

# Transcatheter Arterial Embolization of a Gluteal Pseudoaneurysm Due to Ground-Level Fall in an Elderly Woman Taking Apixaban

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## Abstract

A 90-year-old woman prescribed with apixaban was admitted to a hospital after a ground-level fall. She was transferred to our hospital for advanced evaluation and treatment. Contrast-enhanced computed tomography showed a pseudoaneurysm inside the right gluteus maximus muscle. Angiography revealed an aneurysm of the peripheral branch of the inferior gluteal artery and multiple slight pseudoaneurysms of the peripheral branch of the internal iliac artery. We performed transcatheter arterial embolization using a gelatin sponge. After embolization, the hemoglobin stabilized. She was transferred to another hospital for rehabilitation. The use of direct oral anticoagulants in the elderly can lead to significant hemorrhage with minimal trauma. Transcatheter arterial embolization is a minimally invasive and safe procedure for such cases of trauma.

**Key words:** Transcatheter arterial embolization, direct oral anticoagulants, pseudoaneurysm, geriatric trauma

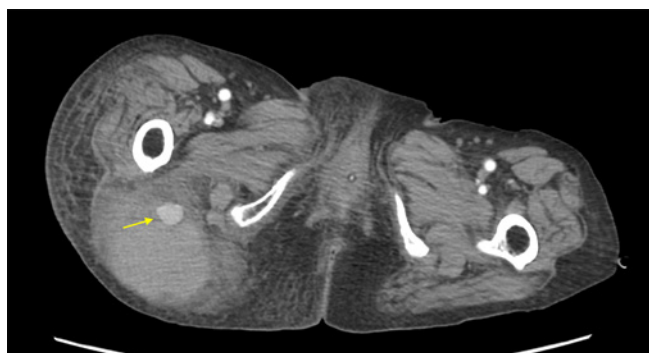
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## Introduction

Direct oral anticoagulants (DOACs) inhibit factor Xa, which converts prothrombin into thrombin, and have been widely used in the geriatric population for venous thromboembolism, stroke prevention, and treatment of atrial fibrillation, among other indications. DOACs are superior to warfarin in that routine coagulation monitoring is not required, and there are few drug interactions. In addition, DOACs are reported to be safer than warfarin with respect to hemorrhagic complications [1]. Therefore, they are used in many geriatric patients.

However, patients using DOACs can experience severe hemorrhage following trauma. It has been reported that elderly people are more likely to experience severe trauma [2]. One reason hemorrhage is more severe in the elderly may

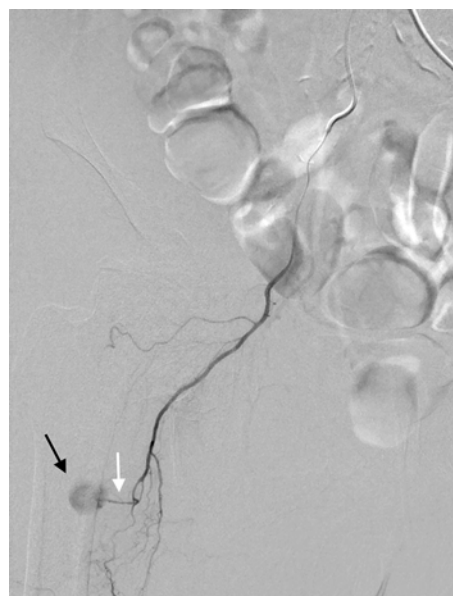
be that hemorrhage can expand into unexpected spaces, including within muscle and soft tissue, because the elderly have looser connective tissue than that in younger individuals. In addition, DOACs have the disadvantage that no reversal agents are available (except for dabigatran etexilate, which is reversed by idarucizumab) in contrast to other anticoagulants. In other words, elderly people who use DOACs could require rapid hemostasis because they are more likely to have severe hemorrhage even following minor trauma. At such times, transcatheter arterial embolization (TAE) could be the most effective procedure to control bleeding. We report a case of successful TAE of an intramuscular pseudoaneurysm due to a ground-level fall in an elderly woman using the DOAC, apixaban.



**Fig. 1.** Contrast-enhanced computed tomography (CT) showing a pseudoaneurysm within the right gluteus maximus muscle (arrow).



**Fig. 2.** Right internal iliac artery angiography showing a pseudoaneurysm of the peripheral branch of the inferior gluteal artery (black arrow) and multiple slight pseudoaneurysms of the peripheral branch of the internal iliac artery (white arrow).



**Fig. 3.** Angiography of the peripheral branch of the inferior gluteal artery showing a pseudoaneurysm (black arrow) and an injured peripheral branch. The white arrow indicates the injured peripheral branch that was the point where embolization using a gelatin sponge particle was performed.

vated partial thromboplastin time, 28.3 s; and fibrinogen, 234 mg/dL. Contrast-enhanced CT revealed a pseudoaneurysm (15 mm × 18 mm) inside the right gluteus maximus muscle (**Fig. 1**). We decided to perform TAE.

The access route was secured with an 18-gauge needle and a 5-Fr/11-cm sheath via the left femoral artery. We accessed the right internal iliac artery using a shepherd's hook catheter, and subsequent angiography showed a pseudoaneurysm of the peripheral branch of the inferior gluteal artery and multiple slight pseudoaneurysms of the peripheral branch of the internal iliac artery (**Fig. 2**). Using a microguidewire (Meister S14, Asahi Intecc, Seto, Japan) and a 1.7-Fr microcatheter (Progreatλ17, Terumo Clinical Supply, Kakamigahara, Japan), we identified the target artery. Angiography revealed the target pseudoaneurysm (**Fig. 3**). Because her coagulation status was normal, we performed superselective embolization of the peripheral artery using a 1-mm cut gelatin sponge (Serescue, Astellas Pharma, Tokyo, Japan). Furthermore, a gelatin sponge particle was injected carefully from the main duct of the internal iliac artery to embolize extravasations in the peripheral branches. After embolization, the pseudoaneurysm and extravasation disappeared on the final angiography obtained via the right internal iliac artery (**Fig. 4**). Left common iliac artery angiography to check collateral flow revealed no pseudoaneurysms/extravasation.

After TAE, Hb levels were no longer decreased. She resumed apixaban 2 days after TAE. Since her Hb level was stable afterwards, we concluded that there was no rebleeding. She was transferred to another hospital for rehabilitation 6 days after the procedure.

## Case Report

A 90-year-old woman, using apixaban (5 mg/day) for the prevention of stroke from atrial fibrillation, fell to the ground and was transferred to a hospital the next day. Magnetic resonance imaging showed no fractures, but a gluteal hematoma was present. Apixaban was stopped and she was treated conservatively, but her hemoglobin (Hb) level gradually decreased. Although she was administered red blood cells as needed, the anemia progressed. Contrast-enhanced computed tomography (CT) showed an expanding hematoma in the gluteal muscle. She was transferred to our hospital for more advanced evaluation and treatment, including surgery, on her fifth day of hospitalization. Her hemodynamic status was stable, and laboratory tests revealed the following: hemoglobin, 6.6 g/dL; platelets,  $20.6 \times 10^4/\mu\text{L}$ ; prothrombin time-international normalized ratio, 1.14; acti-



**Fig. 4.** Final angiography showing the pseudoaneurysms had disappeared.

## Discussion

There are various treatments to manage intramuscular hemorrhage: TAE, ultrasound-guided thrombin injection, and conservative therapy such as compression [3]. No studies have been conducted to determine which treatments are most beneficial. However, trauma patients taking DOACs often have coagulopathy and typically have multiple lesions. Even with an indication for ultrasound-guided thrombin injection, treatment is difficult because the target region is too wide. Compression may be insufficient to achieve hemostasis because of the coagulopathy due to DOAC treatment. In contrast, it has been reported that TAE is safe for soft tissue hematomas in non-traumatic cases [4]. TAE is currently the most reasonable treatment option.

To our knowledge, there are no reports of a patient with an intramuscular hematoma taking a DOAC treated using TAE. In a case similar to ours, it was reported that TAE was used in an elderly woman using antiplatelet agents (ticlopidine and aspirin) with severe subcutaneous hemorrhage due to minor trauma [5]. TAE was effective for intramuscular hematoma in a patient with coagulopathy due to liver cirrhosis, although it did not involve trauma [6].

The half-life of DOACs is about half a day, and the effect is completely lost in about 2 days. If the patient using a DOAC is hemodynamically unstable, unlike in our case, a more aggressive treatment may be needed. At this time, TAE has the advantages of being minimally invasive and safe despite the use of DOACs. In addition, TAE has hemostatic capability regardless of coagulation status when N-butyl-2-cyanoacrylate (NBCA) is used as an embolic agent because it produces an embolic effect through a polymerization reaction on contact with plasma anions, unlike gelatin or coils.

There is no standard treatment for traumatic intramuscular

hematoma in patients taking a DOAC. We consider the following strategies for the therapy of traumatic intramuscular hematoma to be reasonable based on previously reported data for non-traumatic intramuscular hematoma [7]: (1) emergency TAE and resuscitation for hemodynamically unstable patients with extravasation on contrast-enhanced CT; (2) TAE for hemodynamically stable patients with extravasation/pseudoaneurysm on contrast-enhanced CT; (3) discontinuing or tapering off the DOAC as much as possible together with transfusion as necessary (in addition to topical compression) for hemodynamically stable patients with slight or no pseudoaneurysm/extravasation on contrast-enhanced CT; and (4) consider using NBCA as an embolic agent when performing TAE, in cases where stopping the DOAC due to underlying disease is not indicated, regardless of the hemodynamic status.

As the population ages, the incidence of severe hemorrhage due to minor trauma in elderly people using DOACs will likely increase. Interventional radiology, including TAE, is one of the most effective and least invasive procedural approaches in these cases. Radiologists should carefully interpret the imaging of unexpected hemorrhages that can be treated in elderly patients who take DOACs.

**Conflict of interest:** The authors declare that they have no conflicts of interest.

## References

1. Feeney JM, Neulander M, DiFiori M, Kis L, Shapiro DS, Jayaraman V, et al. Direct oral anticoagulants compared with warfarin in patients with severe blunt trauma. *Injury* 2017; 48: 47-50.
2. Labib N, Nouh T, Winocour S, Deckelbaum D, Banici L, Fata P, et al. Severely injured geriatric population: morbidity, mortality, and risk factors. *J Trauma* 2011; 71: 1908-1914.
3. Yoo DH, Jae HJ, Kim HC, Chung JW, Park JH. Transcatheter arterial embolization of intramuscular active hemorrhage with N-butyl cyanoacrylate. *Cardiovasc Intervent Radiol* 2012; 35: 292-298.
4. Touma L, Cohen S, Cassinotto C, Reinhold C, Barkun A, Tran VT, et al. Transcatheter arterial embolization of spontaneous soft tissue hematomas: a systematic review. *Cardiovasc Intervent Radiol* 2019; 42: 335-343.
5. Hagiwara A, Matsuda T, Shimazaki S. Life-threatening subcutaneous hemorrhage following minor blunt trauma in an elderly patient taking ticlopidine and aspirin: a case report. *Emerg Radiol* 2005; 12: 47-49.
6. Yamashita S, Tanaka N, Nomura Y, Miyahara T, Furuya T. Iliopsoas muscle hematoma secondary to alcoholic liver cirrhosis. *Case Rep Gastroenterol* 2012; 6: 704-711.
7. Popov M, Sotiriadis C, Gay F, Jouannic AM, Lachenal Y, Hajdu SD, et al. Spontaneous intramuscular hematomas of the abdomen and pelvis: a new multilevel algorithm to direct transarterial embolization and patient management. *Cardiovasc Intervent Radiol* 2017; 40: 537-545.

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