



## Caso Clínico

### Hemodynamic carotid pseudo-occlusion due to synchronic common and internal carotid artery stenosis

#### *Pseudooclusión carotídea hemodinámica secundaria a estenosis sincrónica de arteria carótida común y carótida interna*

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### Abstract

**Introduction:** synchronic stenosis of the common and internal carotid artery is a rare condition behaving as a hemodynamic pseudo-occlusion of the intracranial carotid artery.

**Case report:** we report an unusual case of a patient with right common and internal carotid symptomatic stenosis diagnosed with carotid artery occlusion. Careful review of the CCTA and arteriogram revealed that tandem stenosis of the common and internal stenosis can mimic the occlusion of the proximal internal carotid artery with alternating blood flow.

**Discussion:** after stenting the common carotid artery the percent diameter stenosis of the internal carotid artery was modified to 60% and a normalization of the cerebral perfusion was shown.

#### Keywords:

Innominate artery. Stenosis. Alternating blood flow. Stent. Common carotid artery.

### Resumen

**Introducción:** la estenosis sincrónica de la arteria carótida común y de la interna es una patología poco frecuente que se comporta como una pseudooclusión a nivel de la arteria carótida intracraneal.

**Caso clínico:** presentamos el caso poco común de un paciente con estenosis de arteria carótida común e interna derecha que fue diagnosticado de oclusión carotídea a nivel intracraneal. Una revisión cuidadosa de la angio TAC y de la arteriografía demostró que las lesiones en tándem de la arteria carótida común e interna pueden comportarse como una oclusión en la porción proximal de la carótida interna con flujo alternante.

**Discusión:** Después de colocar un *stent* en la arteria carótida común, no solo se modificó el grado de estenosis de la arteria carótida común al 60 %, sino que se consiguió la normalización de la perfusión cerebral.

#### Palabras clave:

Arteria innominada. Estenosis. Flujo alternante. *Stent*. Arteria carótida común.

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## INTRODUCTION

Compared to isolated internal carotid artery (ICA), synchronic common carotid artery (CCA) and internal carotid stenoses can all behave as hemodynamic pseudo-occlusions of the artery mimicking a greater stenosis of the ICA. We report an unusual case of this condition.

## CASE REPORT

This is the case of a 53-year-old man—smoker and dyslipemic—who was admitted to the hospital with left brachio-fascial palsy TIA. The CT scan revealed the presence of mixed atheromatous disease of the right CCA and an ipsilateral ICA stenosis > 90 % (Figs. 1 and 2).

The doppler US (DUS) demonstrated that the stenosis of the right CCA caused acceleration > 330 cms/s yet the one on the ICA caused acceleration of 180 cm/s with a 2.4 ratio (1). A proximal near occlusive stenosis can actually decrease the acceleration corresponding to a significant carotid stenosis in the internal carotid artery (Figs. 3 and 4).



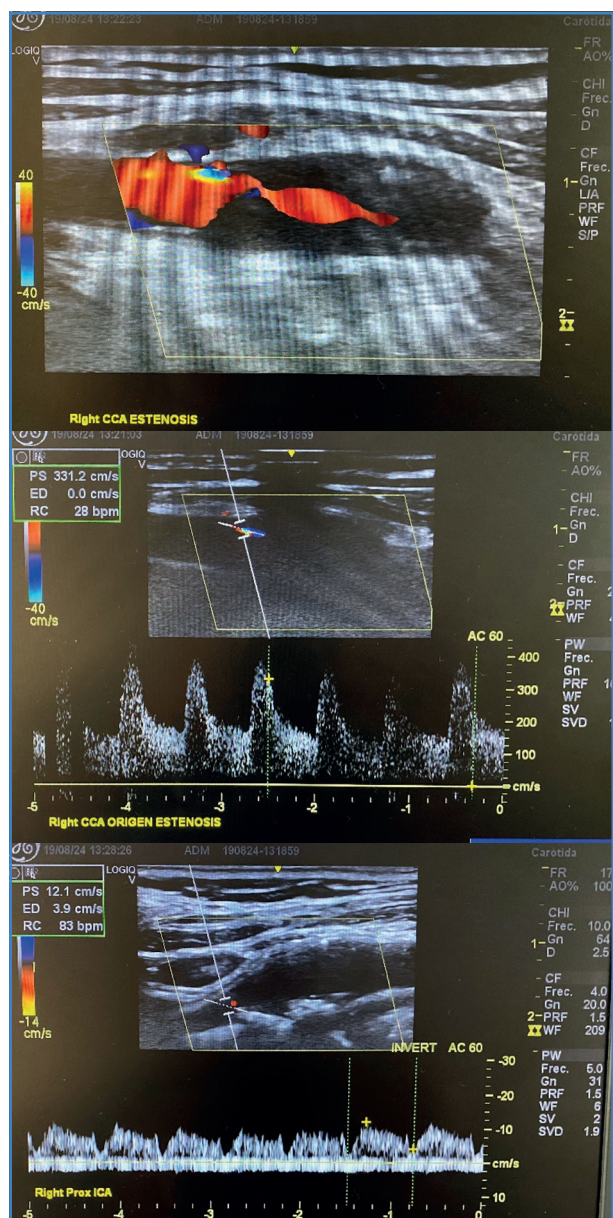
**Figure 1.** CT reconstruction: Right common carotid stenosis.



**Figure 2.** CT reconstruction: Right internal carotid stenosis.

In light of these contradictory findings of the CT scan and DUS, an angiogram was performed, which revealed the already known stenoses. Furthermore, it revealed that contrast did not reach the cerebral perfusion. A closer look at the angiogram demonstrated a different image of the contrast in the intracranial portion of the ICA (Figs. 5 and 6).

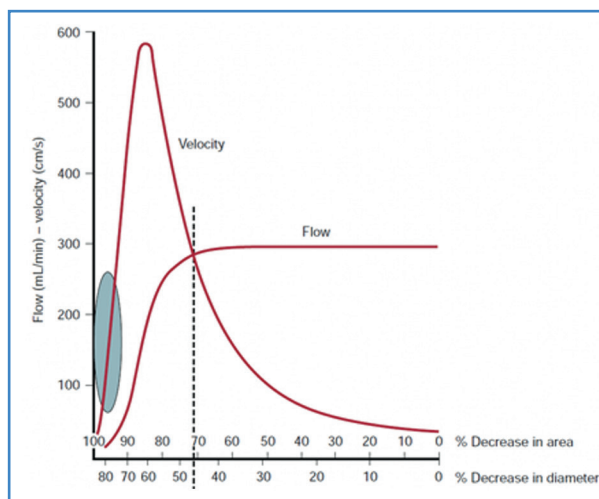
This phenomenon follows the hemodynamic effect of proximal carotid artery stenoses (3). Since blood flow of the intracranial artery is tempered due to stenosis, pressure to the contralateral blood flow does not allow contrast material to reach the circle of Willis, thus resulting in a pseudo-occlusion. It also demonstrated how a continuous significant stenosis can reduce blood flowing through the ICA, showing a lack of acceleration and ratio corresponding to the stenosis found on the CAT scan and behaving as a subocclusive disease. We placed a 8 mm × 37 mm stent in the CCA (3), which resulted in the normalization of cerebral perfusion and reduced ICA percent diameter stenosis down to 60 % (Figs. 7 and 8).



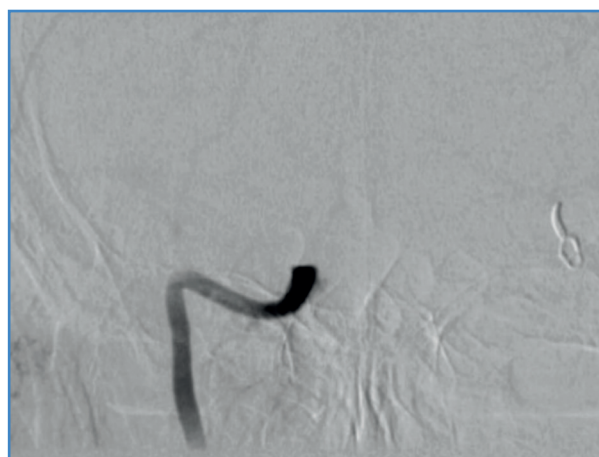
**Figure 3.** The first and second image shows the ICC stenosis with an acceleration up to 331.2 cm/s. The third image shows the tapered acceleration of the ICA due to the proximal stenosis.

## DISCUSSION

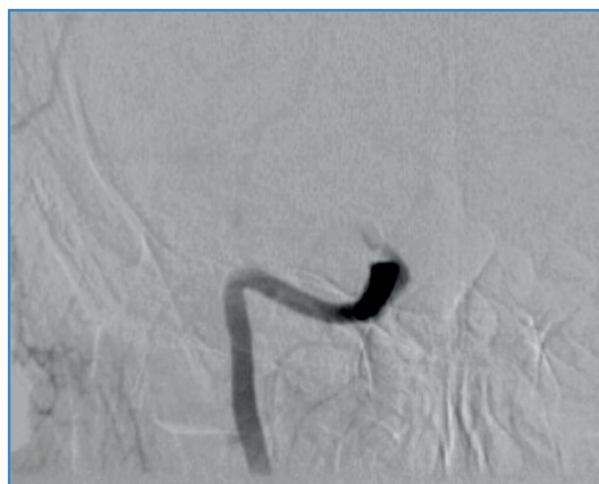
Proximal carotid stenosis generating an alternative blood flow of intracranial circulation is a rare finding. It can mislead diagnosis and affect the correct management of a patient with symptomatic carotid stenosis. López-Hernández et al. (4) described a series of 4 patients with alternative flow in the anterior cerebral artery associated with innominate artery stenosis. A total of 3 patients presented with common carotid stenosis



**Figure 4.** Correlation of percent diameter reduction with increases in blood flow velocity (cm/s). Note that a high-grade diameter-reducing stenosis causes volume flow to decrease toward zero, whereas the velocity within the stenosis may be minimally elevated (2).



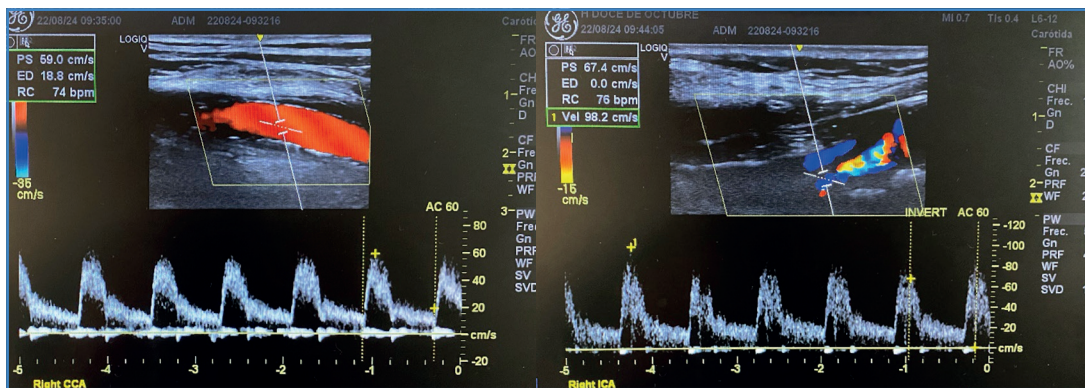
**Figure 5.** Angiogram: apparent occlusion of the intracranial portion of the internal carotid artery.



**Figure 6.** Angiogram: alternating imaging of contrast in the internal carotid artery.



**Figure 7.** stent placing and control. A: common and internal carotid stenosis. B: stent placing with improvement of internal carotid blood flow. C: alternating contrast image before stent placement. D: normalization of cerebral blood flow after stent placing.



**Figure 8.** Doppler ultrasound control after CCA stent placing. Shows a patent stent with normalization of speed on the CCA and ICA.

and 1 with innominate artery stenosis. After successful angioplasties orthograde flow came back to normal in all cases. They also found that early systolic hemodynamic compromise in the first segment of the anterior cerebral artery in the form of alternative flow as an indirect indicator of ipsilateral proximal stenosis of supraaortic arteries.

## CONCLUSIONS

Synchronic CCA and ICA can mimic an increased degree of stenosis of the ICA due to reduced blood flow and produce an image of pseudo-occlusion in the intracranial ICA. Treating the proximal lesion in the innominate or common carotid artery can not only reduce the degree of stenosis in the internal carotid artery but also help restore the normal ipsilateral intracranial blood flow.

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