

## Surgical Management of Carotid Dolichoarteriopathies – A Single Center Experience



### Medical Science

**KEYWORDS :** internal carotid artery, dolichoarteriopathy, surgical treatment

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### ABSTRACT

*Carotid dolichoarteriopathies (tortuosity, kinking and coiling) represents a common angiographic and Duplex scanning finding, but choosing the right method for treatment is still a subject of numerous debates. The aim of this study was to analyze the clinical features of the patients with carotid dolichoarteriopathies who referred for surgery to Clinic of Cardiovascular Surgery from the Emergency Institute for Cardiovascular Diseases and Transplantation, Targu Mures and the type of surgery performed. When these anomalies are the cause of cerebrovascular insufficiency surgical treatment is indicated and the surgeon must be familiarized with all the techniques and choose the right one tailored to each patient.*

### Introduction

Carotid dolichoarteriopathies (tortuosity, kinking and coiling) represents a common angiographic and Duplex scanning finding, but choosing the right method for treatment is still a subject of numerous debates [1,2,3]. Usually mild tortuosity remains asymptomatic, while severe tortuosity can lead to various serious symptoms [4,5,6]. In some of the patients with cerebrovascular insufficiency, the morphological variation of the internal carotid artery is associated with an atheroma of the carotid bifurcation and surgical treatment of both conditions is required to be performed. On the other hand surgical treatment of a symptomatic kinking without an atherosclerotic process associated remain a controversy [7,8,9].

The aim of this study was to analyze the clinical features of the patients with carotid dolichoarteriopathies who referred for surgery to Clinic of Cardiovascular Surgery from the Emergency Institute for Cardiovascular Diseases and Transplantation, Targu Mures and the type of surgical treatment applied.

### Material and methods

From January 2009 to December 2012, there were 220 patients referred to Clinic of Cardiovascular Surgery from Targu Mures for internal carotid artery revascularization, 16 of them being with carotid dolichoarteriopathy.

Preoperative evaluation of each patient included a complete neurologic examination, a cardiac evaluation and an angiography to visualize the intra- and extracerebral circulation.

In all the cases the intervention was performed in general anesthesia and the surgical technique for correction of vascular anomaly was dictated by individual anatomic findings. Carotid dolichoarteriopathies were classified according to Weibel-Fields and Metz as tortuosity, kinking and coiling. Tortuosity is "S" or "C" shaped elongation in the course of the internal carotid artery. Kinking is an acute angulation of the internal carotid artery and it can be mild ( $\geq 60^\circ$ ), moderate ( $30^\circ$ - $60^\circ$ ) or severe ( $< 30^\circ$ ) according to the angle formed between the two segments of the artery. Coiling was defined as an elongation or redundancy of the internal carotid artery resulting in an exaggerated S-shaped curve or in a circular configuration [1].

### Results

Considering the clinical data of the 16 patients with carotid dolichoarteriopathy, it can be observed there is an equal male/female ratio, the mean age was 63 for male and 68,2 for female. Vascular malformations were more frequently found on the left

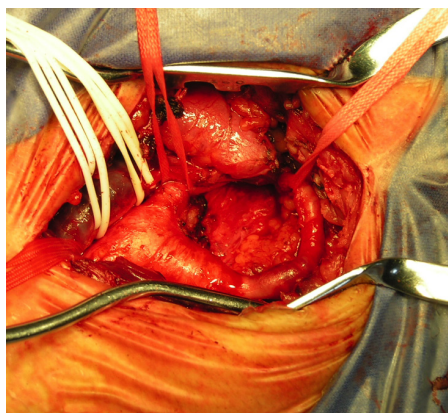
then on the right side. There were 13 patients with kinking of internal carotid artery, in 2 cases there were involved internal and common carotid artery and one patient presented coiling.

Most of the patients had a history of a transient ischemic attack and associated risk factors for atherosclerosis included cigarette smoking, arterial hypertension and diabetes mellitus.

Surgical techniques varied by the individual anatomic findings. Most frequently (9 patients) surgeons performed segmental resection of the internal carotid artery and then end-to-end anastomosis (6 patients) or end-to-side anastomosis (3 patients). Because four of the patients had also an atheroma plaque which cause a stenotic lesion they required first an eversional endarterectomy and then an end-to-end anastomosis.

When the atherosclerotic process was at the carotid bifurcation, there was necessary an endarterectomy of the carotid bifurcation for the stenotic lesion and then segmental resection of 2 cm from internal carotid artery (2 patients) and 3 cm from common carotid artery (one patient). The carotid reconstruction was made by reimplanting the internal carotid artery in the common carotid artery.

In the patient with the coiling, the resection of 3 cm from internal carotid artery and 1 cm from common carotid was performed. In 3 patients with internal carotid kinking there was sufficient angioplasty with vein graft (2 patients) or synthetic graft – Dacron (one patient).



**Fig.1. Internal carotid kinking – intraoperative aspect**

## Discussion

The evolution of carotid dolichoarteriopathy (a) symptomatic is not well known [4,10]. Most of the authors are agreed that there is a difference between coiling and kinking. Coiling had a congenital origin while kinking represents an acquired condition. Kinking coexists in many cases with an atheromatous process as it can be seen in our study. Hemodynamic changes due to a severe kinking may lead to transitory or permanent cerebrovascular insufficiency [11-15]. Today even there are many controversies concerning the surgical or medical treatment of carotid dolichoarteriopathies, in some cases surgical treatment is justified: patients with transient ischemic attacks, patients with a significant hemodynamic kinking or coiling, patients with an occlusion of carotid artery on one side and on the other side with a morphologic variation, patients with bilateral kinking and/or coiling with the correction of one side first and the symptoms do not disappear [4,11,13,16].

The principles of surgical treatment in patients with carotid abnormalities are: relieve permanently the kinking or coiling; remove any stenotic or ulcerative plaques and restore normal flow dynamics without turbulence [4,17].

The simple surgical tethering of elongated artery (arterioplexy) was abandoned because does not correct the redundancy [18].

In our study there were three types of surgical techniques: segmental resection of the internal carotid artery with end-to-end or end-to-side anastomosis; endarterectomy of carotid bifurcation with segmental resection of carotid artery and then reimplantation of internal carotid artery in common carotid artery; angioplasty of internal carotid artery with vein or synthetic graft.

Correction of kinking and coiling is performed with peroperative mortality below 1% and a low postoperative morbidity [19,20].

## Conclusions

Choosing the right treatment of carotid dolichoarteriopathy remains a controversy issue. When these anomalies are the cause of cerebrovascular insufficiency surgical treatment is indicated and the surgeon must be familiarized with all the techniques and choose the right one tailored to each patient.

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