Rare case of isolated true aneurysm in the superficial femoral artery treated with endovascular intervention: a case report

Seyong Chung 1, Ji-Yong Jang 2*, and Do-Kyun Kim 3

1Division of Cardiology, Department of Internal Medicine, Severance Cardiovascular Hospital, Yonsei University College of Medicine, Seoul, Republic of Korea; 2Division of Cardiology, Department of Internal Medicine, National Health Insurance Service Ilsan Hospital, 100 Ilsan-ro, Ilsandong-gu, 10444 Ilsan, Republic of Korea; and 3Department of Cardiovascular Surgery, National Health Insurance Service Ilsan Hospital, Ilsan, Republic of Korea

Received 10 September 2019; first decision 21 October 2019; accepted 19 December 2019; online publish-ahead-of-print 25 January 2020

Background
Isolated true aneurysms in the superficial femoral artery (SFA) have rarely been reported. Most cases are undiagnosed until rupture or the occurrence of complications.

Case summary
A 36-year-old woman presented with a palpable, pulsating mass on her right thigh which had increased in size over 2 months. She also had a swollen right leg and mild claudication (Stage II in Rutherford classification). For 2 months, the patient was treated by manual massage, acupuncture, and extracorporeal shock wave therapy in local clinics. Bed-side ultrasonography identified a 3.4-cm sized true aneurysm of the right SFA. There were no other aneurysms in arteries from head to toe. There was no evidence of atherosclerotic risk factors or connective tissue disease. The patient was successfully treated by a covered stent graft implantation without any complications.

Discussion
Isolated true aneurysm in the SFA is rare and tends to go undiagnosed especially in young women. Ultrasonography is an easy and useful diagnostic tool for differential diagnosis of thigh mass. In this case, endovascular treatment was safely applied for a true aneurysm without rupture.

Keywords
Case report • True aneurysm • Superficial femoral artery aneurysm • Ultrasonography • Endovascular treatment

Learning points
• For mass on thigh, ultrasonography is an easy to use and non-invasive diagnostic tool for differential diagnosis.
• True aneurysm of the femoral artery is rare and can occur in young patients without traditional risk factors and concomitant aneurysm of other arteries.
• Endovascular treatment for true aneurysm of the femoral artery is a safe and effective treatment especially in case of unruptured aneurysm.

Introduction
Aneurysms are rare in the femoral artery and rarer in the superficial femoral artery (SFA).1–3 Of the small number of reported cases, femoral artery aneurysms frequently occur concurrently with other aneurysms. They share similar risk factors with aortic aneurysms including older age, male sex, smoking, hypertension, diabetes mellitus, or hyperlipidaemia.4 Due to its anatomical location deep within the leg, the diagnosis of a SFA aneurysm may be delayed until complications occur.2,3,5 In the absence of aforementioned risk factors, diagnosis could be extremely delayed until severe complications such as rupture occur.

* Corresponding author. Tel: +82 31 900 0630, Email: dogkkoma@gmail.com
Handling Editor: Marco de Carlo
Peer-reviewers: Rania Hammami and Christoph Jensen
Compliance Editor: Carlos Minguito Carazo
Supplementary Material Editor: Peregrine Green
© The Author(s) 2020. Published by Oxford University Press on behalf of the European Society of Cardiology.
This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/4.0/), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com
Timeline

| Time     | Clinical presentation and treatments                                                                 |
|----------|---------------------------------------------------------------------------------------------------|
| 2 months before visit | First noticed mass on right leg; Misdiagnosis as a simple lump on thigh during 2 months          |
| 1 day before visit | Bed-side ultrasonography revealed 3.4 cm aneurysm on right superficial femoral artery (SFA)       |
| The day of visit | Angiography with computed tomography and magnetic resonance revealed no other aneurysm of arteries |
| True aneurysm of right SFA was treated with balloon-expandable covered stent (LIFESTREAM®, BARD Inc., NJ, USA) |
| 6 days after visit | Discharged without any complication                                                                |

Case presentation

A 36-year-old woman with no past medical history presented at the hospital with a mass on her right thigh that had increased in size over 2 months. The patient complained of discomfort and swelling of her right lower leg and mild claudication (Stage II in Rutherford classification), which were aggravated after exercise. Physical examination revealed a palpable, pulsating mass on her right thigh. The patient's vital signs were stable; blood pressure was 119/68 mmHg and heart rate was 79 b.p.m.

The patient had no history of trauma in her right leg. She started playing golf 3 months prior with over 2 h of hard training daily. She noticed the right leg was swollen and uncomfortable when wearing tight pants from 2 months before her visit. Due to no improvement of the symptoms, she visited the clinic of anaesthesiology and pain medicine. The doctor performed radiographical examination of her right leg but found no abnormality and, therefore, prescribed physical massage therapy twice a week. As there was no significant improvement in the symptoms, she visited an alternative medicine clinic and was treated with acupuncture and shock wave therapy of the right leg during misdiagnosis. The distal femoral artery could potentially be deformed by bending, twisting, and compressing upon itself with limb flexion and extension. Unnoticed minor trauma while playing golf and repeated external stress owing to acupuncture and shock wave therapy of the right leg during misdiagnosis could be the most plausible cause of this aneurysm. The distal femoral artery could potentially be deformed by bending, twisting, and compressing upon itself with limb flexion and extension.

As for the aetiology of her condition, the patient had no risk factors for SFA aneurysm. The patient was a never smoker and had no previous medical history of hypertension, diabetes mellitus, or hyperlipidaemia. The patient had no history of infection including syphilis or tuberculosis, with negative results for rapid plasma regain test or interferon gamma release assay. The antinuclear test was also negative.

Invasive peripheral angiography revealed a true aneurysm of SFA, and a covered stent graft (LIFESTREAM®, diameter 7 mm, length 58 mm, C.R. BARD, Inc., NJ, USA) was implanted, followed by adjunct balloononing with a 7-mm sized balloon (MUSTANG™, Boston Scientific, MA, USA) (Figure 3). The final angiography revealed good positioning of the stent graft with no endovascular leakage. The procedure ended without any complications, and the patient was discharged with a course of dual antiplatelet medication. After discharge, the patient is followed for >3 months without complications.

Discussion

Isolated true aneurysms in the SFA are a rare disease that is prone to misdiagnosis. Most of the previously reported cases occurred in elderly individuals and were ruptured and, therefore, surgically treated. A previous review article analysed 61 cases of SFA aneurysm; the average patient age was 75.7 years (range 59–95), 24 (39.3%) aneurysms were not ruptured, and in only 3 (4.9%) cases endovascular treatment was used. Our case was characterized by an unusual clinical course in that SFA aneurysm was diagnosed in a young patient in the absence of any risk factor, unruptured at diagnosis, and involved endovascular treatment. Particularly, the patient’s age, 36 years, is much lower than the previously reported lowest age of 58 years.

Atherosclerosis is the dominant aetiology of true aneurysm, but connective tissue disease, infection, or trauma could be alternate causes. One case of congenital aneurysm has also been reported in early childhood. After excluding other causes, we speculated that trauma is the most plausible cause of this aneurysm. The distal femoral artery could potentially be deformed by bending, twisting, and compressing upon itself with limb flexion and extension. Unnoticed minor trauma while playing golf and repeated external stress owing to acupuncture and shock wave therapy of the right leg during misdiagnosis could be the most likely causes of the aneurysm in this case. Misdiagnosis and inappropriate mechanical treatment may have worsened this condition.

Ultrasoanography with Doppler imaging is easy to use and is a non-invasive method for detecting SFA aneurysm. Hence, if a chronic
mass on the patient’s thigh is palpable, ultrasound should be considered as the first-choice method of diagnosis. Angiography of computed tomography is the gold standard method for diagnosing possible aneurysm, which provides anatomical information and helps to plan further treatment.

Despite the small number of cases and limited long-term follow-up evidence, endovascular treatment is strongly recommended in cases of SFA aneurysm.1–3,5 Surgery should still be the standard treatment especially in the case of complications. However, in patients without complicated aneurysm, endovascular interventions can avoid typical postsurgical stress symptoms. Additionally, anastomotic sutures used in surgery are avoided, which decreases the risk of restenosis and thrombosis.3 Our patient was also treated with endovascular treatment, and there were no early complications.

Among 10 cases of superficial femoral aneurysms with endovascular treatment, there was no consistency regarding the use of antiplatelet agents; it varied from no antiplatelet agent administration to lifelong use of dual antiplatelet agent.5 We initially used dual

---

**Figure 2** Arteriography of the entire body. (A) Cerebral arteries. (B) Carotid arteries with magnetic resonance imaging. (C) The aorta with computed tomography was normal. (D) Computed tomography angiography identified isolated true aneurysm of the right superficial femoral artery.

---

**Figure 3** Invasive peripheral angiography. (A) True aneurysm of right superficial femoral artery. (B) Final angiography showed successful endovascular intervention with covered stent.
antiplatelet agents and planned to use only one antiplatelet agent after 1 month, as suggested in the current guideline for peripheral artery diseases.8

Conclusions
Isolated true aneurysm of SFA may also occur in young women with no risk factors. Ultrasonography is recommended as a first-line diagnostic method in patients with leg mass followed by an accurate diagnosis of true aneurysm using angiography of computed tomography. The use of endovascular treatments for SFA aneurysm showed positive treatment outcome without complications.

Lead author biography
Seyong Chung is a chief resident in Division of Cardiology, Department of Internal Medicine, Severance Cardiovascular Hospital, Yonsei University College of Medicine, Seoul, Republic of Korea. He graduated from College of Medicine, Yonsei University, Seoul, Republic of Korea.

Supplementary material
Supplementary material is available at European Heart Journal - Case Reports online.

References
1. Piffaretti G, Mariscalco G, Tozzi M, Rivolta N, Annoni M, Castelli P. Twenty-year experience of femoral artery aneurysms. J Vasc Surg 2011;53:1230–1236.
2. Leon LR Jr, Taylor Z, Psalms SB, Mills JL Jr. Degenerative aneurysms of the superficial femoral artery. Eur J Vasc Endovasc Surg 2008;35:332–340.
3. Lyazidi Y, Abisegue Y, Chitaa H, Taberkant M. Endovascular treatment of 2 true degenerative aneurysms of superficial femoral arteries. Ann Vasc Surg 2016;30:307.e1–307.e5.
4. Lawrence PF, Harlander-Locke MP, Oderich GS, Humphries MD, Landry GJ, Ballard JL, Abularrage CJ. The current management of isolated degenerative femoral artery aneurysms is too aggressive for their natural history. J Vasc Surg 2014;59:343–349.
5. Mufty H, Daenens K, Houthoofd S, Foumeau I. Endovascular treatment of isolated degenerative superficial femoral artery aneurysm. Ann Vasc Surg 2018;49:311.e11–311.e14.
6. Matsubara M, Hiramatsu Y, Sugita S, Atsumi N, Terada M, Sakakibara Y. Congenital-idiopathic superficial femoral artery aneurysm in a 7-year-old child. J Vasc Surg 2011;53:1699–1701.
7. Desyatova A, MacTaggart J, Romarowski R, Poulson W, Conti M, Kamenskiy A. Effect of aging on mechanical stresses, deformations, and hemodynamics in human femoropopliteal artery due to limb flexion. Biomech Model Mechanobiol 2018;17:181–189.
8. Aboyans V, Ricco JB, Bartelink MEL, Bjorck M, Brodmann M, Cohnert T; Collet JP, Czerny M, De Carlo M, Debus S, Espinola-Klein C, Kahan T, Kownator S, Mazzoli L, Naylor AR, Raffi M, Röther J, Sprenger M, Tendar M, Tepe G, Venero M, Vlachopoulos C, Desormais I; ESC Scientific Document Group. 2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases, in collaboration with the European Society for Vascular Surgery (ESVS): Document covering atherosclerotic disease of extracranial carotid and vertebral, mesenteric, renal, upper and lower extremity arteries. Endorsed by: the European Stroke Organization (ESO)/The Task Force for the Diagnosis and Treatment of Peripheral Arterial Diseases of the European Society of Cardiology (ESC) and of the European Society for Vascular Surgery (ESVS). Eur Heart J 2018;39:763–816.

Slide sets: A fully edited slide set detailing this case and suitable for local presentation is available online as Supplementary data.

Consent: The author/s confirm that written consent for submission and publication of this case report including image(s) and associated text has been obtained from the patient in line with COPE guidance.

Conflict of interest: none declared.