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CASE REPORT

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Complications associated with the Rotarex® wire in a patient with peripheral artery disease

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Abstract

The Rotarex® device is used for thrombectomy as well as atherectomy in patients with PAD. It is important to carefully consider the wire position of the Rotarex® device during the procedure. As possible as the wire should be located in a lesion-free area.

KEYWORDS

atherectomy, complication, peripheral artery disease

1 | INTRODUCTION

Rotarex® is a rotational atherectomy device used for peripheral artery disease. Complications related to the Rotarex® wire are rarely reported. Here, we report a case of wire-related complications in a patient with peripheral artery disease.

The pathogenesis of peripheral artery disease (PAD) is initiated by atherogenic mechanisms, leading to atherosclerosis-related occlusion.[1,2] Peripheral angioplasty is a primary option in the current treatment for PAD, and the use of new devices, including drug-coated balloons, drug-eluting stents, and atherectomy devices, has significantly improved the patency rates.[3-6]

Rotarex® (Straub Medical) can be used as an atherectomy modality for chronic total occlusion.[7-10] Rotarex®-related complications typically occur during the procedure and include vessel perforation, distal embolization, compartment syndrome, and others.[8] In this article, we present a case of procedural complications related to the use of the Rotarex wire.

2 | CASE PRESENTATION

An 87-year-old man was admitted to the hospital due to a left dorsal foot wound. The patient slept with a hot pack on

his left foot, and as a result, he encountered a burn on his foot and was transferred to our hospital for treatment. After admission, the patient underwent wound debridement and a split-thickness skin graft was applied. On postoperative day 4, it was noted that the skin graft on the burn wound had not healed properly (Figure 1A). This patient had hypertension and diabetes mellitus (DM), DM nephropathy, and DM-related foot ulcers that had developed within the last 2 years. Recently, the patient was bedridden because of a transient ischemic attack. The patient was needed to evaluate the status of peripheral artery. After discussion with cardiologist, because the patient had DM nephropathy, the physicians decided to perform angiography to evaluate the peripheral arteries without CT scan to use less contrast.

The angiogram showed that the left superficial femoral artery (SFA) was totally occluded proximally (Figure 2A, Video 1A). Therefore, the angioplasty was necessary for wound healing. A 0.035-inch-wire (Terumo) was successfully inserted via a microcatheter (DAV catheter, Cook Medical) into the distal SFA by knuckle wire technique (Figure 2B). The wire was inserted to subintima, but it seemed to come into the true lumen (Video S1B). After wiring, the contrast was injected through the catheter to confirm to locate in the true lumen (Figure 2C). Both the anterior and posterior tibial arteries were totally occluded, and the peroneal artery was patent (Figure 2C). Initially, revascularization of the SFA was planned to recover the distal perfusion. In the angiogram, there was few calcification in the SFA lesion. Rotarex® is the effective device for native vessel and chronic occlusion, particularly in less calcified vessel. Therefore, we decided to perform an atherectomy using the Rotarex® device (Straub Medical). After the initial guidewire was advanced into the popliteal trunk, the wire was exchanged for the Rotarex® wire, and an atherectomy was performed (Figure 2D). The angiogram showed blood flow recovery (Figure 2E); however, when the Rotarex® wire was pulled back to the distal SFA, the wire tip was coiled and stuck, which would not allow complete removal (Figure 3A, orange circle). We attempted to retrieve the wire, but the distal tip of the wire remained lodged in the vessel. With the distal tip lodged in the vessel, the wire that remained in the catheter was cut (Figure 3B, orange arrow). We inserted a snare (Amplatz Goose neck snare, Medtronic) to remove the tip, but it was not retrievable. We then inserted a catheter toward the wire tip site to separate the wire from the vessel wall (Video S2), but this strategy failed. We tried to pull back the remaining wire by snaring its distal part again. This attempt was successful, and the wire was removed (Figure 3C, magnified in orange circle; Video S3). However, although the wire was successfully removed, the peroneal blood flow was compromised due to vascular rupture (Figure 3D). We inserted the guidewire (Command 014, Abbott) to the posterior tibial artery to rescue the distal runoff of the blood. The guidewire was advanced to the lateral dorsal artery using the knuckle wire technique, and balloon angioplasty (Coyote® 2.0-220 mm, Boston Scientific) was performed (Figure 3E). After rescue of the distal blood flow, two bare-metal stents (Supera® 5.5-150 mm, Abbott; Zilver® PTX® 7.0-80 mm, Cook Medical) were inserted into the SFA to prevent recoil and restenosis, and the procedure was finished. After stenting, the blood flow of SFA was completely recovered, but there still remained flow limitation in below the knee (Figure 4A, Video S4). The coiled tip of the cut wire was released with some vascular tissue still attached (Figure 4B).

After the procedure, edema in the left foot was observed, and an elastic bandage was applied. Furthermore, there was a change in the color of the wound, indicating wound infection (Figure 5). An antibiotic agent, piperacillin-tazobactam (Tabaxin®), was administrated in a dose that was recommended in patients with renal impairment; however, a favorable response indicating infection control was not observed. The patient's creatinine level was elevated and urine output decreased. The patient's chest X-ray showed pulmonary edema; therefore, we explained to the patient and his guardians that hemodialysis was necessary. However, the patient's guardians did not consent to hemodialysis to prolong life. Two weeks after the procedure, the patient died due to multiorgan failure associated with sepsis.

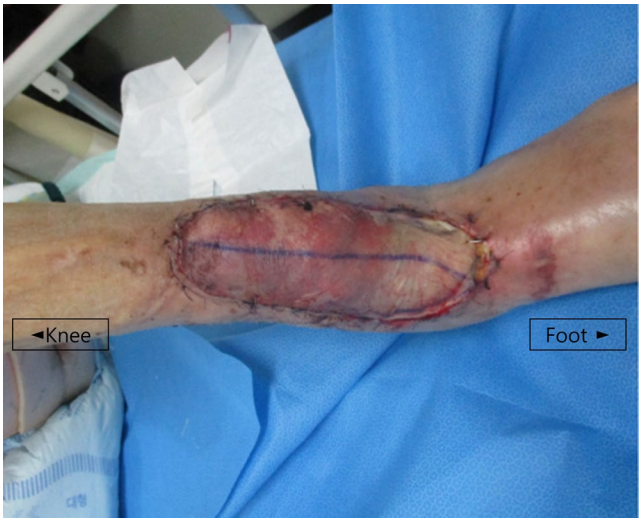

FIGURE 1 After skin graft on the burn wound, the graft had not healed properly

3 | DISCUSSION

We reviewed a case of complications related to the use of the Rotarex® wire in a patient with PAD. The peripheral artery disease (PAD) is a condition where the blood supply to the lower extremities is diminished, leading to a decrease in a

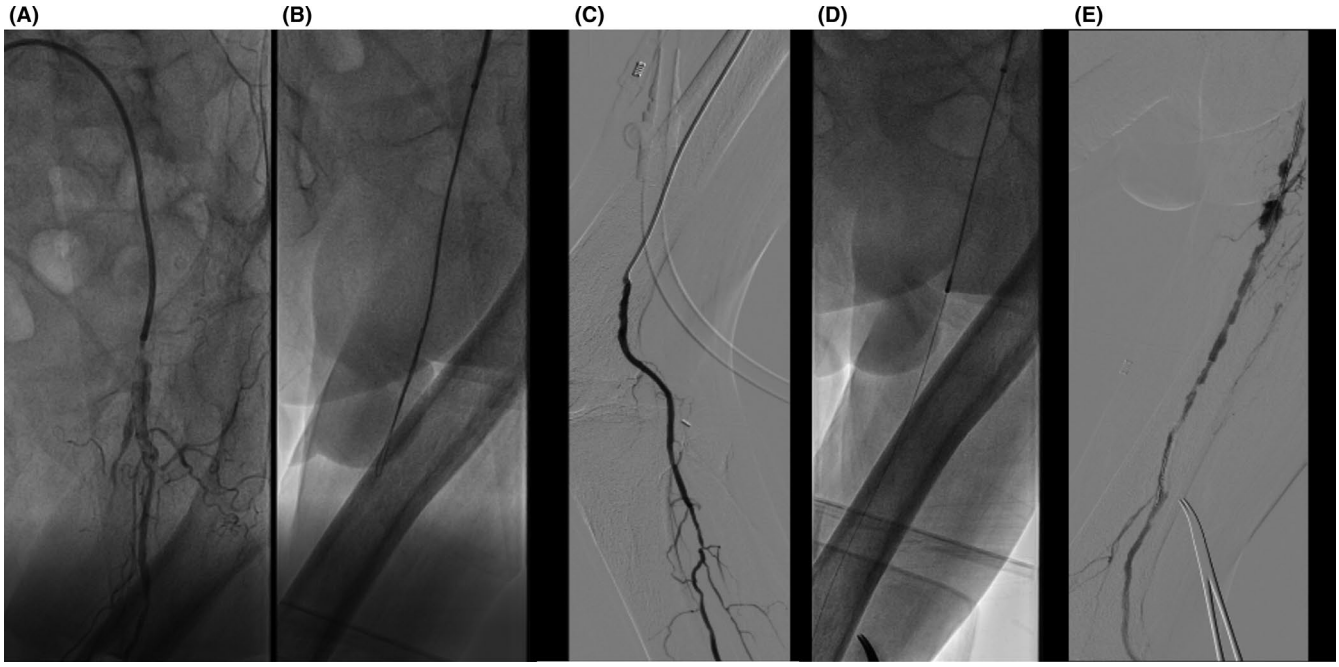

FIGURE 2 A, SFA was totally occluded from proximal part. B, Wire and microcatheter were advanced by knuckle-wire technique. C, Patent peroneal trunk flow before atherectomy. D, Atherectomy with Rotarex. E, After atherectomy, there was some dissection at proximal of SFA, but blood flow was recovered

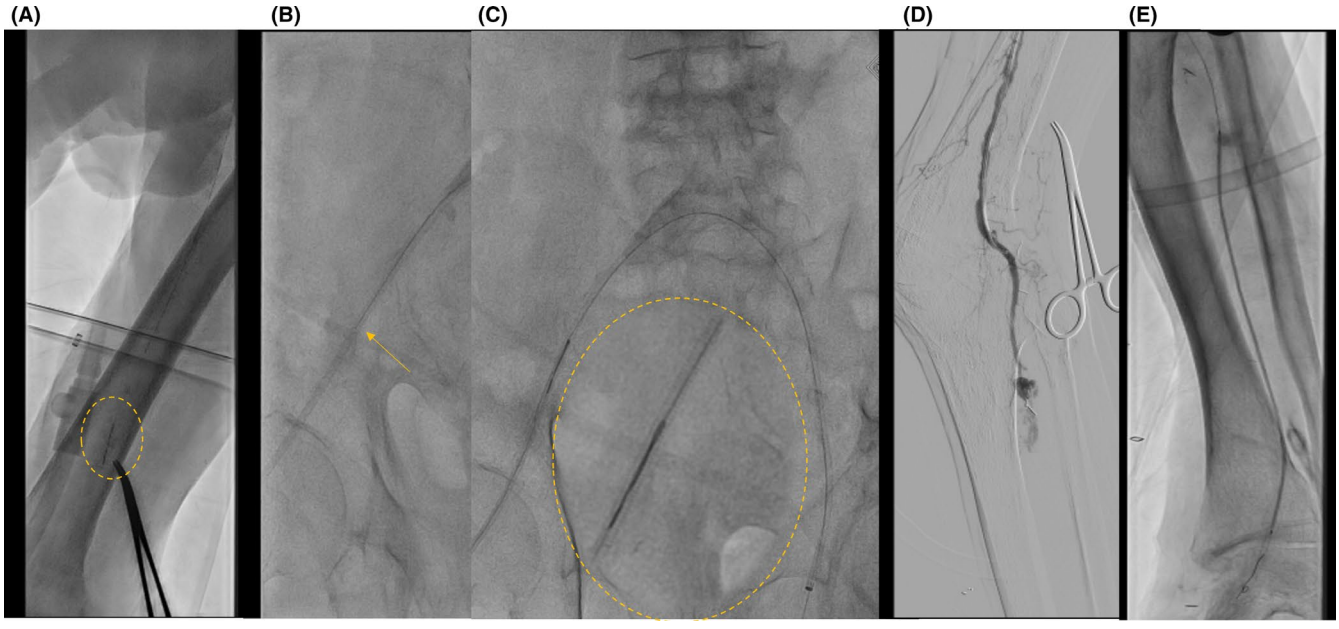

FIGURE 3 A, The Rotarex wire location was changed and the wire was stuck in the distal SFA. B, After retrieval the wire, distal part was remained in the sheath (the cutting end in the sheath, orange arrow). C, Grabbed the cut wire using a vascular snare(magnification in orange circle) D, Ruptured peroneal artery. E, Angioplasty to below the knee was performed to rescue distal run off

patient's functional capacity and quality of life of patients.[11] Moreover, in patients with a lower extremity wound, PAD can make it challenging for wound healing and even make the wound worse.[11,12] Peripheral angioplasty using a stent is currently a standard endovascular treatment for PAD and the use of new devices, including drug-coated balloons, drug-eluting stents, and atherectomy devices, has significantly improved the patency rates.[3,5,6]

Especially, because PAD is initiated by atherogenic mechanisms, the use of percutaneous atherectomy devices is known as an effective alternative treatment for atherosclerosis-associated total occlusion and calcified lesions.[1,2,8]

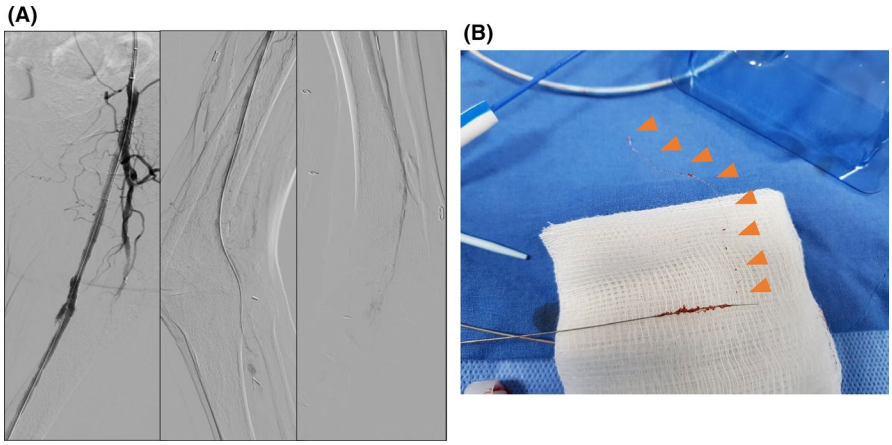

FIGURE 4 A, Final angiography. After stent implantation, the blood flow of SFA was recover. However, there was still flow limitation at BTK flow. B, The cut Rotarex® wire. The coiled tip was released (orange triangles) with some vascular tissue attached

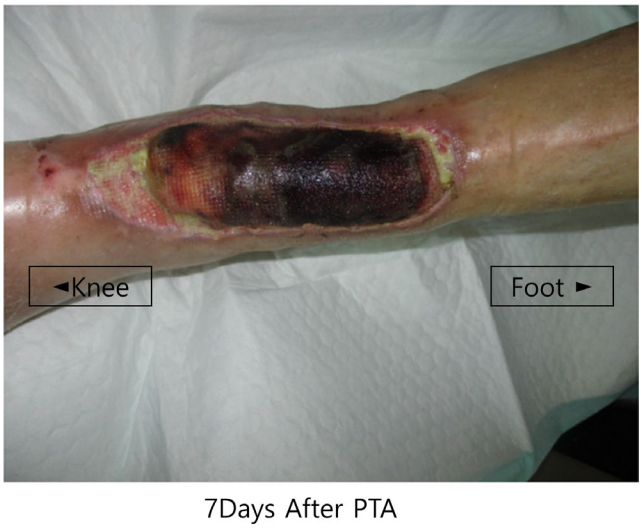

FIGURE 5 One week after angioplasty, the wound became worse

Although the Rotarex® is usually used for thrombectomy procedures in a peripheral artery, it can also be used as an atherectomy device in patients with PAD.[8,10] Generally, complications related to the device include compartment syndrome, distal embolization, and extravasation due to perforation. However, wire-related complications have been rarely reported. Rotarex® is a rotational atherectomy device with a speed of 40, 000-60, 000 rounds per minute, creating negative pressure.[10] If the wire position is unstable and there is a lack of volume, it is possible for the Rotarex® device to apply suction to the wire. Therefore, it is better for the wire to be located in a lesion-free area.

4 | CONCLUSION

In conclusion, atherectomy using the Rotarex® device is a good option for atherosclerosis-related occlusion in patients with PAD. However, the clinician should carefully consider the wire location during the procedure.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTION

The work for this report has been supervised by YH Cho. The patient was under the care of JW Lee, D Han, and S Choi. The report was written by D Han. The report was reviewed by DG Shin, MK Kang, JR Cho, and N Lee.

ETHICAL APPROVAL

The patient's family provided informed consent for publishing this data.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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