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World Neurosurgery Research

ISSN 2995-6579

Short Communication

How Much We Know About Dolicoarteriopathies.

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Abstract

Carotid artery dolicoarteriopathies, including elongation, kinking, and coiling, are linked to various cerebrovascular dysfunctions. Kinking, categorized by Metz et al., is graded by angle severity: Grade 1 (90-60°), Grade 2 (60-30°), and Grade 3 (<30°). In Grade 2 and 3, reduced blood flow heightens ischemic risk, contributing to hemodynamic instability and cerebrovascular insufficiency. While most symptomatic cases undergo endovascular or surgical correction, some patients with severe kinking remain asymptomatic, questioning current understanding. In 52 cases of carotid artery kinking, we observed stenosis in symptomatic patients, differing from the expected arterial enlargement seen in dolicoarteriopathies. This suggests two potential kinking types: stenotic and enlarged. A notable case presented bilateral Grade 3 internal carotid artery kinking, with right-sided stenosis and cerebral hypoperfusion, yet left-sided transient ischemic attacks occurred. This finding challenges existing classifications and suggests further investigation is warranted.

Keywords : *Dolicoarteriopathies, Kinging, Carotid Artery.*

Carotid artery dolicoarteriopathies, encompassing elongation, kinking, or coiling of the vessel, has been identified as a contributor to a spectrum of cerebrovascular dysfunctions. (1,2) Kinks are classified according to Metz et al., classification according to the severity of the angle (3). (Grade 1:90-60 degrees (mild kinking), Grade 2: 60- 30 (moderate kinking), Grade 3 < 30 degrees (severe kinking)). Especially, in grade 2 and 3 dolichoarteriopathies, there is a reduction in blood flow, which escalates the risk of ischemic events (4). Such vascular anomalies can lead to hemodynamic disturbances and are implicated in cerebrovascular insufficiency pathophysiology. These vascular aberrations can disrupt hemodynamic stability.Endovascular or surgical procedures are tailored to address these specific vascular anomalies present in dolicoarteriopathies, offering alternative avenues for restoring cerebral hemodynamics and alleviating the associated neurological symptoms. (5-7)

However in clinical practice most of us have seen that some patients with grade 2 or 3 kinking have no neurological symptoms. After operating over 52 due to carotid artery kinking, we have observed that in all of these symptomatic cases, the kinking area alone/or including the proximal side was stenotic. All surgeries were performed by the senior surgeon (M.E.Ü), with informed consent obtained from all participants. The local ethics committee approved the study, documented under approval number 2/12 dated 03.30.2022. From the literature we know that in dolicoarteriopathies the arteries are enlarged even in kinking cases. But in our cases they were stenotic. Therefore in our operations we used a technique that has been used for the first time in dolicoarteriopathies. After arteriolysis (releasing the artery from surrounding fibrotic tissue and thickened adventitia) We cut the sympathetic fibers around the vessel under microscopic magnification which we named as perivascular sympathectomy. (8-9) The dilatation of the vessel with this technique showed us that the main pathology was outside the vessel. (**fig.1**) This observation raises an important question do at least kinkings apart from dolicoarteriopathies, have two

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Received: 12-Jun-2025, Manuscript No. WNSR-4933 **; Editor Assigned:** 13-Jun-2025 **; Reviewed:** 30-Jun-2025, QC No. WNSR-4933 **; Published:** 05-Jul-2025, **DOI:** 10.52338/wnsr.2025.4933
Citation: **Mehmet Erkan Üstün MD**. How much we know about dolicoarteriopathies. World Neurosurgery Research. 2025 July; 12(1). doi: 10.52338/wnsr.2025.4933.

types as stenotic and enlarged.

Figure 1A. Intraoperative view after arteriolysis, the arrow shows the kinking and stenosis at the right internal carotid artery.

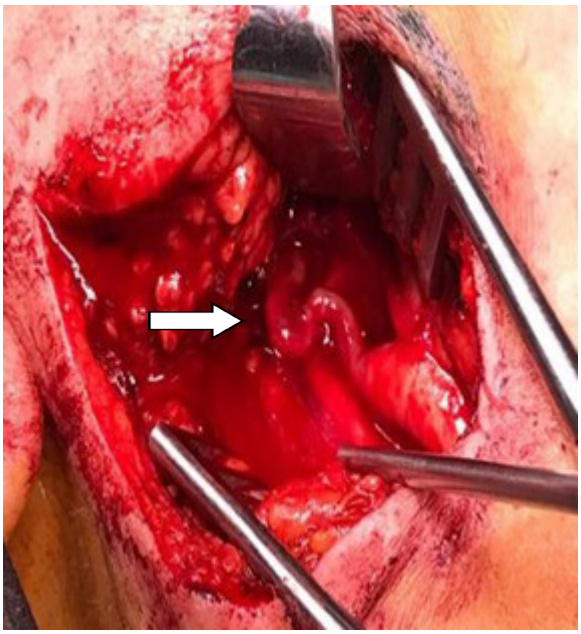
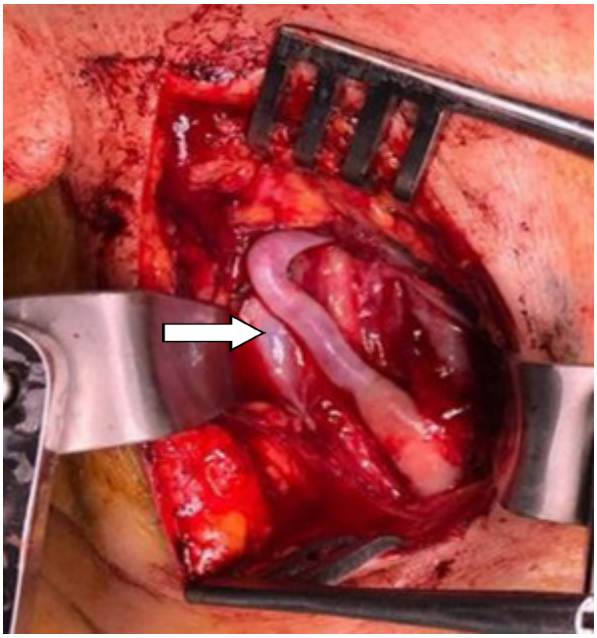


Figure 1B. Intraoperative view after perivascular sympathectomy, the arrow shows the dilatation at the right internal carotid artery.



In one case (**fig.2**) the patient had grade 3 kinking in both internal carotid arteries (ICA) at the same level, but interestingly right ICA was stenotic, but left was not. The patient had cerebral hypoperfusion at the right side, but not at the left and experienced 3 times left sided transient ischemic attacks (TIA).

Figure 2A. Magnetic perfusion image showing right-sided hypoperfusion with white arrow.

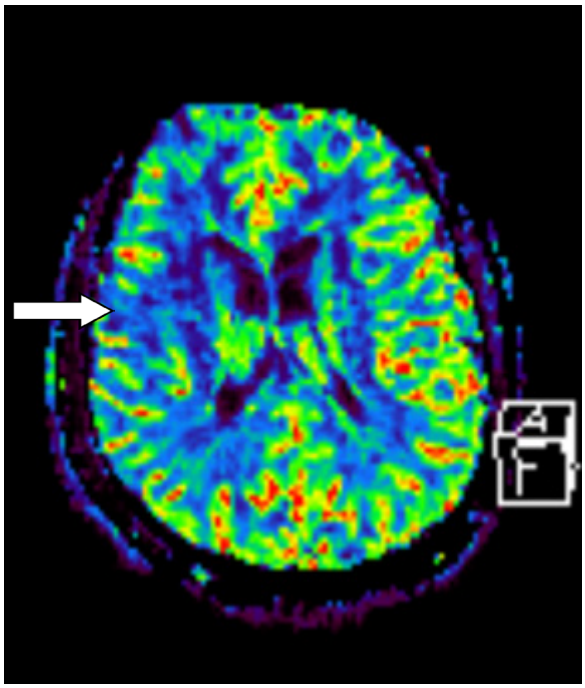
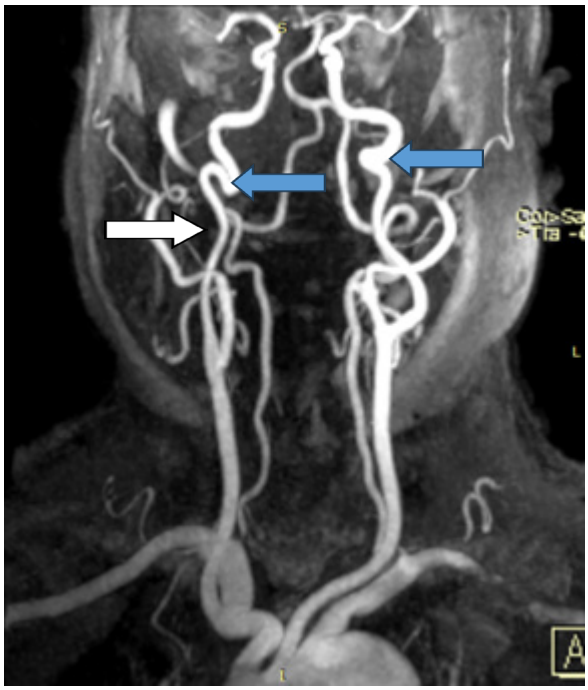


Figure 2B. Magnetic neck angiography showing distal cervical internal carotid artery grade 3 kinking at both sides shown with blue arrows, but with stenosis at the right side shown with white arrow.



CONCLUSION

Dolicoarteriopathies, particularly severe forms of kinking, have long been associated with reduced cerebral blood flow and increased ischemic risk. However, our observations

challenge the prevailing understanding that these vascular anomalies primarily involve arterial enlargement. In a series of 52 cases, we found that symptomatic patients often exhibited arterial stenosis at the kinking site alone/or including proximal site,which were corrected with a new technique named as perivascular sympathectomy, suggesting the existence of two distinct types of kinking: stenotic and enlarged. This finding is further supported by a case of bilateral Grade 3 internal carotid artery kinking, where only the stenotic side caused hypoperfusion despite identical anatomical presentations. These results highlight the need for re-evaluating the clinical approach to dolicoarteriopathies, particularly regarding the differentiation of kinking types, and suggest a potential shift in treatment strategies based on hemodynamic profiles rather than anatomical classification alone.

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