

doi: 10.3897/bgcardio.30.e114526

ЗАГУБА И ПЕРКУТАННО ВЪЗСТАНОВЯВАНЕ И ЗАТВАРЯНЕ НА ФЕМОРАЛЕН ДОСТЪП ПО ВРЕМЕ НА ТРАНСКАТЕТЕРНА ИМПЛАНТАЦИЯ НА АОРТНАТА КЛАПА – КЛИНИЧЕН СЛУЧАЙ

П. Илиев¹, Д. Хазърбасанов¹, Ем. Азис¹, Д. Фърънджъ¹, П. Павлов²

¹Клиника по кардиология, МБАЛ Лозенец – София

²Клиника по кардиология, МБАЛ Сърце и мозък – Плевен

LOSS AND RECOVERY OF PERCUTANEOUS FEMORAL ACCESS DURING TRANSCATHETER AORTIC VALVE REPLACEMENT. A CASE REPORT

P. Iliev¹, D. Hazarbasanov¹, Em. Azis¹, D. Farandzha¹, P. Pavlov²

¹Cardiology Department, Lozenetz University Hospital – Sofia

²Cardiology Department, Heart and Brain Multidisciplinary Hospital – Pleven

Резюме.

Устройствата за затваряне на съдови достъпи с голям размер (VCDs) се използват за постигане на незабавна хемостаза след перкутанни трансфеморални процедури с големи устройства. Такова устройство или комбинация от устройства осигуряват ранна амбулация на пациента и възстановяване, и избягват хирургични компликации, но носят риска от типични компликации, свързани с достъпа, които се наблюдават при перкутанни интервенции. В случай на транскатетерна смяна на аортната клапа (TAVR), компликациите от васкуларния достъп остават сред най-честите. Устройството за затваряне на съдовите достъпи MANTA широко се използва за затваряне на достъпа след TAVR, осигурявайки затваряне за устройства до 20F или 25F OD във вариант 18F. Представяме случай на загуба и възстановяване на перкутанен достъп през феморалната артерия по време на TAVR. Необходимият водач за поставяне на MANTA беше премахнат погрешно, но след това бе възстановен, което позволи успешно затваряне с MANTA впоследствие. Постпроцедурната ангиография и ехографско изследване показаха успешно затваряне на съда без усложнения.

Ключови думи:

транскатетерна имплантация на аортна клапа, аортна стеноза, съдови усложнения, MANTA

Адрес

Д-р Петър Илианов Илиев, Клиника по кардиология, МБАЛ Лозенец, 1407 София, ул. Козяк 1, тел: 0898939214, e-mail: petarilieff@gmail.com

за кореспонденция:

Abstract.

Large bore access vascular closure devices (VCDs) are used to achieve immediate haemostasis after large device percutaneous procedures through the common femoral artery. Such a device or a combination of devices provide early patient ambulation and recovery and avoid surgical complications, however they carry the risk of typical access-related complications seen with percutaneous interventions. In the case of transcatheter aortic valve replacement (TAVR) vascular access complications remain the some of the most common. The MANTA vascular closure device is widely used for access management after TAVR, providing closure for up to 20F or 25F OD devices in the 18F variant. We present a case of loss and restoration of percutaneous femoral arterial access during a TAVR procedure. The necessary guidewire for MANTA deployment was removed mistakenly but was subsequently recovered which enabled successful MANTA deployment afterwards. Postprocedural angiography and ultrasound all revealed successful vessel closure with no access-related complications.

Key words:

transcatheter aortic valve implantation, aortic stenosis, vascular complications, MANTA

Address

Petar Iliyanov Iliev MD, Cardiology Department, Lozenetz University Hospital, BG – 1407 Sofia, phone: 0898939214,

for correspondence:

e-mail: petarilieff@gmail.com

INTRODUCTION

Large bore access vascular closure devices (VCDs) are used to achieve immediate hemostasis after large device percutaneous procedures through the common femoral artery. Such a device or a combination of devices provide early patient ambulation and recovery and avoid surgical complications, however they carry the risk of typical access-related complications seen with percutaneous interventions. In the case of transcatheter aortic valve replacement (TAVR) vascular access complications remain the some of the most common. The MANTA vascular closure device is widely used for access management after TAVR, providing closure for up to 20F or 25F OD devices in the 18F variant. We present a case of loss and restoration of percutaneous femoral arterial access during a TAVR procedure. The necessary guidewire for MANTA deployment was removed mistakenly but was subsequently recovered which enabled successful MANTA deployment afterwards. Postprocedural angiography and ultrasound all revealed successful vessel closure with no access-related complications.

CASE REPORT

An 81-year-old man was admitted to our hospital with symptoms of fatigue during minimal physical activity, dyspnea at rest, as well as chest pain at rest. At admission the patient had 91% oxygen saturation on pulse oximetry, 115/70 mm Hg blood pressure, and large right-sided pleural effusion. The patient had a his-

tory of stable ischemic heart disease with previous PCI of LAD and RCA. Two months before admission the patient had COVID-19. His echocardiography revealed low-flow low-gradient severe aortic stenosis with an AVA of 0.8-0.9 cm² with moderate valvular calcification, ejection fraction of 40%, estimated pulmonary systolic pressure of 50 mm Hg. The patient had chronic kidney disease with an eGFR of 64 ml/min/1.73 m².

Our structural cardiac interventions team planned the patient for coronary angiography with minimal contrast use, and CT scan for access and TAVR device selection and evaluation. We chose

Myval (provided by Meril Life Sciences) balloon-expandable valve size 24.5 with 6.8% oversizing by area. The right common femoral artery was chosen for main access because it had sufficient size with no calcification, no tortuosity and no intersecting branches (Fig. 1). A right jugular venous access was used for the temporary pacemaker lead, and 6F left radial access for a pigtail catheter. We proceeded with an initial 6 F sheath placement in the right common femoral artery, then we placed an Amplatz Extra-Stiff 0.035 curved guidewire (COOK Medical) in the descending aorta. We used the stiff guidewire to do depth measurement as per IFU of MANTA (Teleflex) which is the closure device of choice at our institution. Then we placed the expandable 14 F Python sheath (Meril Life Sciences). Afterwards we performed valve crossing with an Amplatz left catheter and straight 0.035 wire. We used a SAFARI small guidewire to deliver the valve. Without predilatation the 24.5 Myval valve was successfully implanted. Then we repositioned the transradial pigtail catheter in the de-

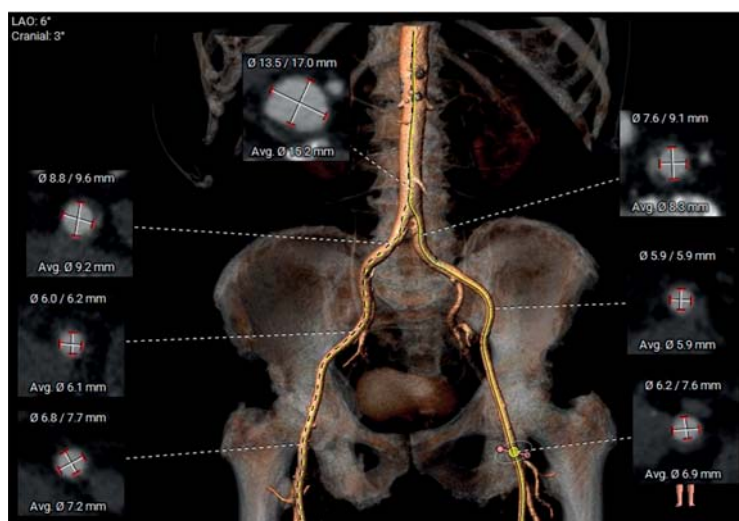


Fig. 1. Three-dimensional rendering of CT angiography of aortoiliac segments. The right common femoral artery was deemed suitable for percutaneous closure device use

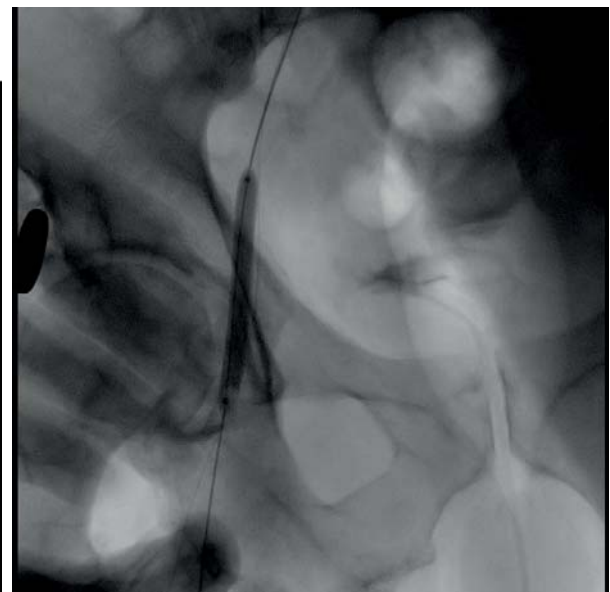


Fig. 2. Inflated 6 x 40 x 150 Admiral Xtreme balloon catheter for partial arterial occlusion and wiring of parallel 0.014-inch guidewire

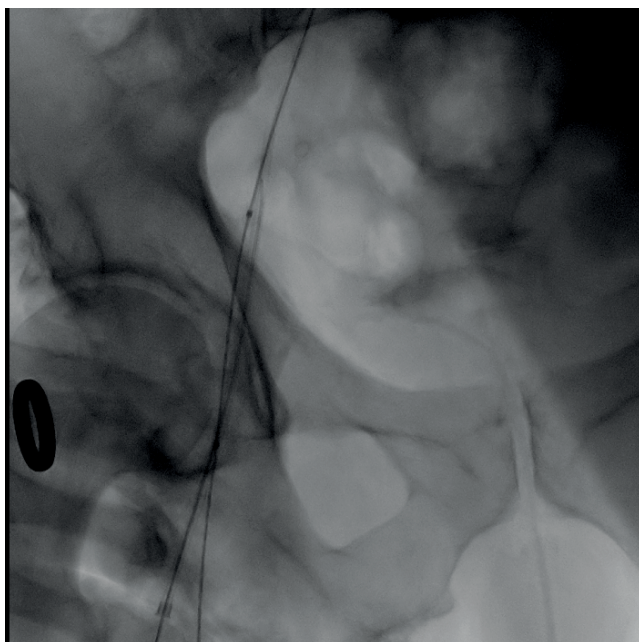


Fig. 3a. Placement of 5 Fr sheath parallel to deflated Admiral Xtreme balloon catheter and wiring it with a stiff 0.035-inch guidewire

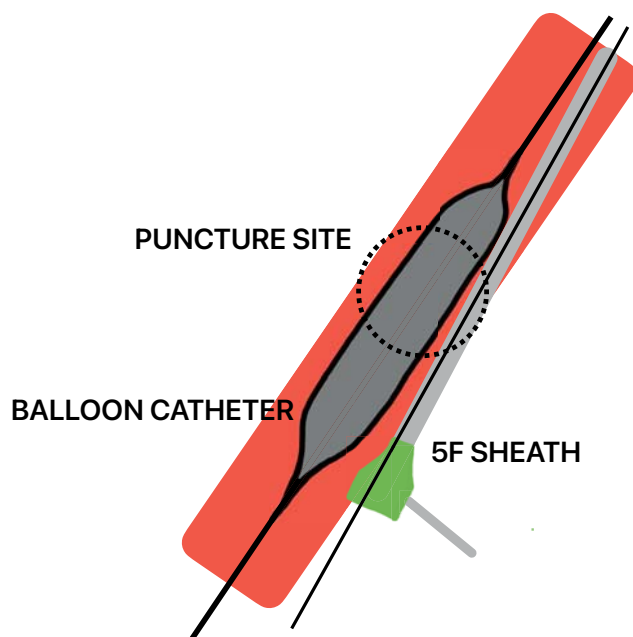


Fig. 3b. Graphical representation of the parallel placement of the balloon catheter and the 5 French sheath through the common femoral artery

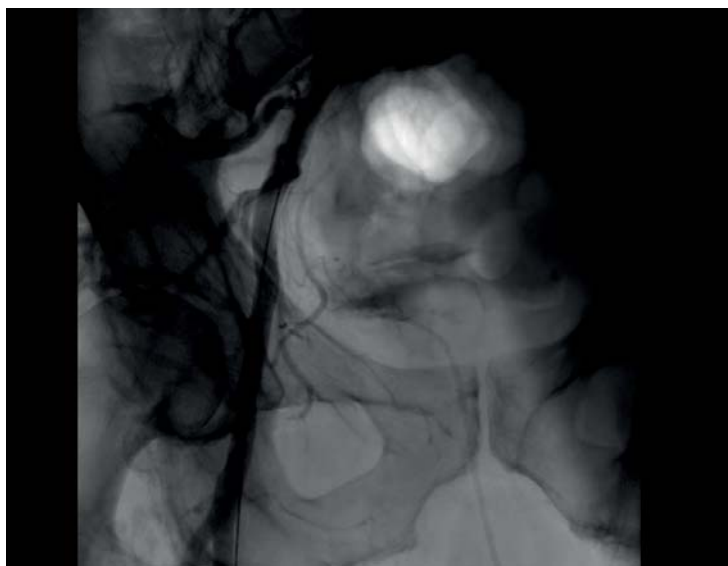


Fig. 4. Angiography after MANTA closure device deployment showing no extravasation or vessel occlusion

scending aorta and prepared for sheath removal and vessel closure. The Python sheath was removed however in tandem with the exchanged Amplatz Extra-Stiff wire thus leaving the access site open. Manual pressure was initiated immediately and a 6.0 x 40 x 150 cm Admiral Xtreme balloon catheter (Medtronic) was placed using the 6 F left radial access (Fig. 2). A blunt coronary introducer needle was used to pass a 0.014-inch Runthrough guidewire (Terumo) parallel to the inflated balloon. Then a 5 Fr 10 cm sheath slid along the 0.014 wire and the Amplatz 0.035 wire was then exchanged (Fig. 3a and Fig. 3b). The balloon catheter and the 5 F sheath were removed, subsequently the

MANTA closure device was successfully deployed using the depth measurement requirements as per IFU. A control angiography was obtained revealing good seal-off without any contrast extravasation (Fig. 4). Post-procedure and next-day ultrasound of the femoral access site revealed no vascular or cardiac complications. The post-procedure period was uneventful, and the patient was discharged after two days.

DISCUSSION

As large-bore access percutaneous procedures are performed increasingly more worldwide vascular

access management becomes crucial step for better outcomes. In fact, vascular complications are the most common complications during transcatheter aortic valve procedures that significantly increase procedure-related morbidity and mortality [1, 2]. During the evolution of TAVR devices the use of smaller sheath sizes, multidetector computer tomography (MDCT) and the accumulated operator experience have driven access-related mortality down significantly [3, 7]. Another consideration when choosing a vascular closure device and optimizing patient outcomes is operator experience. MANTA provides easy positioning without the need for preclosure and in comparative studies it performed as good as other combinations of closure devices without significantly increasing the rate of complications [4]. In the presented case the absence of suture-based closure device preclosure compelled the structural interventions team to consider a way to regain guidewire-based vascular access after it was lost. If efforts to recover access didn't yield, then a surgical bailout or covered stent implantation are both viable options [5]. The case report illustrates that in cases of failure of other vascular closure devices that allow guidewire maintenance or placement, MANTA can be used for bailout vessel closure. In our experience overestimating the depth of implantation of MANTA is less deleterious than underestimating. In addition, there are novel methods for estimating depth of implantation in situations of post hoc closure of large bore arterial access. These methods utilize direct angiographic imaging and measurement of skin-to-vessel depth and adding 1cm to that [6].

CONCLUSION

In conclusion, accumulating experience with only a handful of vascular closure devices and understanding their limitations and advantages provide a significant

benefit to clinical outcomes and patients themselves [7]. Sharing that experience enables less experienced operators to safely resolve complications. Given the increase in the number of TAVR procedures, optimizing outcomes is a primary objective in evidence-based practice.

No conflict of interest was declared

References

1. Hayashida K, Lefevre T, Chevalier B et al. Transfemoral aortic valve implantation new criteria to predict vascular complications. *JACC Cardiovasc. Interv.* 2011;4:851-858, doi: 10.1016/j.jcin.2011.03.019.
2. Toggweiler S, Gurvitch R, Leipsic J et al. Percutaneous aortic valve replacement: Vascular outcomes with a fully percutaneous procedure. *J. Am. Coll. Cardiol.* 2012;59:113-118, doi: 10.1016/j.jacc.2011.08.069.
3. Scarsini R, De Maria GL, Joseph J et al. Impact of Complications During Transfemoral Transcatheter Aortic Valve Replacement: How Can They Be Avoided and Managed? *J Am Heart Assoc.* 2019;8(18):e013801, doi: 10.1161/JAHA.119.013801.
4. Eftychiou C, Eteocleous N, Mitsis A et al. Comparison of MANTA vs ProGlide Vascular Closure Device and 30- Day Outcomes in Transfemoral Transcatheter Aortic Valve Implantation. *Tex Heart Inst J.* 2022;49(5):e217650. doi: 10.14503/THIJ-21-7650.
5. Drouelle E, De Poli F, Couppie P et al. Suivi clinique après implantation d'un stent couvert dans l'artère fémorale commune au décours immédiat d'une complication vasculaire per-TAVI [Common femoral artery bailout stenting with covered stent graft due to TAVR vascular complication: Clinical long term follow-up]. *Ann Cardiol Angeiol (Paris).* 2019;68(5):316-324. French, doi: 10.1016/j.ancard.2019.08.007.
6. Sharma RK, Poulin MF, Tamez-Aguilar H, Pinto DS. Post hoc closure of large bore vascular access using the MANTA closure device. *Catheter Cardiovasc Interv.* 2021;97(2):282-286, doi: 10.1002/ccd.28900.
7. Petrov Iv., Stankov Z, Polomski P. et al. Safety and efficiency of the minimalistic and precise approach for transcatheter aortic valve implantation (TAVI) compared to the standard one. *Bulgarian Cardiology,* 2022;28(2): 79-89, <https://doi.org/10.3897/bgcardio.28.e82274>.