

## **CAROTID ARTERY STENTING OF INTERNAL CAROTID ARTERY “NEAR OCCLUSION” STENOSIS – CASE REPORT**

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### **Abstract**

Carotid near-occlusion stenosis is distal luminal collapse of the internal carotid artery beyond a tight stenosis. In everyday practice, it is easily misdiagnosed as a conventional high degree stenosis.

Because of the different stroke risk, proper differentiation of these two types of lesions is important for the correct treatment decision. Recent data showed no advantage of best medical therapy versus surgical endarterectomy or carotid artery stenting.

We report a case of carotid artery stenting of symptomatic ICANO stenosis without full collapse, via transradial approach, in the presence of contralateral ICA (Internal Carotid Artery) “critical” stenosis.

This case provides additional data about optimal treatment of these patients, who are often excluded from randomized control trials (RCT’s), but frequently encountered in the cardiovascular practice.

**Key words:** carotid artery stenting, near occlusion stenosis, internal carotid artery

### **Introduction**

Population based studies show that about 10-15% of ischemic strokes are caused by large vessel cerebrovascular disease. In this group of patients, atherosclerosis of the extracranial internal carotid artery is the most important cause of large vessel stroke [1,2].

The method of treatment of internal carotid artery (ICA) atherosclerotic stenosis depends on the presence of symptoms, percentage of luminal stenosis, and other clinical and plaque morphology characteristics.

Two of the four prespecified descriptive criteria are required for diagnosis of ICANO: 1) delayed filling, 2) intracranial collaterals, 3) ipsilateral distal ICA less than the contralateral distal ICA, and 4) ipsilateral distal ICA equal to or less than the ipsilateral external carotid artery (ECA). In everyday practice, ICANO stenosis, especially without full collapse, can easily be misdiagnosed as a conventional high degree stenosis.

Because of the different stroke risk, proper differentiation between these two types of lesions is important for the correct treatment decision [3].

We report a case of carotid artery stenting (CAS) of symptomatic ICANO stenosis, without full collapse, via transradial approach (TRA), in the presence of contralateral ICA “critical” stenosis.

### **Case report**

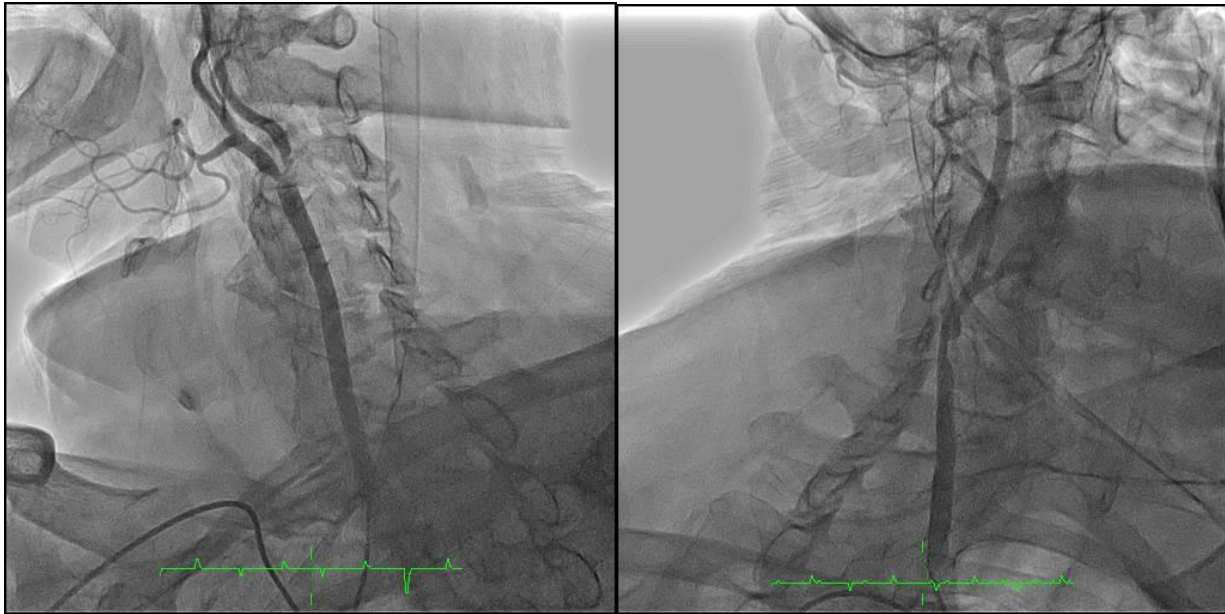
We present the case of a male patient, 68 years old, with intense attacks of vertigo, visuospatial problems and limb clumsiness. Comorbidities included dyslipidemia, on statin therapy. He was normotensive.

Duplex ultrasound of carotid arteries showed significant bilateral stenosis (>90%) on ICA. Carotid angiography was indicated for further diagnosis and treatment strategy.

As of diagnostic work-up protocol coronary angiography was performed before carotid angiography. Our preferred approach was via right TRA. The coronary angiogram showed an

intermediate atherosclerotic stenosis of the distal circumflex and the right coronary artery, with recommendation for medical treatment.

Lateral carotid angiogram revealed a critical stenosis (95-99%) of the left ICA and a right ICANO stenosis (99%) at the ostium, without full collapse and with delay in distal filling with contrast. Proximal to the bifurcation, there was another significant stenosis (60-70%) in the common carotid artery (CCA). Stenoses were eccentric, homogenous, angiographically described as soft, lipid-rich plaques without a significant calcification (Figure 1,2).

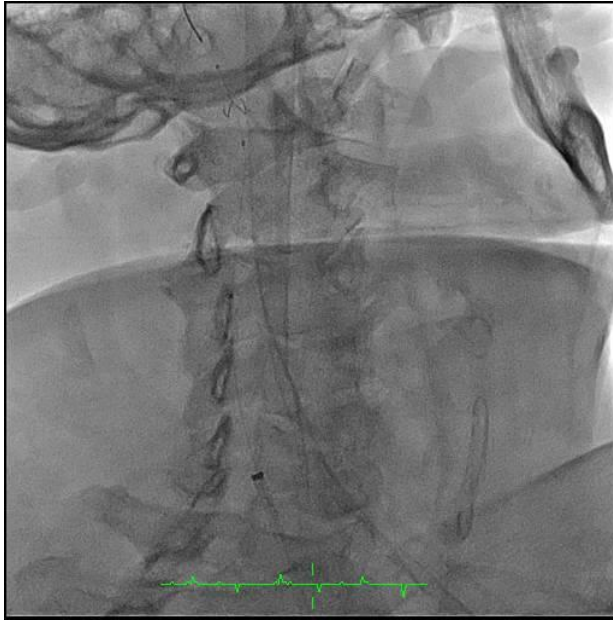


**Figure 1.**Critical 95-99% stenosis of left ICA

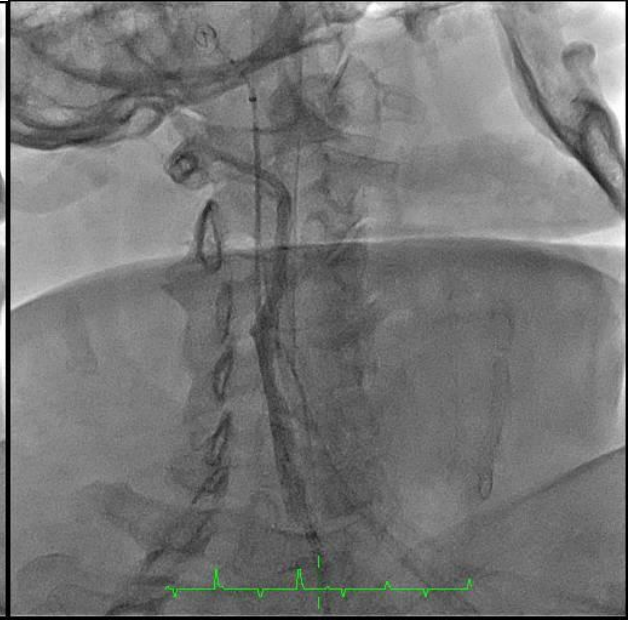
**Figure 2.**Right ICANO stenosis, without full collapse

We decided to perform CAS of the right ICA, because delayed distal filling and instability of the plaque. The 6 French (Fr) radial sheath was exchanged for a 6 Fr/110 cm Flexor Shuttle Guiding Sheath (Cook Medical, USA), into the right CCA. A distal protection filter (Emboshield NAV, Abbott, USA) was placed several centimeters distal to the lesion, in ICA (Figure 3).

Double-mesh, self-expanding carotid stent 8 mm x 30 mm (Roadsaver, Terumo, Japan) was deployed, with the “double mesh” part across the area of maximal stenosis (Figure 4).



**Figure 3.** Deployed distal protection filter in distal ICA



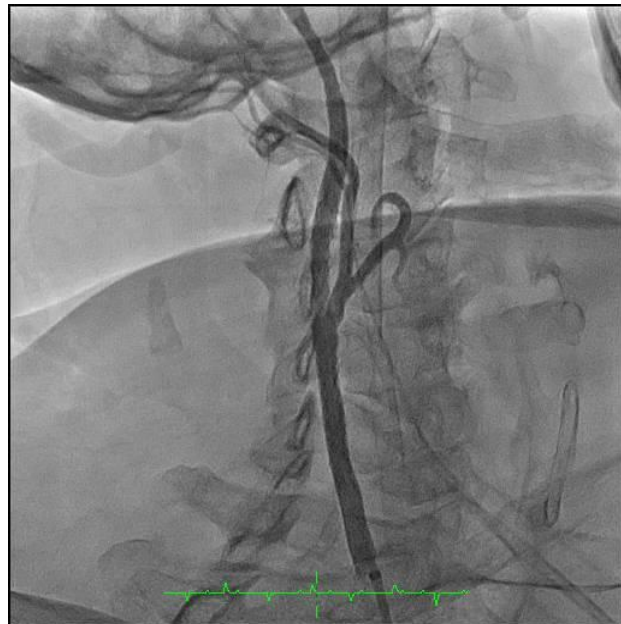
**Figure 4.** Positioning of "Double-mesh" carotid self-expandable stent

The procedure was finished with two post-expansion balloon dilations (Balloon 5.5/20 mm x 7 atm); at the bifurcation and in the proximal part of the stent in CCA. Using a "retriever catheter", the distal protection filter was recaptured and removed. The final angiogram showed an optimal result with normal flow, and optimal carotid stent expansion (Figure 5,6).

Angiography of the cerebral vascularization showed no distal thromboembolism.



**Figure 5.** Final lateral carotid angiogram



**Figure 6.** Final lateral carotid angiogram

The patient was hemodynamically and neurologically stable during and after the procedure. He was discharged the hospital the next day with dual antiplatelet (aspirin and clopidogrel) and high dose statin therapy (rosuvastatin).

### Discussion

ICANO stenosis has been described in the literature with different terms: “string sign”, “pseudo-occlusion”, “slim sign” stenosis, etc. [3]. In clinical practice they are not rare. Fox *et al.* showed that 21.5% of patients from the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the European Carotid Surgery Trial (ECST), who had severe stenosis, were categorized as ICANO, or one in every five patients with severe stenosis met two or more diagnostic criteria for ICANO [4]. Diagnostic criteria should be followed in everyday practice because diagnosis of ICANO stenosis can be easily overlooked, if only the percentage of luminal stenosis is measured [3]. In our case, where bilateral stenosis was present, diameter comparison between the two ICA can be difficult.

Although ICANO stenoses are “critical” and visually perceived as the “worst degree” of carotid stenoses, they have a better outcome and prognosis than conventional severe stenoses. The lower stroke risk from the stenosed artery in ICANO is a result of the stroke mechanism, which is embolic rather than hemodynamic. With near occlusion, there is a relative embolic protection from the decreased arterial diameter, with contribution to the affected hemisphere from the ipsilateral carotid circulation [4]. Furthermore, there is a difference in stroke risk between the two subtypes of ICANO, with and without full collapse. Recent data have shown a lower risk for stroke in symptomatic ICANO without full collapse [5].

Separating ICANO stenosis from conventional severe stenosis is also important because of the potential miscalculation of the percentage of stenosis using the diameter of ICA as a reference value [3].

Current guidelines recommend treating ICANO stenosis with the best medical therapy (BMT): “Carotid endarterectomy (CEA) or CAS are not recommended in symptomatic patients with a chronic internal carotid near-occlusion, unless associated with recurrent ipsilateral symptoms (despite optimal medical therapy) and following multidisciplinary team review” [2]. But this recommendation is based on level III and class C evidence from a *post hoc* re-analysis of the NASCET and the ECST data, published in 2003. Consequently, patients with ICANO stenosis were excluded from following RCTs of carotid interventions [6].

Recent data from meta-analysis have not confirmed the advantage of BMT alone over CAS and CEA. Meershoek *et al.* showed that BMT was not superior to surgical CEA or CAS with respect to 30-day or 1-year stroke/death prevention in patients with an ICANO. There was no significant difference in outcome between the two revascularization methods [6]. Similar data were presented by Mylanos *et al.* with a significantly higher incidence of stroke in the BMT group compared to CAS or CEA [7].

The comparison of CAS with CEA for ICANO showed similar outcomes in restenosis and vessel maturation rates. Kim *et al.* presented no major differences in clinical outcomes and periprocedural complications between the two treatments. They concluded that CAS is a revascularization option for ICANO if the patient is with a high surgical risk for CEA [8].

### Conclusion

In everyday practice, looking for diagnostic criteria for ICANO in patients with severe carotid stenosis should be a routine procedure. The optimal treatment for patients with ICANO stenosis remains to be determined. These patients should be included in RCTs to obtain significant data regarding the necessity and type of treatment. CAS is a revascularization option for ICANO, especially if the patient is considered as high risk for CEA. Nevertheless, the decision for treatment should be individually assessed.

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