rubber tip (arrowhead) was disconnected from catheter. **D.** Soft rubber tip was retrieved by using snare wire (arrowhead).

patient with a graft, the disconnection of the soft rubber tip developed at the mid portion of the graft.

In all cases the removal of the disconnected soft rubber tip was tried with a snare catheter. The soft rubber tip was removed in three patients using the 5–10 mm snare catheter and was swept away into the pulmonary artery in two patients. After that, the PTD thrombectomy was resumed with the use of another PTD device and an angioplasty for the underlying stenosis was performed.

All patients underwent hemodialysis without any problem immediately after the procedure. No additional medical management such as antibiotics treatment was administered in the patients with the soft rubber tip migration to the pulmonary artery. The duration of follow-up ranged from 9 to 21 months (median 16 months). There were no subjective or objective symptoms associated with the soft rubber tip lodged in the pulmonary artery.

DISCUSSION

Arterial embolization has been reported as a possible complication of the PTD before (5), but the disconnection of the soft rubber tip has not been previously reported.

A device fracture is one of the rare complications associated with interventional procedures. Possible causes may be a knotting of the catheter due to twisting at the level of tortuous vascular structure (6) or a disconnection because of pinch-off syndrome (7) and others. The device tip is made of soft and flexible rubber which can be easily maneuvered through vessels. Our speculation is the soft rubber tip can be disconnected from the PTD when it is located at an acute angle within thrombosed veins or grafts because the basket is rotating at a high speed (3000 rpm). In the present study, the disconnection of the soft rubber tip occurred in 4 out of 46 patients with thrombosed native fistula. The authors presume the acute angulation as the cause of this complication in three patients. Therefore, the use of PTD for the removal of a thrombus at an acute angulation is not recommended. In this situation a balloon angioplasty or an aspiration thrombectomy could be a better alternative.

In one patient with an indwelling stent in the innominate vein, the tip of the PTD was caught at the end of the stent strut so that a disconnection developed. So, the PTD device should not be activated within the stent.

In the present study, a disconnection of the soft rubber tip occurred in one out of 407 patients with hemodialysis

graft only. In this patient, the PTD device was reused. In this case we speculate the reuse of the PTD device as cause for the disconnection of the soft rubber tip because there is no acute angulation throughout the graft and anastomosis in hemodialysis graft in general. In our institution, the reuse of PTD device after sterilization is uncommon, because the reused PTD device may be weakened and fragile.

In the literature there are many reports concerning the removal of intravascular foreign bodies by interventional procedures. A snare-loop wire or its modification, the wire-balloon technique, a nitinol goose-neck snare, grasping forceps and Fogarty balloon catheters are methods to remove intravascular foreign bodies (8-10). We also used a snare catheter to remove the rubber tip if the soft rubber tip was disconnected from the basket of the PTD. Although we failed to remove the rubber tip in two patients, no symptoms were developed during the follow-up period.

In conclusion, the rubber tip of the PTD can be disconnected during the procedure when the PTD is working in an acute angulated vessel particularly.

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The Rubber Tip Disconnection

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