

CASE REPORT

An anchoring technique by looping with the tip of a super-stiff wire: may be a solution in patients with anomaly of the aortic arch and tortuous carotid artery disease?

Ahmet Barutcu,¹ Emine Gazi,¹ Feyza Aksu,² Ersan Tatli³

¹Department of Cardiology, Canakkale Onsekiz Mart University, Canakkale, Turkey
²Department of Cardiology, Istanbul Medeniyet University, Istanbul, Turkey
³Department of Cardiology, Ada Tıp Hospital, Sakarya, Turkey

Correspondence to

Dr Ahmet Barutcu,
 ahmetbarutcu@comu.edu.tr

SUMMARY

Vascular anatomy is one of the most important factors for the successful carotid artery interventions, either angioplasty or stenting. We report a new technique for advancing a guiding catheter into the common carotid artery when there is an unfavourable aortic arch anatomy and tortuosity of the carotid artery.

BACKGROUND

Unfavourable vascular access is the main problem responsible for failure in carotid artery (CA) stenting.^{1 2} Excessive vascular tortuosity is the cause of failed endovascular therapy in 4–6% of patients.² Certain anatomical factors, including the severe atherosclerotic and tortuous aortic arch, sharp angulation of the great vessel origins from the aortic arch, which is classified as unfavourable aortic arch, and marked tortuosity of the common CA (CCA), have been described as relative contraindications for the procedure.³ Several techniques have been proposed to overcome these anatomical difficulties. Hence, we report a new technique for the intervention in a patient with CA anatomical variation and tortuosity.

CASE PRESENTATION

A 64-year-old right-handed woman with a history of hypertension, and dyslipidaemia was admitted to the hospital with a transient ischaemic attack. The transient ischaemic attack was presented with amaurosis fugax.

INVESTIGATIONS

The patient underwent carotid Doppler studies which showed a significant 80% stenosis in the left internal CA (LICA). The aortography presented dextrocardia and anomaly of the aortic arch branching pattern with a single brachiocephalic trunk originating from the aortic arch eventually splitting into bilateral subclavian arteries and a bicarotid trunk (figure 1). The angiogram of the right CCA showed no significant stenosis of the right internal CA (RICA). The angiogram of the left common CA (LCCA) revealed a significant 95% stenosis in LICA (figure 2). Medical treatment with the clopidogrel and statin was started. After 5 days, angioplasty and stenting were planned for the LICA.

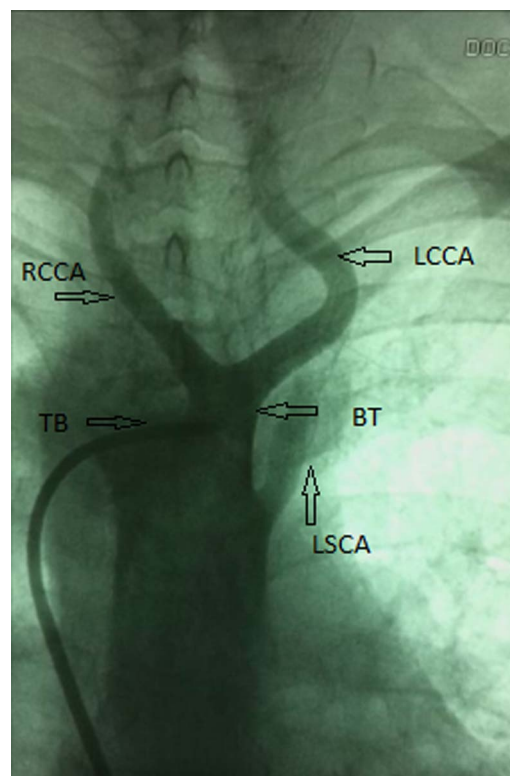


Figure 1 The aortography showing tortuosity of the left internal carotid artery and anomaly of the aortic arch branching pattern has a single brachiocephalic trunk originating from the aortic arch that eventually splits into the bilateral subclavian arteries and a bicarotid trunk. RCCA, right common carotid artery; LCCA, left common carotid artery; LSCA, left subclavian artery, TB, trunkus brachiocephalicus; BT, bicarotid trunkus.

TREATMENT

A 5F HH1 (Head Hunter, Impress Hydrophilic/Merit Medica/SLC) catheter was placed in the left external CA (LECA) by using a 9F sheath with 0.035-inch hydrophilic guide wire (Raptor/Insitu) via the transfemoral route. Then, a super-stiff wire (Merit Medica/SLC) was left at the distal portion of LECA by replacement of the hydrophilic wire with the super-stiff wire. Neurovascular guiding catheter was exchanged over superstiff wire instead of HH1 catheter, neurovascular guiding catheter (Shethless PV Guiding Sheath Set, Asahi Intecc-Japan) was tried to settle in bicarotid trunkus. However, owing to the unfavourable aortic arch and tortuous CA, the



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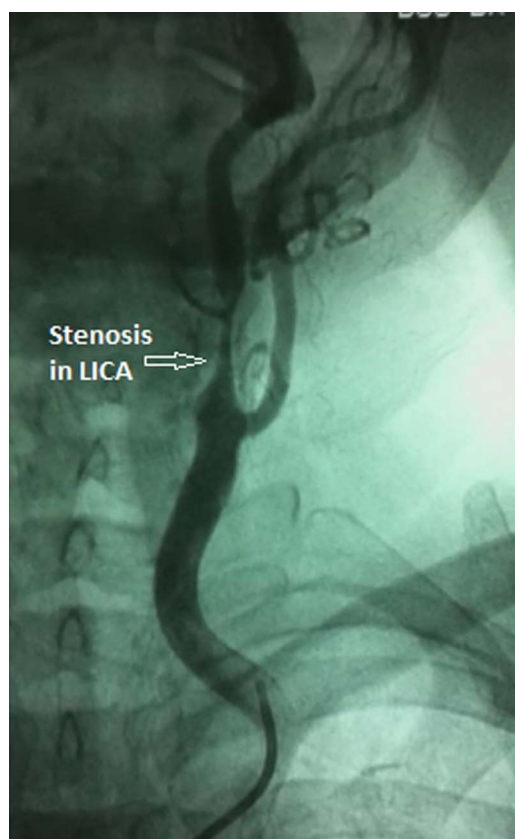


Figure 2 The angiogram of the left internal carotid artery showing a significant 95% stenosis. LICA, left internal carotid artery.

super-stiff wire did not provide sufficient support to proceed (figure 3). The super-stiff wire and guiding catheter got collapsed into the aorta. The super-stiff wire was again settled in LECA and a guiding catheter was fastened on it. Once more, the guiding catheter collapsed in the arcus aorta together with the super-stiff wire. Next, a loop of the tip of stiff wire to one of the branches of LECA was constructed, which is called the anchoring technique (figure 4). After the construction of the loop, we advanced to the bicarotid aorta and LCCA with a guiding catheter. At this point, while we tried to pull back the stiff wire slowly, the guiding catheter collapsed in the aorta once again. Guiding catheter settled in LCCA after the stiff wire was settled in LECA by constructing a loop of the tip of the stiff wire. Before pulling back the super-stiff wire, a 0.014-inch Asahi Grand Slam guidewire (Asahi Intecc-Japan), which has a rough body and is considered to straighten tortuous structures, was left for extrasupportive purposes as it had passed through the LICA lesion (figure 5). Afterwards, the super-stiff wire was removed by gentle withdrawal. After all these steps, a routine carotid stenting (Sinus Carotid Hybrid Stent, Optimed-Germany) was performed under the Angioguard protection system (Cordis Corp.) and the postdilatation process was successful without any complications (figures 6 and 7).

DISCUSSION

Several techniques have been described as a solution to overcome the anatomical difficulties of the aortic arch and great vessels in patients with severe atherosclerosis and tortuosity of the aortic arch, extreme angulation of the great vessel origins from the aortic arch and marked tortuosity of the CCA. Although exchanging a diagnostic catheter over a stiff exchange

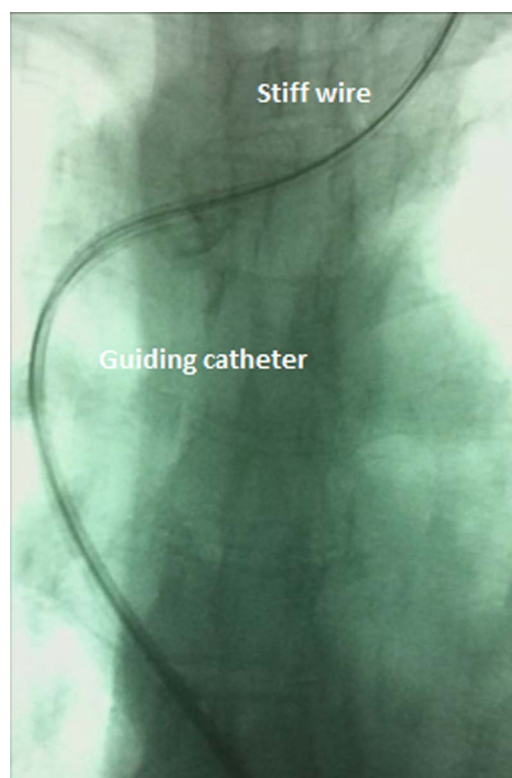


Figure 3 The figure demonstrates the unfavourable arch anatomy and tortuosity of the guiding catheter and stiff wire.

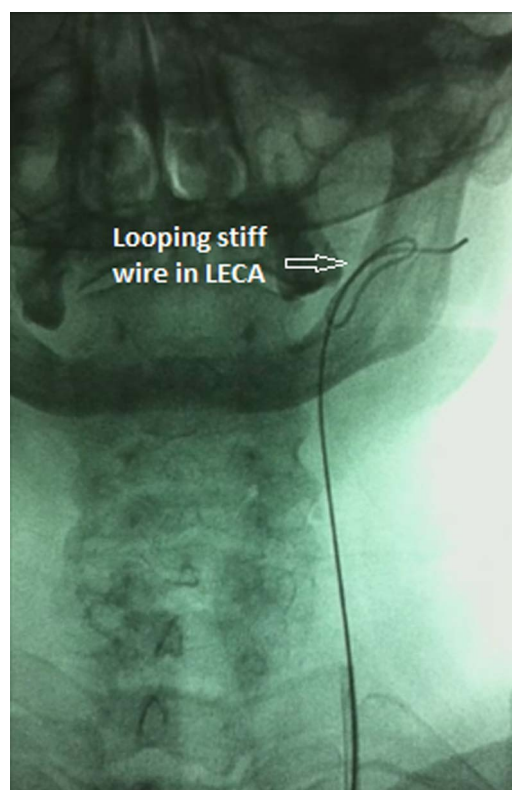


Figure 4 The figure demonstrates anchoring by looping with the tip of the super-stiff wire. LECA, left external carotid artery.

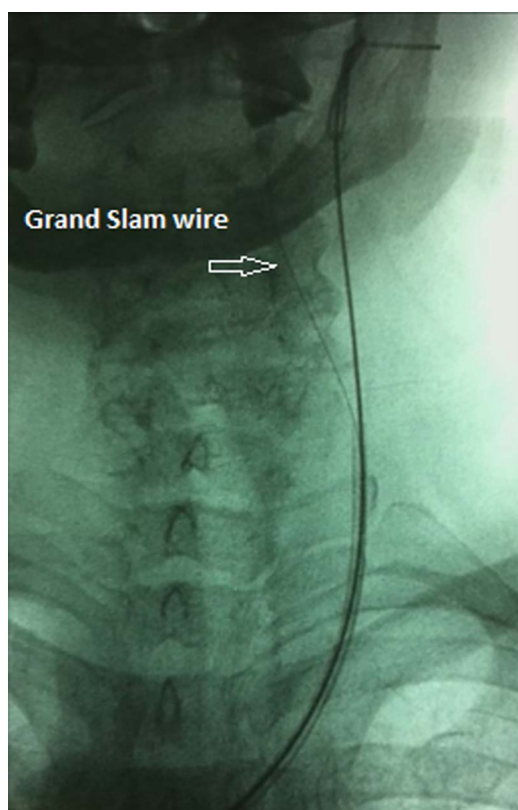


Figure 5 The figure demonstrates the stiff wire in the external carotid artery anchoring the guiding catheter while a second, 0.014-inch wire is advanced into the internal carotid artery.

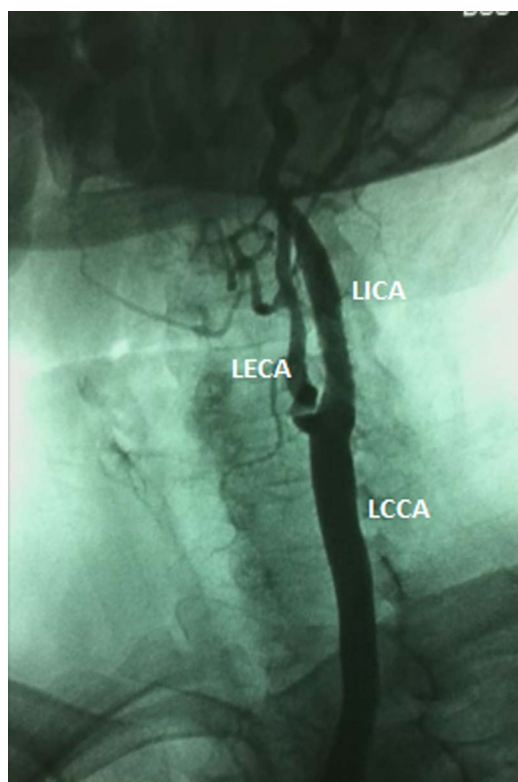


Figure 6 The angiography of the left internal carotid artery showing the final result of successful stenting. LCCA, left common carotid artery; LECA, left external carotid artery; LICA, left internal carotid artery.

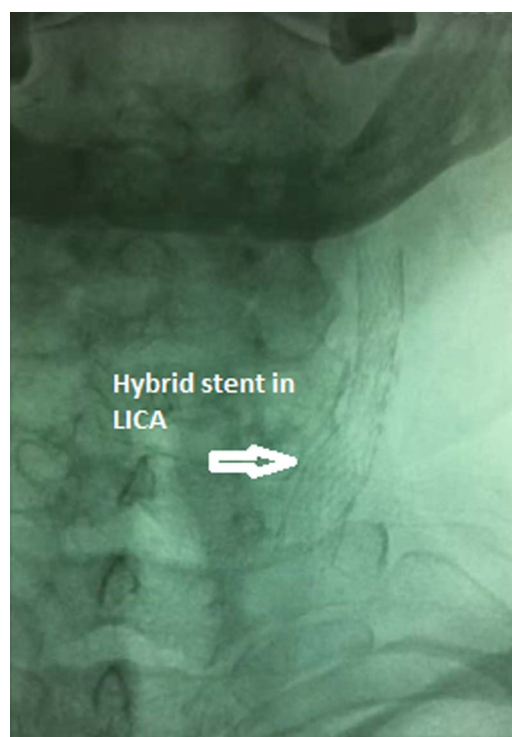


Figure 7 The angiography of the left internal carotid artery showing the final result of successful stenting. LICA, left internal carotid artery.

wire to settle down in CCA is a commonly used and standard procedure,¹ this technique may not be sufficient for unfavourable anatomy of CA such as severe atherosclerosis of the aortic arch, tortuosity of CA, sharp acute angled CCA and severe stenosis in the target lesion. In these cases, 5F catheter can be settled into external CA (ECA) but stiff guide wire usually pulls the catheter to out of the vessel during exchanging. An approach as a solution in this situation is to modify with curving the 8F stent delivery stent system like Simmons catheter and exchanged 5F catheter over the stiff guide-wire.⁴ Thus, this method is not always successful in patients with acute angled CCA. Some authors have suggested a direct percutaneous puncture of the CA in patients with tortuous aortic anatomy, but this technique involves serious risks of complications such as cervical haematoma due to the treatment with anticoagulants and inadequate haemostasis, embolisation of the particles of the atherosclerotic plaque and also CA dissection.^{5,6}

Another way is to use the 8F Simmons-2 guiding catheter to proceed to the proximal end of the target vessel without a guide wire, in patients with complex anatomy.⁷ Cardaioli *et al*⁸ have described a technique to place a double or triple 0.035 hydrophilic wire in ECA as another alternative way called the multi-wire technique. Since it is a different technique, we did not cannulate the CCA using the usual methods in our case with a tortuous CA and unfavourable aortic arch. By looping the tip of the super-stiff wire, anchor function within ECA is performed as a supportive role. In addition, after withdrawal of the super-stiff wire, the stenting process has been performed by the Grand Slam guide wire, which has a rough body and is used for guidance and prevention of collapse of the guiding catheter. The most dangerous risk of this procedure is dissection of the CA due to looping of the stiff wire in LECA. To reduce the risk, looping the stiff wire may be performed before settling in the guiding catheter. Our technique, to make looping by placement

of the tip of the stiff wire in the side branch, may have a dissection risk, but this risk is not as high due to the tip of the stiff guide being extremely soft. This method is actually known as the anchor technique and is used in coronary interventions resembling the Mo-ma catheters. The anchor technique is a method available in robust anatomical lesions of the CA. Pass a 0.014 inch wire to one of the side branches of LECA and then pass a coronary balloon and dilate at low pressures, likewise in coronary intervention, may give extra support as an another solution in this case. This technique has not been reported in the literature.

Learning points

- ▶ Successful vascular access to the carotid artery is a problem in patients with congenital trunk anomalies as difficult as severe atherosclerosis and tortuosity of the aortic arch, extreme angulation and marked tortuosity of the common carotid artery.
- ▶ Several techniques have been described for vascular intervention of the aortic arch and great vessel anatomy in these patients.
- ▶ Anchoring in the external carotid artery by looping with the tip of a super-stiff wire may be a solution for intervention in the internal carotid artery in patients with an unfavourable aortic arch.

In conclusion, placement of a guide wire with a rough body in the internal CA and anchoring in ECA by looping with the tip of the super-stiff wire may be a solution in patients with a tortuous CA and unfavorable aortic arch.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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