Journal of Rare Cardiovascular Diseases 2018; 3 (7): 239–242
www.jrcd.eu

Transradial carotid artery stenting with the use of a novel integrated embolic protection technology (RCD code: I-1B.O)

Damian Maciejewski[1*], Piotr Paluszek[2], Roman Machnik[2], Łukasz Tekieli[1], Mariusz Trystuła[2], Marek Kazibudzki[2], Robert Musiał[3], Jacek Legutko[1], Piotr Pieniążek[1,2]

[1] Department of Interventional Cardiology, Institute of Cardiology, Jagiellonian University Medical College, John Paul II Hospital, Krakow, Poland; [2] Department of Vascular Surgery and Endovascular Interventions, John Paul II Hospital, Krakow, Poland; [3] Department of Anaesthesiology and Intensive Care, John Paul II Hospital, Krakow, Poland

Abstract

We present the case of a 79-year-old woman with critical right internal carotid artery stenosis in whom carotid artery stenting was performed via a right radial artery approach with the use of a novel integrated embolic protection technology- Paladin System® (Contego Medical). JRCD 2018; 3 (7): 239–242

Key words: carotid artery stenting, radial approach, Paladin System

Introduction

Carotid artery disease is one of the causes of ischaemic stroke and as a consequence, severe disability in adults [1]. Every year 75 000 people in Poland suffer from stroke and it has been demonstrated that atherosclerotic carotid artery stenosis accounts for about 10–12% of all ischaemic strokes [2].

Carotid artery stenting (CAS) has been shown to prevent strokes and therefore is indicated in certain patients. Therapy-related periprocedural complications including microembolisation are a major concern related to CAS [3,4]. A novel system with integrated embolic protection technology, the Paladin System® (Contego Medical), has recently been introduced. The system integrates a post-dilatation balloon with an embolic protection filter at the distal catheter tip, which allows for a reduction in adverse outcomes. We have recently implemented this system to treat a patient with critical right internal carotid artery stenosis via right radial artery access.

Case report

A 79-year-old woman was admitted to our institution due to a rapid progression of right internal carotid artery stenosis revealed in duplex ultrasonography (DUS). Additional comorbidities included a history of left hemispheric ischaemic stroke, right subclavian and left internal carotid artery stenting, stable coronary artery disease, hypertension, hypercholesterolaemia, diabetes mellitus, and severe peripheral artery disease. DUS performed on admission confirmed a high grade right internal carotid artery (RICA) stenosis with peak systolic velocity of 2.8m/s and end-diastolic velocity of 0.7m/s. After consultation within the Neurovascular Team composed of a neurologist, vascular surgeon, and interventional cardiologist, the patient was scheduled for right-sided CAS. As no femoral artery access was available, a transradial approach was recommended. A loading dose of clopidogrel 300 mg and continuation of aspirin (75mg/d) were prescribed before the procedure. Catheterisation of the right common carotid artery with a 5 french (Fr) Cobra 2 diagnostic catheter (Terumo) was performed via the right radial artery with the use of a 7 Fr arterial Glidesheath Slender (Terumo). A tapered steerable Jindo 0.035”

Please cite this article: Maciejewski D, Paluszek P, Machnik R, et al. Transradial carotid artery stenting with the use of a novel integrated embolic protection technology: case report (RCD code: I-1B.O). J Rare Cardiovasc Dis. 2018; 3 (7): 239–242; doi: http://dx.doi.org/10.20418%2Fjrcd.vol3no7.326
Conflict of interest: none declared. Submitted: April 29, 2018. Accepted: June 4, 2018.

* Corresponding author: Department of Interventional Cardiology, Institute of Cardiology, Jagiellonian University Medical College, John Paul II Hospital, ul. Prądnicka 80, 31-202 Krakow, Poland; tel: +48 609 448 745, e-mail: damianmaciejewski@tlen.pl

Figure 1. Successful cannulation of the right common carotid artery with 7 Fr Guider Softip Guiding Catheter via the right radial artery

guidewire (Cordis) was positioned at a distal segment of the right external carotid artery and the diagnostic catheter was then exchanged for a 7 Fr Guider Softip XF Guiding Catheter (Boston Scientific) (Figure 1). The selective angiography showed an eccentric 70% stenosis of the RICA (Figure 2). The lesion was crossed with a 0.014" coronary guidewire and a 6 Fr FilterWire EZ distal embolic protection device (Boston Scientific) was introduced and opened distally. A closed-cell design, self-expanding Carotid Wallstent 7x30mm (Boston Scientific) was implanted using the direct stenting technique. Next, a Paladin® 5x20mm dilatation catheter was introduced and a distal Paladin® filter was opened prior to post-dilatation (Figure 3). After post-dilatation to 12 atm, the Paladin® system and distal protection filter were successfully removed. Post-stenting angiography demonstrated good apposition of the stent without dissection or residual stenosis (Figure 4). The peri- and post-procedural period was uneventful and the patient was discharged from the hospital the next day. After angioplasty, 75mg of acetylsalicylic acid was maintained indefinitely and 75 mg of clopidogrel daily was continued for the following 3

Figure 2. Selective angiography confirming critical ostial stenosis of the right internal carotid artery

months. Neither new cerebral events nor restenosis were observed during the one-month follow-up.

Discussion

The transfemoral approach is commonly used for CAS, however, in cases of severe peripheral artery disease or unfavourable aortic arch anatomy, transradial access remains a viable alternative [5], although it has some limitations [6]. First, it requires lower profile systems (up to 7 Fr). Second, the radial approach is much more technically demanding for CAS procedures. On the other hand, radial approach is associated with fewer major bleeding events compared with femoral access, particularly in patients with antithrombotic therapy, and a lower rate of catheter-induced cerebral embolisation [7,8]

According to current guidelines, the use of embolic protection devices (EPDs) should be considered in patients undergoing carotid artery stenting [9]. EPDs are designed to reduce periprocedural strokes, although data regarding their effectiveness have been mixed [10,11]. Embolic release of atherosclerotic debris due to catheterisation mainly occurs during post-dilatation but might also occur at any time during the intervention. Two types of EPD

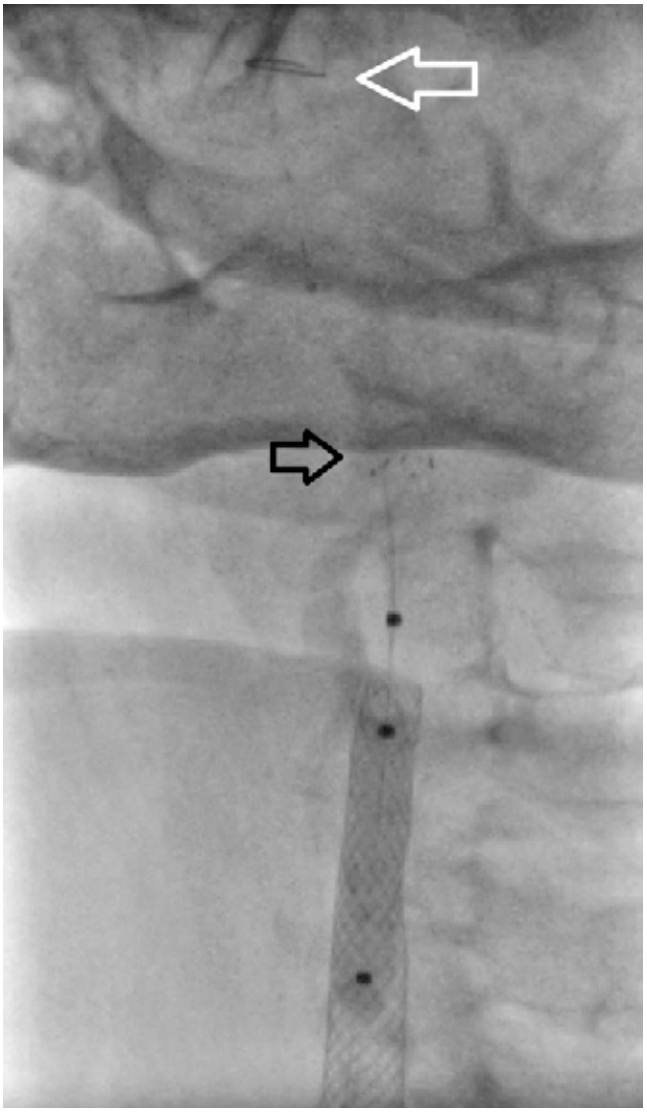

Figure 3. Self-expanding Carotid Wallstent 7×30mm post-dilatation with Paladin system (black arrow – Paladin filter; white arrow – FilterWire EZ distal embolic protection device)

Figure 4. Final angiography showing optimal effect of RICA-CAS

are currently available. Distal filter EPDs are small baskets deployed in the internal carotid artery distal to the lesion to protect the cerebral circulation from debris that may be produced by manipulation during angioplasty and stent placement. Proximal EPDs occlude the common and external carotid artery and induce stoppage of flow in the internal carotid artery. Aspiration is performed either continuously or before balloon deflation, removing any released debris. Proximal EPDs are advocated by some experts as being particularly useful in symptomatic or thrombotic lesions [12]. However, in cases with complex arch anatomy or stenosis which involves the common carotid or external carotid artery, or inadequate collateral flow, the use of proximal EPDs may be precluded [13].

Despite the widespread use of embolic protection devices, the risk of stroke remains one of the largest challenges in CAS. Magnetic resonance imaging and transcranial Doppler imaging data has shown that despite the use of EPDs, microemboli reach the middle cerebral artery in almost every intervention, especially in the critical procedural stage of post-dilatation [14–16]. Therefore, to reduce the risk of embolisation during post-dilatation, the Paladin® System has been developed. A 40-micron Paladin filter device (2–3 times smaller pore size than standard protection devices) can provide an added measure of protection against both macro- and microembolic debris. On the other hand, extra procedural costs and severe tortuosity of the proximal internal carotid artery or high level of stenosis may prevent the use of this device.

As shown in our case, the Paladin® filter deployed during post-dilatation may offer an additional protection in CAS procedures.

References

1. Sudlow CL, Warlow CP. Comparing stroke incidence worldwide: what makes studies comparable? Stroke 1996; 27: 550–558.

2. Grau AJ, Weimar C, Buggle F, et al. Risk factors, outcome, and treatment in subtypes of ischemic stroke: the German stroke data bank. Stroke 2001; 32: 2559–2566.
3. Gurm HS, Yadav JS, Fayad P, et al. Long-term results of carotid stenting versus endarterectomy in high-risk patients. N Engl J Med 2008; 358:1572–1579.
4. Rosenfield K, Matsumura JS, Chaturvedi S, et al. Randomized Trial of Stent versus Surgery for Asymptomatic Carotid Stenosis. N Engl J Med 2016; 374:1011–1020.
5. Maciejewski D, Tekieli Ł, Kabłak-Ziembicka A, et al. Transradial approach for vertebral artery stenting. Postep Kardiol Inter 2015; 11: 32–36.
6. Etxegoien N, Rhyne D, Kedev S, et al. The transradial approach for carotid artery stenting. Catheter Cardiovasc Interv 2012; 80: 1061–1067.
7. Bertrand OF, Belisle P, Joyal D, et al. Comparison of transradial and femoral approaches for percutaneous coronary interventions: a systematic review and hierarchical Bayesian meta-analysis. Am Heart J 2012; 163: 632–648.
8. Faggioli G, Ferri M, Rapezzi C, et al. Atherosclerotic aortic lesions increase the risk of cerebral embolism during carotid stenting in patients with complex aortic arch anatomy. J Vasc Surg 2009; 49: 80–85.
9. Aboyans V, Ricco JB, Bartelink ML, et al. 2017 ESC Guidelines on the Diagnosis and Treatment of Peripheral Arterial Diseases, in collaboration with the European Society for Vascular Surgery (ESVS): Document covering atherosclerotic disease of extracranial carotid and vertebral, mesenteric, renal, upper and lower extremity arteries Endorsed by: the European Stroke Organization ESO) The Task Force for the Diagnosis and Treatment of Peripheral Arterial Diseases of the European Society of Cardiology (ESC) and of the European Society for Vascular Surgery (ESVS). Eur Heart J. 2017, doi: 10.1093/eurheartj/ehx095, indexed in Pubmed: 28 886 620.
10. Giri J, Yeh RW, Kennedy KF, et al. Unprotected carotid artery stenting in modern practice. Catheter Cardiovasc Interv 2014; 83: 595–602.
11. Garg N, Karagiorgos N, Pisimisis GT, et al. Cerebral protection devices reduce periprocedural strokes during carotid angioplasty and stenting: a systematic review of the current literature. J Endovasc Ther 2009;16: 412–427.
12. White CJ. Proximal embolic protection: a "game changer" for carotid stents. J Am Coll Cardiol 2010; 55:1668–1670.
13. Pieniążek, P, Tekieli, Ł, Musiałek P. Carotid artery stenting according to the tailored-CAS algorithm is associated with a low complication rate at 30 days: data from the TARGET-CAS study. Kardiol Pol 2012; 70: 378–386.
14. Montorsi P, Caputi L, Galli S, et al. Microembolization during carotid artery stenting in patients with high-risk, lipid-rich plaque. A randomized trial of proximal versus distal cerebral protection. J Am Coll Cardiol 2011; 58: 1656–1663.
15. Bijuklic K, Wandler A, Hazizi F, et al. The PROFI study (Prevention of Cerebral Embolization by Proximal Balloon Occlusion Compared to Filter Protection During Carotid Artery Stenting): a prospective randomized trial. J Am Coll Cardiol 2012; 59:1383–1389.
16. Cano MN, Kambara AM, de Cano SJ, et al. Randomized comparison of distal and proximal cerebral protection during carotid artery stenting. J Am Coll Cardiol Intv 2013; 6: 1203–1209.