

# Conservative treatment of giant popliteal aneurysm with edoxaban in an elderly man

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Although popliteal aneurysm is an uncommon condition, it is the most common peripheral artery aneurysm. Peripheral artery aneurysms may dilate or rupture, but can also result in embolism and thrombosis. The optimal management strategy for unoperated popliteal aneurysm and the prophylaxis of thromboembolism in high-risk patients remains to be determined. We present the case of an 81-year-old man with an unoperated popliteal aneurysm with a maximum diameter of 55 mm that was conservatively treated with direct oral anticoagulation and periodic surveillance. The patient also had Alzheimer's disease and other severe comorbidities. He refused surgery; therefore, we decided to treat him with 30 mg of edoxaban daily to reduce the risk of thrombosis and distal embolism. The patient was followed up with a medical examination and ultrasound monitoring every six months. After a 5-years of follow-up, the size of the aneurysm remained stable, and there were no episodes of thrombosis or limb embolism. No bleeding or adverse effects were reported. These results suggest that a conservative approach with direct oral anticoagulation and periodic surveillance might be an effective strategy for patients at high surgical risk, with limited life expectancy or who refuse operative repair. However, further research and evidence are needed to support direct oral anticoagulation for conservative popliteal aneurysm treatment.

## Keywords

Popliteal aneurysm; peripheral artery aneurysms; edoxaban; direct oral anticoagulants; conservative treatment

## 1. Introduction

Popliteal aneurysm (PA) is the most frequently occurring peripheral artery aneurysm. Male sex, older age, smoking, arterial hypertension, and cardiovascular disease are the main risk factors. PA is frequently associated with contralateral and abdominal aneurysms [1]. A growing number of PAs are being diagnosed in asymptomatic subjects, following ultrasound screening of patients with abdominal aortic aneurysms. The most prevalent clinical manifestations are claudication, symptoms of local compression, and distal embolization. Rupture is a rare but serious com-

plication. Silent embolization can result in chronic limb ischemia, and sudden occlusion or rupture of the aneurysm can cause acute ischemia. The surgical options for the treatment of PA include open repair and endovascular stent grafting. However, for asymptomatic PA in very elderly patients, the best treatment strategy is yet to be established [2], and elective surgery remains controversial. This group of patients would most likely benefit from optimal medical treatment (OMT) [3]. There is currently little evidence to support the use of direct oral anticoagulation; although, the use of warfarin may be appropriate in selected patients [4, 5, 6].

## 2. Case history

An 81-year-old male non-smoker with Alzheimer's disease, diabetes, arterial hypertension, and chronic renal failure was referred to us for a cardiovascular check-up. An episode of pulmonary embolism had occurred 10 months earlier. The physical examination revealed a pulsating mass in the right popliteal fossa. *Doppler ultrasonography* showed a large dilatation of the right popliteal artery with a maximum diameter of 55 mm and preserved leg blood flow (Fig. 1). The patient had no medical history of trauma, claudication, or previous treatment for arterial disease. There were no clinical signs of limb ischemia. According to the 2005 American College of Cardiology/American Heart Association guidelines [7], operative repair with an open or endovascular procedure was indicated. This would reduce the risk of thromboembolic complications and limb loss. However, after discussing the need for surgical treatment and the potential risks with the patient and his family caregiver, they refused any intervention. Because of the diameter of the aneurysm, the very high risk of thromboembolism, and the patient's limited life expectancy, we proposed conservative treatment. We prescribed edoxaban, a direct oral anticoagulant (DOAC), 30 mg daily. The dosage was adjusted based on the comorbidities and his renal function (*CrCl* according to CKEPI formula: 43 ml/min/1.73 m<sup>2</sup>).

The patient was followed up with a medical examination and ultrasound monitoring every six months. After a 5-years of follow-up, the size of the aneurysm remained stable, and there were no episodes of thrombosis or limb embolism. No bleeding or adverse effects were reported.

Informed consent was obtained from the patient's family caregiver for publication of the case report and accompanying images.

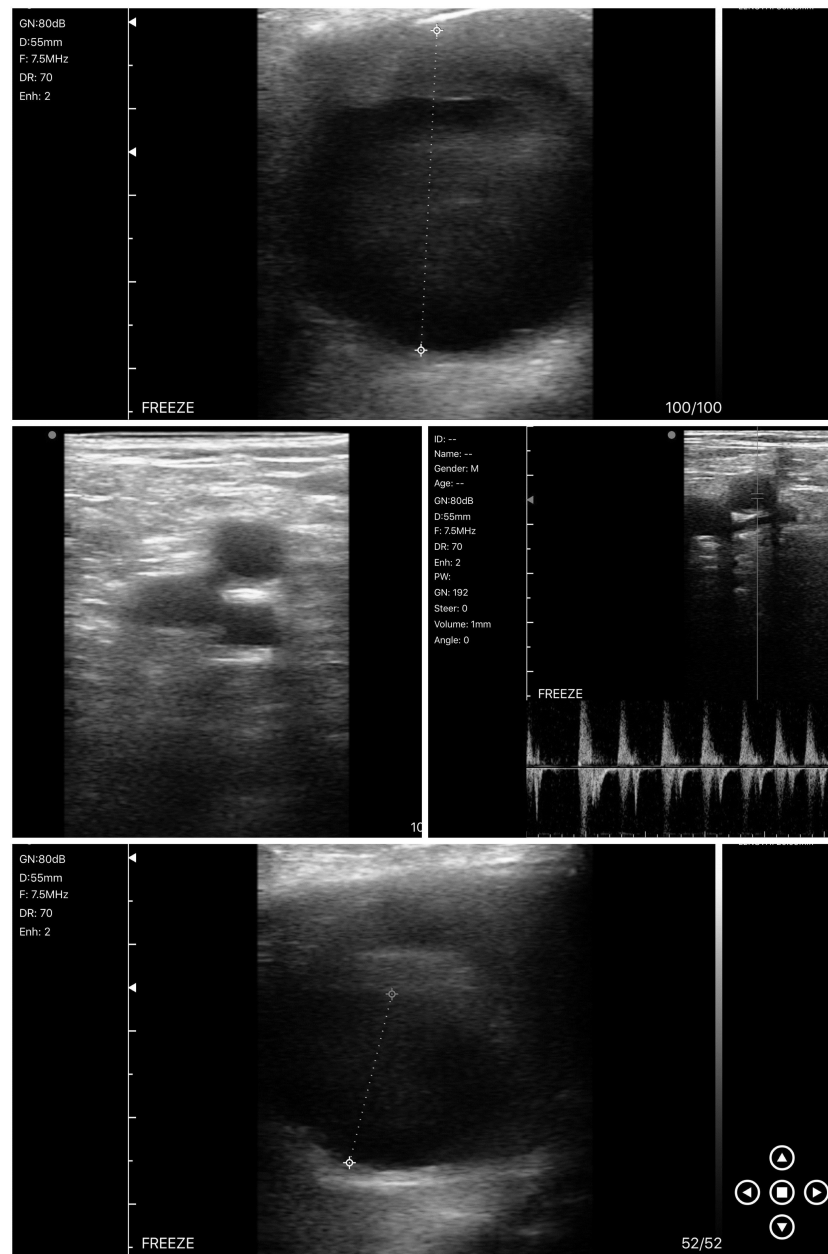


Figure 1. Doppler ultrasonography view of the lower limbs. Panel A and D shows the large dilation of the right popliteal artery with calcified plaque in trans-coronal view. The maximum diameter was 55 mm. Panel B shows the longitudinal view while Panel C shows the doppler artery flow.

### 3. Discussion

PAs occur almost exclusively in older men with severe comorbidities and a limited life expectancy. Approximately half are bilateral [8], and the most frequent clinical presentations are rest pain, claudication, thromboembolism, and rarely, rupture. Nerve compression syndromes can occur when a large aneurysm compresses and irritates nearby nerves, such as the medial popliteal, distal sciatic, or common peroneal nerves [9]. Repair is recommended for patients with popliteal aneurysms 2 cm or over in diameter, but the best treatment option for PA has yet to be established. In older people at high-risk for open repair, endovascular stenting may be a reasonable option. However, this patient and

his caregiver refused any form of surgery due to his advanced age, the severity of his dementia, clinical comorbidities, and his limited life expectancy. Moreover, the surgical treatment of PAs has a high risk of unfavorable outcomes. Death and limb loss have been reported, and about 1% of patients remain symptomatic [10]. It is generally accepted that a size larger than 2 cm, the presence of intraluminal thrombus, and low distal flow are the highest risk factors for the development of complications without surgery.

An intraluminal thrombus may be a possible source of microemboli, which progressively compromises distal blood flow, but there is not sufficient evidence to prove that it is effective. In a study by Galland et al., the combination of a diameter larger than

3 cm with greater than 45° distortion was associated with positive and negative predictive values for thrombosis of 83% and 94%, respectively [10]. In the absence of limb-threatening ischemia, the diameter criterion is the main indication for elective treatment, but other important conditions to be considered are the clinical status, severity of symptoms, and availability of surgical or endovascular facilities [3].

The optimal management strategy for unoperated PA and of thromboembolism prophylaxis in high-risk patients remains unsettled. We decided to treat our patient with 30 mg of edoxaban daily, to reduce the risk of thrombosis and distal embolism.

Edoxaban inhibits the intrinsic factor Xa (FXa), a protease that enzymatically cleaves prothrombin to form activated thrombin [11]. A recent study has shown that FXa can inhibit the expression of proteins associated with the pathogenesis of aortic artery aneurysm, such as proteins linked to oxidative stress, and exhibits anti-inflammatory properties and has direct radical scavenging activity. These findings indicate a probable role for FXa in the pathogenesis of aneurysms. Perhaps, a better understanding of the role of FXa in aneurysms in the future may create new opportunities and possibilities for the use of direct FXa inhibitors [12].

#### 4. Conclusion

The natural evolution of peripheral artery aneurysms may include dilation, rupture, embolism, or thrombosis. The optimal management of unoperated PA remains unsettled. A conservative approach with DOACs and non-invasive periodic surveillance might be a possible strategy for the management of patients at high surgical risk, limited life expectancy, or who refuse operative repair. More research and evidence are needed to support DOAC prescription for unoperated PA.

#### Ethics approval and consent to participate

The subject gave his informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of ASP 6 (approval number: 03-2017).

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#### Conflict of interest

The Authors have no conflict of interest to declare.

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