Unexpected Contralateral Femoral Artery Atheromatous Plaque Embolism After TAVI

TAVI Sonrası Beklenmedik Kontrlateral Femoral Arter Aterom Plak Embolisi

Femoral Artery Embolism After TAVI

Barış Akça[1], Nevzat Erdil1, Şıho Hidayet[2], Mehmet Cengiz Çolak[1], Bektaş Battaloğlu[1]
[1]Department of Cardiovascular Surgery, Inonu University School of Medicine,
[2]Department of Cardiology, Inonu University School of Medicine, Malatya, Turkey

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Öz

Transfemoral transkateter aort kapak implantasyonu ile ilişkilendirilen vasküler komplikasyonlar sıklıkla arteriyel kılıf yerleştirilmesinin istenmeyen sonuçlarıdır. Bu olguda Sağ femoral arter cerrahi kanülasyonu yapılmasını takiben gelişen sol ana femoral arter aterom plak embolisi sunulmaktadır. Transfemoral erişim yolu kullanılıyorsa, bilateral alt ekstremite nabızları yakından izlenmeli ve akut iskemi durumunda, acil operasyon gerekliliği unutulmamalıdır.

Anahtar Kelimeler

Aort Kapak Stenozu; Transkateter Aort Kapak Replasmanı; Ateroembolism; Embolektomi

Abstract

Vascular complications associated with transfemoral transcatheter aortic valve implantation are frequent and unfortunate consequences of arterial sheath insertion. The current report presents a case of atheromatous plaque embolization to the left common femoral artery when the right femoral artery is cannulated by surgical cutdown following transcatheter aortic valve implantation. If the transfemoral access route is used, bilateral lower extremity pulses should be monitored closely and, in the case of an acute ischemia, the necessity of emergency operation should be noted.

Keywords

Aortic Valve Stenosis; Transcatheter Aortic Valve Replacement; Ateroembolism; Embolectomy

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Corresponding Author: Barış Akça, Department of Cardiovascular Surgery, Inonu University School of Medicine, Malatya, Turkey.
T.: +90 4223410660/3903 F.: +90 4223410036 E-Mail: dr.baris.akca@yandex.com.tr

Introduction

Aortic stenosis (AS), the most common form of adult valvular heart disease, has become more prevalent in the aging population [1]. Transcatheter aortic valve implantation (TAVI) is an effective and reliable treatment method in patients with severe AS, who exhibit high surgical risk and are ineligible for surgical intervention. Despite being a less invasive method, this procedure can lead to various complications [2,3]. The current report presents a case of atheroma plaque embolization to the left common femoral artery, while the right femoral artery is cannulated by surgical cutdown.

Case Report

An 87-year-old woman with chest pain and NYHA (New York Heart Association) functional dyspnea class III-IV was referred to our institution with severe AS. Transthoracic echocardiography revealed a calcified and immobilized aortic valve. The mean aortic pressure gradient was 47 mmHg. The calculated aortic valve area was 0.70 cm^2 according to the continuity equation. The aortic annulus diameter was 23 mm, as measured by transesophageal echocardiography. There was no critical stenosis of the coronary arteries, and peripheral angiography revealed a femoral artery diameter of 6 mm (Figure 1A-B). She had a history of chronic obstructive lung disease and chronic renal failure (creatinine clearance: 32 ml/min). The patient's logistic Euroscore and Society of Thoracic Surgeons scores were calculated as 27% and 8.5%, respectively. The heart team (HT), which included cardiovascular surgeons, clinical and interventional cardiologists, as well as anesthesiologists, decided to proceed with TAVI using 26 mm CoreValve (Medtronic) by the transfemoral access route.

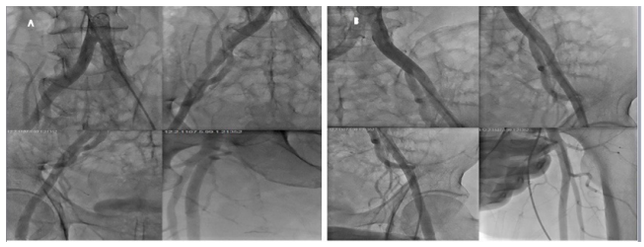

Figure 1. Pre-procedural angiographic images of aortoiliac bifurcation and the right iliofemoral arteries(A). Pre-procedural angiographic study of the left iliofemoral arteries(B).

Initially, unfractionated heparin (UFH) was administered perioperatively at a dose of 6000 IU (100 IU/kg) for anticoagulation. The antiplatelet regimen consisted of 100 mg acetylsalicylic acid and 75 mg clopidogrel administered before and after the procedure. After the induction of general anesthesia, the right common femoral artery (CFA) was cannulated by surgical cutdown. An 18 F introducer sheath was inserted through the right CFA. A 6F pigtail catheter was inserted for aortography through a 6F sheath to the left CFA and positioned at the aortic root during the procedure. A temporary pacemaker was placed in the right ventricle via the left femoral vein. A 0.035-inch Amplatz Super Stiff wire was inserted into the left ventricle through the 18 F sheath. Balloon dilatation of the stenotic aortic valve was performed with a balloon, under rapid pacing, using a temporary pacemaker. Then, a 26-mm CoreValve was deployed in the aortic annulus under angiographic guidance. Immediate post-procedural aortogram revealed the CoreValve to be in a good position. At the end of the process, the right CFA was surgically repaired.

After the procedure, the patient was taken to the intensive care unit, with continuous intravenous heparin therapy. During follow-up in the intensive care unit, the patient's left leg showed ischemic signs and became cold. The left femoral artery sheath was removed immediately. Distal extremity pulses were not palpable. Emergency Doppler ultrasonography revealed an occluded left common femoral artery.

The patient was immediately taken to the operating room. Under local anesthesia, the left common femoral artery was explored by transverse arteriotomy, first with a scalpel blade, then enlarged with Potts scissors. After performing embolectomy with 4F Fogarty catheter, arteriotomy was closed with 6-0 polypropylene suture. There was no thrombus in the femoral artery, but massive atherosclerotic plaque was removed from the femoral artery (Figure 2). After the operation, the distal pulses were palpable. The postoperative course was uneventful and the patient was discharged after four days with dual antiplatelet therapy.

Figure 2. The image of massive atherosclerotic plaque removed from the contralateral femoral artery.

Discussion

TAVI is a less invasive complex procedure in high-risk patients, but several complications can occur during or after the procedure. Consequently, transapical, trans-subclavian, transfemoral, and direct aortic access routes have been proposed for TAVI [4]. Among these, the transfemoral access route represents the most widely used and least invasive approach, but is also associated more frequently with vascular complications [5].

Vascular complications have been associated with significantly increased morbidity, mortality, and prolonged hospital stays [6]. The incidence of major vascular complications ranges between 5.6% and 17.3% [7]. The rate of contralateral femoral artery atheromatous plaque embolism is 1.1% (1 of 87 patients), in our experience.

The patients' pre-procedural evaluation must be performed cautiously to avoid major vascular complications. Pre-procedural angiography and/or CT can be useful to predict and avoid possible vascular complications during transfemoral TAVI. Careful patient screening and selection is essential, but complications can never be completely eliminated. It is important to be prepared for all mishaps that may occur, such as those related to large occlusion balloons, covered stents, surgical instruments, and bleeding. Most importantly, the surgeon should not hesitate to use non-iliofemoral access if the iliofemoral vessels are inadequate [4].

To determine the feasibility of an arterial approach, we used angiography to assess the presence and severity of iliofemoral disease with a femoral artery diameter of 6 mm. CoreValve's newer low-profile system with 18 F sheath (outer diameter: approximately 7 mm) was used in our approach and was deployed successfully with an uneventful procedure period.

Ideally, the minimal lumen diameter should exceed the diameter of the delivery system. However, in the absence of extensive calcification, bulky atheroma, or severe tortuosity, short segments of a relatively compliant artery 1 to 2 mm smaller in diameter than the intended sheath can often be safely cannulated [2].

In our case, the lumen diameter was 1 mm smaller than the sheath diameter and the intervention was successfully completed without any difficulty, but an atheromatous plaque embolization occurred despite the absence of difficulty during the sheath insertion. We believe that when the right common femoral artery was cannulated with a large-bore catheter, the atheromatous plaque was peeled off by the catheter and deposited at the iliac bifurcation. The embolization occurred during removal of the catheter from the iliac bifurcation to the left common femoral artery.

During the placement of a transcatheter aortic valve, iliofemoral artery intimal injury and peeling or rupture complications can occur [8].

Vascular access route complications during TAVI are a life-threatening problem that can only be treated successfully if immediately recognized and managed effectively. Because of the relatively large (18 F) sheath required, vascular complications may occur during and after CoreValve placement.

These complications are usually expected from the large arterial access routes used for sheath insertion.. Our case was unique, an atheromatous plaque embolization to the contralateral femoral artery, in which a sheath had not been inserted. To the best of our knowledge, this is the first case report of embolization of an atheromatous plaque of the contralateral CFA due to cannulation of the right CFA with an 18 F sheath during a TAVI procedure.

In cases of a relatively small-diameter femoral artery and difficult sheath insertion, other access routes should be considered. Also, pre-procedural angiography and/or CT can be useful to predict and avoid possible vascular complications during transfemoral TAVI. The surgeon must follow a meticulous and attentive technique in order to avoid vasospasm during the procedure. When the transfemoral access route is used, extremity pulses, ischemia signs, and hemodynamic monitoring should be followed closely, and the possibility of the development of bilateral acute lower extremity ischemia must always be kept in mind. In the case of an acute ischemia, the necessity for an emergency operation should be noted.

Competing interests

The authors declare that they have no competing interests.

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