

# Successful Endovascular Repair of Complicated Pseudoaneurysm Using Perclose Proglide

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## Abstract

Iatrogenic pseudoaneurysm is common vascular complications of angiographic procedures. Patients with uncomplicated pseudoaneurysms can be managed with ultrasound-guided techniques. However, for complicated pseudoaneurysms, surgical repair of the artery is mandatory. We report a case of successful repair of complicated pseudoaneurysm using access-site closure device, Perclose Proglide<sup>TM</sup> without surgical approach.

## Introduction

Iatrogenic pseudoaneurysm is a false aneurysm that occurs after arterial wall injury related to an incomplete hemostatic plug at the puncture site. A pseudoaneurysm can develop at any arterial site used for arterial puncture. The most common site for pseudoaneurysm development is the femoral artery, which is used as access for percutaneous-based diagnostic and interventional procedures. Uncomplicated pseudoaneurysms can usually be managed with ultrasound-guided compression or percutaneous thrombin injection. However, for complicated pseudoaneurysms and those failing nonsurgical management, surgical repair of the artery is needed.

We herein report a case of successful repair of complicated pseudoaneurysm using an access site closure device, Perclose Proglide<sup>TM</sup> (Abbott Vascular Inc., Santa Clara, CA, USA) without a surgical approach.

## Case presentation

A 72-year-old man consulted our division because of femoral artery pseudoaneurysm. The patient had undergone endovascular treatment for left subclavian artery stenosis, for which the access site was the right femoral artery, four days before the consultation. Three days after the procedure, the patient complained of right lower quadrant pain, and a blood test showed a decreased hemoglobin (Hb) level from 12.9 to 9.0 g/dl. Computed tomography (CT) was then performed, revealing right-sided retroperitoneal hematoma extending from the right femoral access site, suggesting pseudoaneurysm with extravasation (Figure 1) (Online Video S1).

Although duplex echo-guided compression was performed, follow-up CT the next day showed worsening retroperitoneal hematoma and progression of anemia (Hb 7.2 g/dl). Therefore, the previous team consulted our division. Duplex echo (Video S2) showed a pseudoaneurysm 40 mm in diameter, with an aneurysmal neck continuing from the femoral artery at 6.1 mm in diameter (Figure 2). We diagnosed this case as complicated pseudoaneurysm with rupture.

Because there was no sign of infection, we decided to perform endovascular repair using a Perclose Proglide<sup>TM</sup>. To confirm the location of the pseudoaneurysm, we performed angiography using a contralateral femoral approach and punctured the pseudoaneurysm near the previously punctured skin mark under duplex echo guidance. Subsequently, a 0.035-inch guidewire was crossed to the right iliac artery through the aneurysmal

neck (Video S3), and a 7-Fr sheath was inserted to facilitate closure device insertion. After retrieval of the 7-Fr sheath, the Perclose Proglide<sup>TM</sup> was tracked over the wire into the right femoral artery, and the foot was deployed at the appropriate position under fluoroscopy guidance (Figure 3ab, Video S4). Closure was then performed based on the appropriate position, and successful aneurysmal closure was confirmed by angiography (Figure 3c, Video S5, S6). The contralateral access site was also closed using the Perclose Proglide<sup>TM</sup>.

After the endovascular procedure, no recurrence of pseudoaneurysm was observed, and the patient was discharged on post-operative day 4.

## Discussion

Iatrogenic pseudoaneurysm is one of the most common vascular complications of cardiac and peripheral angiographic procedures. The incidence of pseudoaneurysm after interventional procedure ranges from 2% to 6%.<sup>1</sup> Most patients with uncomplicated pseudoaneurysms can be managed with ultrasound-guided techniques. Ultrasound-guided thrombin injection (UGTI) is the first-line technique, rather than ultrasound-guided compression, because of the high success rate (97.5%) and acceptably low rate of thrombotic complications (0.5%).<sup>2</sup> However, it should be noted that this is off-label use of thrombin.

For complicated pseudoaneurysm, defined as cases with hemodynamic instability, extensive skin and subcutaneous damage, or soft tissue infection, the common treatment strategy is open surgical repair.<sup>3</sup> The present patient showed progressive anemia and aneurysmal wall rupture, suggesting complicated pseudoaneurysm. Due to the size and ruptured nature of the wall, coil embolization or UGTI was not suitable for this case. However, because there were no signs of infection, the management goal was simply to close the related arterial wall. Based on the duplex echo findings, we considered ultrasound-guided puncture of the pseudoaneurysm and passage of a guidewire through the wide aneurysmal neck (6.1 mm) to be feasible. Perclose Proglide<sup>TM</sup> was thus applied, and we adopted a low-invasiveness strategy involving percutaneous suture with a Perclose Proglide<sup>TM</sup> to successfully repair this case of complicated large pseudoaneurysm. No recurrence has yet been noted.

In the literature, only one report has described two cases of successful pseudoaneurysm repair with Perclose Proglide<sup>TM</sup>.<sup>4</sup> Although the previous report described the difficulties with this method, several tips would help overcome these problems. First, it is important to evaluate pseudoaneurysms and the neck using duplex echo to determine whether or not it is feasible to pass a guidewire through the aneurysmal neck. In addition, performing puncture near the previously punctured skin mark is essential. Second, angiography of the related lesion should be performed, and the aneurysmal neck should be visualized to facilitate guidewire passage. Third, to deploy the foot of the device at the appropriate position, confirmation by fluoroscopy guidance is vital, as bleeding from the indicator of the device indicates an inappropriate position.

## Conclusion

Management of a pseudoaneurysm with a Perclose Proglide<sup>TM</sup> should be the first choice when the pseudoaneurysm has a wide neck or complicated features, which is less invasive and costless.

## Conflict of interest

The authors declare no potential conflict of interest.

## Author Contributions:

Author Tetsuo Yamaguchi: assistant operator of the procedure and preparation of figures.

Author Hideomi Fujiwara: assistant operator of the procedure and preparation of figures.

Author Masanari Kuwabara: Brief summary of contribution.

## References

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## Figure legends

### Figure 1

Contrast computed tomography showed that right-sided retroperitoneal hematoma extending from the right femoral access site, suggesting pseudoaneurysm with extravasation (white arrow; (a) axial view and (b) 3D composition image).

### Figure 2

Duplex echo showed a pseudoaneurysm 40 mm in diameter, with an aneurysmal neck continuing from the femoral artery at 6.1 mm in diameter. White arrow shows blood flow from femoral artery to pseudoaneurysm.

### Figure 3

1. Femoral angiography showed the pseudoaneurysm near the previously punctured skin mark.
2. The foot of Perclose Proglide<sup>TM</sup> was deployed at the appropriate position under fluoroscopy guidance.
3. Angiography showed the successful aneurysmal closure.

## Video legends

### Video S1

Computed tomography revealing right-sided retroperitoneal hematoma extending from the right femoral access site, suggesting pseudoaneurysm with extravasation.

### Video S2

Duplex echo showed a pseudoaneurysm with an aneurysmal neck continuing from the femoral artery. Color doppler imaging shows blood flow from femoral artery to pseudoaneurysm.

### Video S3

A 0.035-inch guidewire was crossed to the right iliac artery through the aneurysmal neck.

### Video S4

The Perclose Proglide<sup>TM</sup> was tracked over the wire into the right femoral artery, and the foot was deployed at the appropriate position under fluoroscopy guidance.

### Video S5

Angiography showed the successful aneurysmal closure.

### Video S6

Digital subtraction angiography after the procedure showed complete repair of the pseudoaneurysm.

