Posterior Wall Capture with the Application of Prostar XL® Vascular Closure Device: Case Report

Prostar XL® Vasküler Kapama Cihazı ile Arka Duvar Yakalanması

Eyüp HAZAN,[a,b]
Emrah ŞİŞLİ,[a,b]
Yiğit GÖKTAY,[c]
Osman Nejat SARIOSMANOĞLU,[a,b]
Öztekin OTO[a,b]

Departments of
[a]Cardiovascular Surgery,
[c]Radiology,
[b]Division of Interventional Radiology,
Dokuz Eylül University Faculty of Medicine, İzmir

Geliş Tarihi/*Received:* 24.04.2011
Kabul Tarihi/*Accepted:* 03.08.2011

This article was presented as a poster presentation at the 59th ESCVS International Congress in conjunction with the 6th Congress of Update in Cardiology and Cardiovascular Surgery, Cesme, Turkey in April 2010.

Yazışma Adresi/*Correspondence:*
Emrah ŞİŞLİ
Dokuz Eylül University Faculty of Medicine, Department of Cardiovascular Surgery, Division of Interventional Radiology, İzmir, TÜRKİYE/TURKEY
dresisli@hotmail.com

ABSTRACT A variety of vascular closure devices (VCD) are widely used worlwide with very low access-site related complication rates and favorable patient related consequences even in endovascular procedures in which large-bore sheaths are required. The suture-mediated Prostar XL® VCD is stated to be eligible for up to 26Fr sheaths' puncture sites. The main criticized point of Prostar XL® is the complexity of the deployment steps with resultant experience of the interventionist, which is pointed to be the major cause of adverse events. The aim of this report is to warn the interventionists to take into account of this rare complication.

Key Words: Equipment failure; postoperative complications; ischemia

ÖZET Birçok Vasküler Kapama Cihazı (VKC), erişim alanı ile ilgili çok düşük komplikasyon oranları ve büyük çaplı kılıf (sheath) kullanımını gerektiren endovasküler girişimlerde dahi hasta ile ilgili olumlu sonuçlanmaları dolayısıyla tüm dünyada yaygın olarak kullanılmaktadır. Dikiş-aracılı Prostar XL® VKC'nin, 26Fr'e kadar kılıfların kullanıldığı ponksiyon bölgeleri için uygun olduğu belirtilmektedir. Prostar XL'in en çok eleştiri aldığı nokta ise, uygulama basamaklarının karmaşıklığı ve bununla birlikte, istenmeyen olayların başlıca sebebi olarak ta gösterilen, girişimcinin deneyimidir. Bu sunumun amacı, bu seyrek görülen komplikasyonun dikkate alınması konusunda girişimcileri uyarmaktır.

Anahtar Kelimeler: Teçhizat yetersizliği; postoperatif komplikasyonlar; iskemi

Turkiye Klinikleri J Cardiovasc Sci 2012;24(3):353-6

Within accelerated developing era of endovascular procedures, enthusiasm to minimal invasiveness is the core topic many surgeons and interventionists are dealing with. Preference on vascular closure device (VCD) over other modalities relies on lower morbidity rates, lower intervention time, better patient comfort, early ambulation, reduced hospital stay and cost.[1-3]

The suture-mediated Prostar XL is designed to close the femoral artery puncture site percutaneously. The Prostar XL System consists of the device and the knot pusher. An attractive feature of a suture-mediated VCD is the eligibility for up to 26Fr sheaths' applied puncture sites by using the 'Preclose' technique.[1]

The main criticized point of this device is the complexity of the deployment steps. Many of the incidence of access-site related complications

are stated to be linked with the unfamiliarity and inexperience of the interventionists.[3,4] While the access-site related complication rates are stated to be low, the incidence rates of device-related posterior wall capture resulting in occlusion of the femoral artery (FA) are much more infrequent.[4-7] The aim of this case report is to present a case of VCD related posterior wall capture resulting in iatrogenic acute arterial ischemia developing after total percutaneous endovascular aortic repair (EVAR).

CASE REPORT

Total percutaneous EVAR was applied to a 76 year old obese woman (body mass index: 33) with an infrarenal abdominal aortic aneurysm, extending to the right common iliac artery. While the body of the aortic stent was deployed through 18 Fr sheath via right, the limb extension was deployed through 12 Fr sheath via left FA. Successful hemostasis was achieved by Prostar XL® (10 Fr) at right and by manual compression at left FA.

While the introducer sheath remained in place, the incision was slightly extended and the subcutaneous tissue was dilated. After a smaller guide wire was introduced through the introducer sheath, it was removed. The device was introduced over the guide wire. The hub was unlocked and rotated while the barrel was gently advanced. The device was properly positioned which was confirmed by a steady, continuous drip of blood coming from the dedicated marker lumen. Then the hub was locked back in place. The handle was pulled away from the hub to deploy the needles. After deployment, the posterior and the anterior needles were removed. The device was withdrawn and tension was applied to the sutures. The two ends of the anterior and the posterior suture ends were separated. The sutures were tied and the knot was advanced to the arteriotomy site by knot pusher through the tissue tract. Finally the device was completely removed.

At the end of the intervention, the patient revealed coldness in the right extremity with pulse deficit. Recently performed checking angiogram pointed the roughness remained at right FA after VCD application with an intact femoral arterial vasculature (Figure 1). She was urgently operated in the endovascular suite with right femoral exploration showing that the anterior and posterior wall of the subclavian flap aortoplasty (SFA) was su-

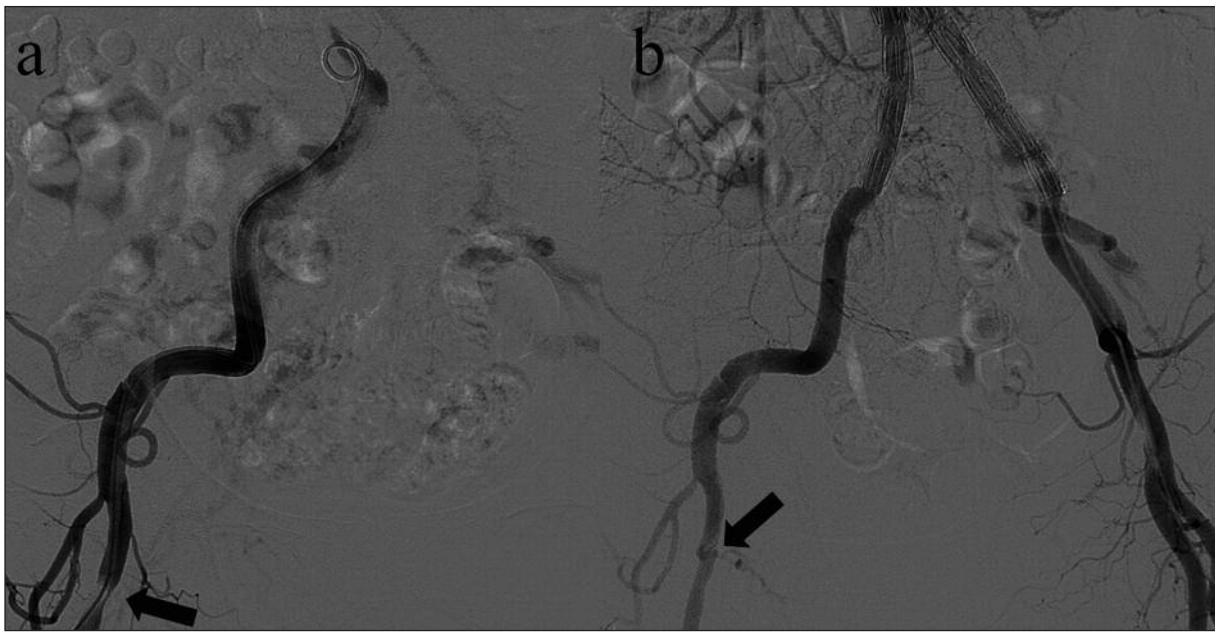

FIGURE 1: Conventional angiogram of the case. **a:** *arrow* indicates the superficial femoral arterial puncture site; **b:** *arrow* indicates the roughness remained at the end of the procedure after VCD deployment.

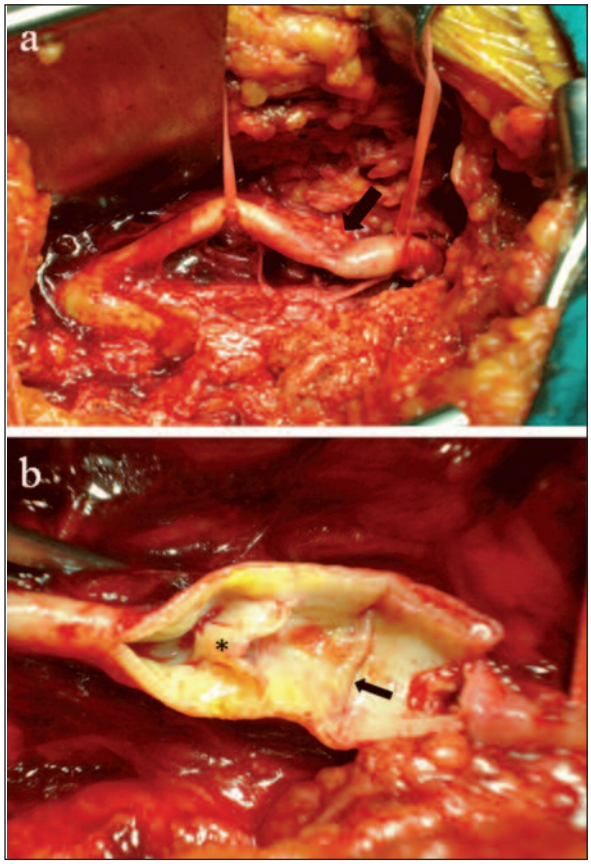

FIGURE 2: a: Femoral exploration; *arrow* indicates the sutured anterior and posterior wall of the superficial femoral artery together. **b:** The appearence of arteriotomy; indicators revealing the posterior wall capture. The *star* points the take-off of the posterior intimal layer and the *arrow* reveals the posterior wall capture site where the anterior and posterior walls came together.
(See for colored form http://cardivascular.turkiyeklinikleri.com/)

tured together (Figure 2a). Arteriotomy revealed posterior wall capture taking off the intimal layer (Figure 2b). Because the FA appeared healthy, the taken-off intimal layer was sutured to the posterior wall with tacking sutures and ePTFE vascular patch angioplasty was performed together with embolectomy. At postoperative period, no any other complication occured and she was discharged on postoperative day five.

DISCUSSION

As in our case, SFA catheterization should have to be avoided due to expected high complication rates. Furthermore, the healty and smooth appearance of the SFA deceived us to keep on the procedure. Posterior wall capture of the SFA did not developed total occlusion instantly. Otherwise, it should be seen on checking angiogram as a cut-sign along with lack of distal flow. We think, the roughness remained after VCD application which was a result of minimal extravasation, superimposed the stenotic segment that resulted it to be missed. Furthermore, the patent distal femoral flow did not develop suspicion and necessity to evaluate the femoral vasculature with doppler ultrasonography.

It is apparent that to achieve lower complication rates, necessity of familiarity and experience in VCD usage is essential.[8] Etazidi et al.[3] encouraged us that even in cases with obesity and calcified femoral artery which are the relative contrindications for VCD usage, attainment of lower complication rate is possible. On the contrary, we think, eligibility criterias should strictly be obeyed especially in cases with circumferential FA calcification, obesity and hostile femoral triangle.[9]

In the step of handle rotation, any resistance is an indicator that the hub was not properly positioned and no any further attempt should be done to deploy the needles because, this is the most critical step resulting in the posterior wall capture.

As a result, while hemostasis is achieved by VCD, one should always take into account of posterior wall capture and be aware of the roughness remained at the end of the procedure, recalling the possibility of complications.

Acknowledgements

I would like to thank to my estimable academics in giving me the opportunity for managing this case report. I also would like to thank to Berna Şişli for her estimable effort in order to check and correct the grammatical issues of this article.

REFERENCES

1. Lee WA, Brown MP, Nelson PR, Huber TS. Total percutaneous access for endovascular aortic aneurysm repair ("Preclose" technique). J Vasc Surg 2007;45(6):1095-101.
2. Torsello GB, Kasprzak B, Klenk E, Tessarek J, Osada N, Torsello GF. Endovascular suture versus cutdown for endovascular aneurysm repair: a prospective randomized pilot study. J Vasc Surg 2003;38(1):78-82.
3. Etezadi V, Katzen BT, Naiem A, Johar A, Wong S, Fuller J, et al. Percutaneous suture-mediated closure versus surgical arteriotomy in endovascular aortic aneurysm repair. J Vasc Interv Radiol 2011;22(2):142-7.
4. Hon LQ, Ganeshan A, Thomas SM, Warakaulle D, Jagdish J, Uberoi R. An overview of vascular closure devices: what every radiologist should know. Eur J Radiol 2010;73(1):181-90.
5. Lee WA, Brown MP, Nelson PR, Huber TS, Seeger JM. Midterm outcomes of femoral arteries after percutaneous endovascular aortic repair using the Preclose technique. J Vasc Surg 2008;47(5):919-23.
6. Stone PA, Campbell JE, Andrews KH, Bates MC. Posterior wall capture and resultant common femoral occlusion complicating StarClose access closure. J Vasc Surg 2008;48(2):469-71.
7. van der Steeg HJ, Berger P, Krasznai AG, Pietura R, Schultze Kool LJ, van der Vliet JA. Acute arterial occlusion after deployment of the Angio-Seal closure device: is it as uncommon as we think? Eur J Vasc Endovasc Surg 2009;38(6):715-7.
8. Watelet J, Gallot JC, Thomas P, Douvrin F, Plissonnier D. Percutaneous repair of aortic aneurysms: a prospective study of suture-mediated closure devices. Eur J Vasc Endovasc Surg 2006;32(3):261-5.
9. Shafique S, Murphy MP, Sawchuk AP, Cikrit D, Dalsing MC. Femoral arterial access management for endovascular aortic aneurysm repair: evolution and outcome. Perspect Vasc Surg Endovasc Ther 2009;21(1):29-33.