

Managing Iliac Rupture After TAVI

A case study demonstrating how to overcome a serious complication after transcatheter aortic valve implantation.

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Since the first transcatheter aortic valve implantation (TAVI) in 2002, more than 20,000 procedures have been successfully performed. Knowledge of potential periprocedural complications is mandatory, as they most often require immediate action.

CASE STUDY

An 82-year-old woman was referred to our clinic for further evaluation of suitability for TAVI after a symptomatic, high-grade aortic stenosis had recently been detected. Clinically, she suffered from severe dyspnea on exertion. Furthermore, she had concomitant pulmonary hypertension, arterial hypertension, and peripheral arterial disease. Her logistic EuroSCORE was 29%. Transthoracic echocardiography revealed concentric left ventricular (LV) hypertrophy and good LV systolic function, with an estimated ejection fraction of 65%. High-grade calcified stenosis of the aortic valve was also verified. Her peak gradient was measured at 174 mm Hg, and her mean gradient was 100 mm Hg. The aortic valve area was calculated to be 0.45 cm². Transesophageal echocardiography ruled out intracardiac thrombi or obstruction of the LV outflow tract. The aortic annulus measured 21.2 X 24 mm in the short-axis view and 19.9 mm in the long-axis view.

Percutaneous access was achieved via the left and right femoral arteries and the left femoral vein. After successful crossing of the aortic stenosis, the aortic valve was dilated with a 20-mm balloon under rapid ventricular pacing. The sheath and valve delivery system (NovaFlex, Edwards Lifesciences, Irvine, CA) were inserted without difficulty. Subsequently, a 23-mm Sapien XT valve (Edwards Lifesciences) was implanted in an adequate position without any immediate complications (Figure 1). Aortography and intracardiac echocardiography revealed mild paravalvular aortic insufficiency after valve implan-

tation. Yet, only minutes after removing the sheath positioned in the right groin and achieving hemostasis with the Perclose system (Abbott Vascular, Santa Clara, CA), the patient experienced a sudden and severe drop in systemic blood pressure and immediately required cardiopulmonary resuscitation and intubation.

DECISION POINT 1

Which concurrent complications may lead to an instantaneous severe drop of blood pressure after TAVI?

Commonly, only a limited number of entities will instantaneously lead to a significant drop of systemic blood pressure, all of which must be looked for and identified immediately: (1) systolic pump failure; (2) valve deployment in the reverse direction; (3) pericardial tamponade; (4) arrhythmia; (5) rupture/dissection of an arterial access vessel; (6) failed arteriotomy closure after using



Figure 1. Transcatheter implantation of a 23-mm Sapien XT valve via the right femoral artery (A). Aortography after implantation reveals adequate filling of the aortic root, ascending aorta, and ostial left and right coronary arteries (B). The implanted valve prosthesis measures 21.3 mm in diameter in fluoroscopy (C).

a closure device; or (7) severe aortic valve insufficiency into a hypertrophic left ventricle.

In this patient, intracardiac echocardiography showed normal LV function, an unaltered position of the valve prosthesis, adequate valve leaflet mobility, and no signs of pericardial tamponade. Because a perforation or dissection of one of the arterial accesses could be assumed at this point, we initially placed a 30-mm sizing balloon into the aorta to block further blood loss and stabilize hemodynamics before performing further angiographic diagnostics (Figure 2).

We then performed angiography of the iliac arteries via the left femoral artery because the sheath had already been removed from the right groin. Angiography revealed modest vascular leakage corresponding to the proximal right common iliac artery. Most likely, the reason why only sparse contrast leakage could be detected at that time was that the inflated aortic balloon was already in position. In our experience, when using a transfemoral approach, the proximal common iliac artery and the external iliac artery are more frequently exposed to the risk of arterial rupture or dissection than other vessel segments. Performing angiography at the time of sheath removal may help to detect this complication at an early stage.

DECISION POINT 2

Which immediate therapies should be considered when a ruptured proximal common iliac artery has been detected?

In this context, the catheterization laboratory should always be equipped with covered stents of different sizes to enable immediate endovascular rescue. Accordingly, trained personnel should be on-site during TAVI to perform the respective rescue procedure, if required. In our patient, an emergency endovascular approach was chosen. For this procedure, the right groin was repunctured, the perceived area of perforation was crossed, and a 10-mm X 8-cm covered Atrium stent (Atrium Medical Corporation, Hudson, NH) was deployed at the proximal common iliac artery. Afterward, no further leakage of contrast could be detected on angiography, and the patient's systemic blood pressure concomitantly normalized.

The final aortic pressure was 140/60 mm Hg, and the left ventricular pressure was 145/20 mm Hg after valve implantation. The patient showed no further hemodynamic complications throughout the postprocedural hospital stay. She received a permanent pacemaker due to a new-onset left bundle branch block, which occurred in the early postprocedural phase. The patient was discharged 16 days after the initial TAVI procedure. Follow-

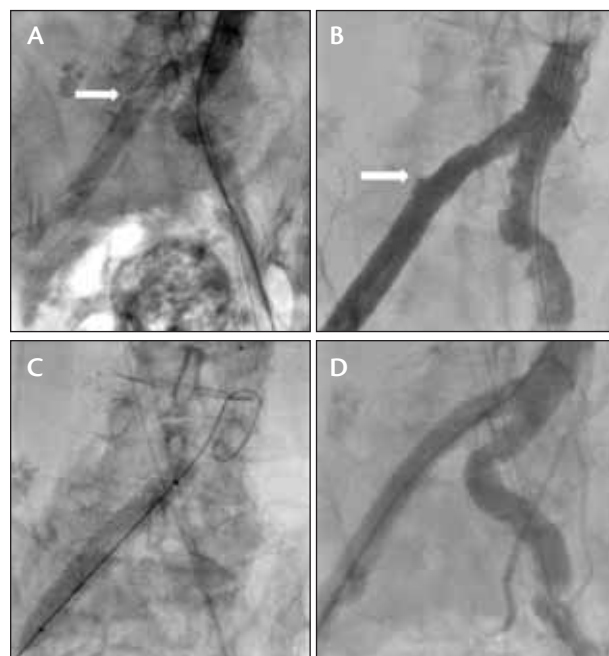


Figure 2. Angiography revealed rupture of the proximal right common iliac artery. At that time, a 30-mm sizing balloon had just been inflated into the aorta to block further blood loss. The white arrow indicates the suspected primary area of vessel leakage (A). A second angiogram obtained shortly afterward shows further reduction of leakage via the culprit vessel. The white arrow indicates the “notch” at the alleged area of vessel rupture (B). Balloon dilation of a 10-mm covered Atrium stent at the proximal common iliac artery (C). Final result of transcatheter implantation of a covered stent at the site of access vessel rupture (D).

up duplex examinations at 3 and 6 months revealed an asymptomatic < 50% stenosis of the right common iliac artery. Additionally, correct position and function of the aortic valve prosthesis were verified by echocardiography. Urgent surgery with arterial repair alone or with placement of a stent graft is a viable option that should be considered when transcatheter therapies have failed. Yet, in most cases of severe vessel rupture, surgery often constitutes an incalculable delay, and in cases of nonsevere vascular complications, surgery is most likely not necessary.

CONCLUSION

In cases of sudden hemodynamic instability immediately after TAVI, prompt identification of the underlying cause is mandatory. Commonly, only a limited number of entities come into question, and as all of them are fatal complications, they must be ruled out quickly. As in our

patient, if a ruptured arterial access vessel is the suspected cause of instantaneous severe drop of blood pressure, a large occlusion balloon should be on hand to occlude the aorta and facilitate initial circulatory stabilization. Furthermore, a covered stent should be implanted at the site of arterial rupture. As demonstrated in this case, most periprocedural complications of TAVI can be handled on-site given trained personnel and the availability of required tools for the respective bailout techniques, and routine angiography of the access vessel at the time of sheath removal should be performed. ■

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