

# Local stent delivery in tortuous carotid artery

## ABSTRACT

This case report describes a symptomatic case of extremely tortuous left internal carotid artery, which caused difficulties in advancing protection device and delivering a stent over the stenosis. We overcome the problem with "local stent delivery" technique, which is advancing a guiding catheter through the stenosis, putting the stent inside it and then retracting the catheter leaving the stent at the stenosis.

**Key words:** internal carotid artery stenosis, tortuous course, local stent delivery

Kardiol. Inwazyjna 2017; 12 (3), 3–5

## STRESZCZENIE

Przedstawiono przypadek objawowego zwężenia bardzo krętej lewej tętnicy szyjnej wewnętrznej, co spowodowało trudności w dostarczeniu systemu do neuroprotekcji, jak również stentu. Trudności pokonano stosując technikę „lokalnego dostarczenia stentu”, w której cewnik prowadzący przeprowadzono przez zmianę, przez niego stent za zmianę, a następnie, wycofując cewnik prowadzący, implantowano stent w miejscu zwężenia.

**Słowa kluczowe:** zwężenie tętnicy szyjnej wewnętrznej, kręty przebieg, lokalne dostarczenie stentu

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## Patient history

We present a 60-year old male with history of transient ischemic attacks in left mid cerebral artery region, symptoms of transient right leg and arm weakness. A duplex Doppler revealed significant stenosis in left internal carotid artery. His past medical history was arterial hypertension and dyslipidemia. He was referred for carotid artery angiography and intervention.

## Angiography

We started with coronary angiography, which did not show stenosis on the coronary arteries. The diagnostic images of the carotid arteries showed aortic arch type II, normal origin of the supra-aortic vessels. The right internal carotid artery and its branches were without stenosis or aneurysms. The left carotid images showed tortuous S-shaped left common and internal arteries, there was significant stenosis at proximal segment of the internal carotid artery just after another 90 degrees genus (Fig. 1).

## Treatment procedure

We used 5F femoral sheath through which we introduced 90 cm diagnostic JR4 5F in the common carotid artery, then placed a 0.035-in J wire in external carotid artery, the initial sheath was withdrawn and through the wire a 90 cm Flexor with Check-Flo Valve was introduced in the common carotid artery. Then we

Liubomir Dosev<sup>1</sup>, Dobrin Vassilev<sup>1</sup>,  
Kiril Karamfilov<sup>1</sup>, Robert J. Gil<sup>2,3</sup>

<sup>1</sup>UMHAT Aleksandrovka Sofia Bulgaria;

<sup>2</sup>Mossakowski Medical Research Centre, Polish Academy of Sciences, Warsaw, Poland

<sup>3</sup>Department of Invasive Cardiology, Central Clinical Hospital of the Ministry of the Interior, Warsaw, Poland



Figure 1.

easily crossed the lesion with a Terumo Runthrough 0.014-in into the petrous portion of the left internal carotid artery (ICA). Our attempted to introduce the protection system Spider FX was not successful, we tried using a BMW Universal Guide Wire as buddy wire did not help, the next step was using a Grand Slam with the same negative result. We added Guidezilla 6F for extra support, which still did not help. After all these attempts on delivering the protection device we abandoned our initial strategy on using protection device. So we decided on direct stenting and made few negative attempts on delivering the stent (Wallstent  $9 \times 50$  mm, 135 cm), we tried advancing the Flexor sheath at the ostium of the ICA, but the stent did not do through the curved ICA, tried again using buddy wires, extra support from Grand Slam, tried putting the stent through the Guidezilla but because of device diameter mismatch the stent did not go through. As a last step we used a JR 4 6Fr 125 cm guide catheter without a valve. We danced the catheter through the 0.014 Runthrough guide wire, since we have used a 90 cm sheath we had distance enough to advance the JR catheter through the stenosis, which went easily without much effort or friction. Once having the catheter through the stenosis it was really easy to advance the stent inside the catheter at the projection place of the stenosis. The stent shaft was 135 cm, guide catheter shaft was 125 cm, sheath shaft 90 cm so we managed to pullback the guide catheter into the sheath, leaving the stent right at the spot of the stenosis (Fig. 2). So instead of delivering the stent forward towards the tortious segment we brought it backwards. After stent deployment we appreciated a good angiographic result without significant residual stenosis, dissections, or intracranial embolization (Fig. 3).

## Discussion

We presented a case, which showed difficulties in passing devices through tortuous internal carotid

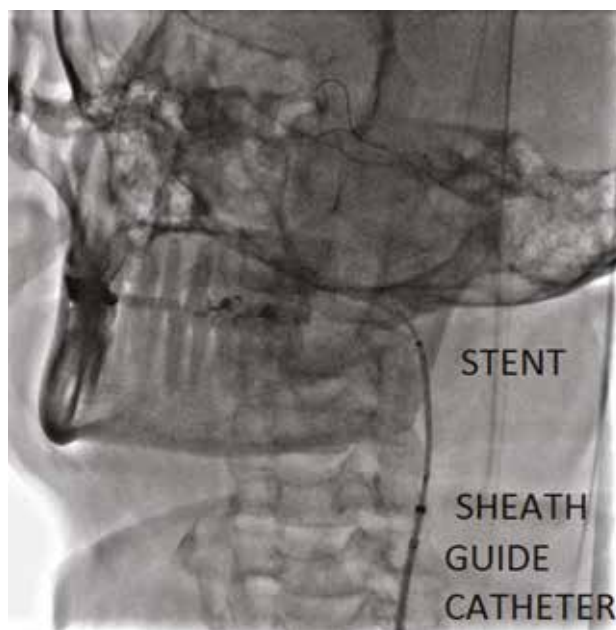


Figure 2.



Figure 3.

artery. In this case we used several techniques for straightening the segment and gaining better support, all of which failed. At the time of the intervention we did not have available at the catheterization lab proximal embolization protection device nor more flexible stent like Roadsaver. As last resort we advanced the guiding catheter through the stenosis which was at the risk of dissecting the lesion, but we found that advancing the catheter was much more easy and efficient. Showing that the main problem in advancing the stent was not the stenosis severity but the tortuosity of the segment. That is why we think predilatation of the stenosis would have not helped and could be risky without distal protection device.

### Address for correspondence:

Liubomir Dosev, MD  
 "Alexandrovska" University Hospital, Medical University, Sofia, Bulgaria  
 e-mail: liubodosev@gmail.com

# Comment

Thank you for the opportunity to review interesting case report of successful delivery of carotid stent into extremely tortuous vessel using stent delivery through the guiding catheter placed distally from target lesion.

Progressive aging of population, improved surviving of high risk patients and technical progress will certainly lead into increasing number of carotid artery stenting procedures during next years and such cases spreading the experience of different carotid artery stenting techniques are very much welcome.

Nevertheless, some points regarding this case report need to be expressed. First I need to consider why proximal embolic protection device was not used in this case when distal protection could not be used. Did the patient have a lack of intracranial collateral flow because external carotid artery was convenient in the use of proximal protection? It should be mentioned in the case report.

Second question is about the selection of stents. Why was the first choice of Carotid Wallstent, one of the most rigid devices on market and why authors did not try to use Terumo Roadsaver, possibly the most flexible stent on market, which is the excellent choice for tortuous anatomy?

In last paragraph of discussion, authors have expressed an opinion that predilatation with small balloon would not help the passing and would be riskier than passing with 6F guiding catheter through the lesion. I cannot agree on this point, I think 2 mm large catheter with sharp edge is riskier than cautious predilatation with 2.5 or 3 mm balloon.

Last but not least, only this technique is used in patients with contraindication for surgical endarterectomy. In the case of such a difficult anatomy and no signs of high risk for surgery (at least none was mentioned in your medical history summary) it could be suitable option.

**Prof. Piotr Pieniżek MD PhD**

Jagiellonian University, John Paul II Hospital  
Krakow, Poland

# Answer to comment

We would like to thank Professor Pieniżek for his great comments and important questions.

Regarding first and second question, at the time of the intervention we did not have available in the catheterization laboratory proximal embolization protection device or more flexible stent like Roadsaver. As mentioned in the discussion section, we found that advancing the catheter was much more easy and efficient suggesting that the main problem in

advancing the stent was not the stenosis severity but the tortuosity of the segment. That is why we think predilatation of the stenosis would have not helped and could be risky without distal protection device. The choice of treatment options was discussed with our patient, who refused surgery.

On behalf of the authors,

Liubomir Dosev