

Simultaneous treatment of carotid artery stenosis and kinking with regional cervical block

İbrahim Erdinç¹, Didem Melis Öztaş², Cenk Eray Yıldız², Murat Uğurlucan²

¹Department of Cardiovascular Surgery, University of Health Sciences, Bozyaka Training and Research Hospital, Izmir, Turkey

²Department of Cardiovascular Surgery, Istanbul University Istanbul Faculty of Medicine, Istanbul, Turkey

ABSTRACT

Severe carotid artery stenosis is a pathology which is associated with increased morbidity and mortality. The rate of carotid artery kink increases together with the increasing aging population. There is a need for concomitant treatment of both pathologies, when they co-exist. In this report, we present the surgical treatment that we performed in a 76-year-old patient presenting with carotid artery stenosis and kinking.

Keywords: Carotid artery kinking; carotid artery stenosis; carotid endarterectomy.

Internal carotid artery (ICA) kinking is defined as angulation in one or more segments according to angiographic findings.^[1] Prevalence in the general population is estimated to have increased from 10 to 16%.^[2] Kinking is thought to increase with advanced age due to structural degeneration of the artery, but is actually fundamentally congenital.^[1] In symptomatic patients with concurrent carotid artery stenosis and ICA kinking, simultaneous treatment of both pathologies is the generally accepted therapy model, ensuring completely secure revascularization.^[3]

This case report presents the surgical treatment of a male patient with carotid artery stenosis as well as severe kinking.

CASE REPORT

A 76-year-old male patient was admitted to our clinic with symptoms of numbness of the right arm and dizziness. The patient was on medication for hypertension and had a 35 pack/year history of smoking. Laboratory tests revealed elevated levels of triglycerides and LDL.

Doppler ultrasound showed a plaque with more than 70% stenosis in the right ICA, upon which computed tomography angiography was performed. Right ICA stenosis was confirmed and kinking of the right proximal ICA was also detected (Figure 1). Surgery was planned in order to simultaneously treat carotid artery stenosis and kinking. The patient was appropriately informed and the procedure was planned after the patient provided consent.

The operation was performed under regional and infiltration anesthesia. The patient tolerated carotid clamping and use of shunt was unneeded. In the right proximal ICA segment with kinking (Figure 2), atheroma plaque was observed and resection of the narrowed segment and reimplantation of the ICA to the common carotid artery (CCA) was decided. Carotid endarterectomy together with primary repair was performed. The ICA was reimplanted to the CCA to correct its configuration (Figure 3). The patient was neurologically stable throughout the operation.

The patient's postoperative period was unremarkable and the patient was discharged without issue on

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Correspondence: İbrahim Erdinç, MD. SBÜ Bozyaka Eğitim ve Araştırma Hastanesi, Kalp ve Damar Cerrahisi Kliniği, 35170 Karabağlar, İzmir, Türkiye.
e-mail: ibrahimerdinc@yahoo.com

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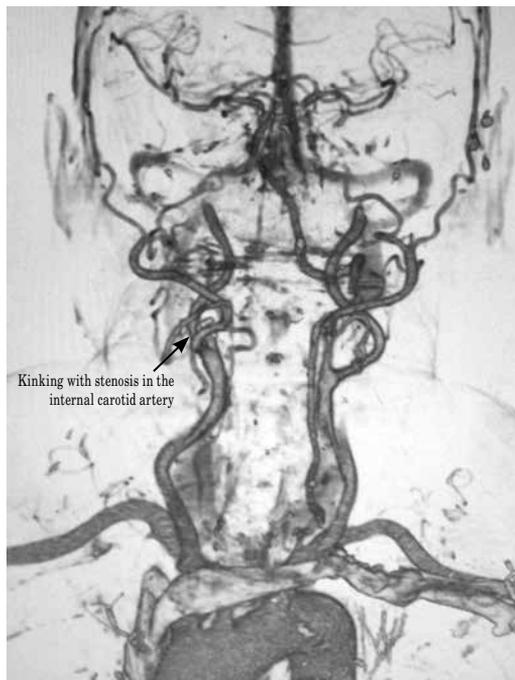


Figure 1. Computed tomography angiography shows kinking with stenosis in the internal carotid artery.

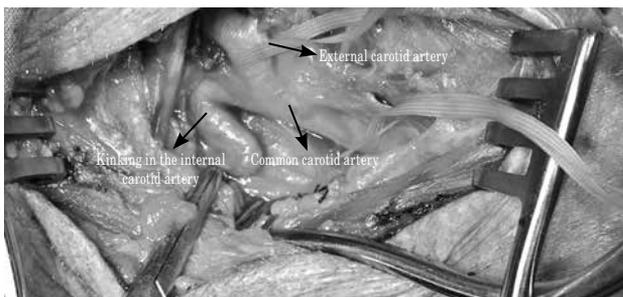


Figure 2. Intraoperative image of kinking in the internal carotid artery.

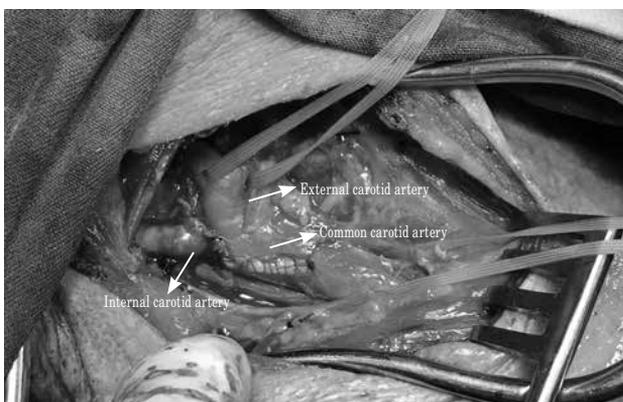


Figure 3. Intraoperative resection of the atherosclerotic internal carotid artery segment, endarterectomy and primary repair, and corrected kinking and reimplantation of the segment to the common carotid artery.

postoperative day three. Doppler ultrasound taken three months after the operation showed normal configuration of the internal and external carotid arteries and no residual stenosis.

DISCUSSION

Elongation of the ICA with angulation of 90 degrees or less causes kinking. In patients with cerebrovascular symptoms or incidental carotid artery stenosis despite being asymptomatic, incidence of this pathology is between 5-25%.^[3]

The exact incidence is unknown as it can be asymptomatic. Although there are publications that report rates of incidental detection as high as 16-34%, symptoms related to fibromuscular dysplasia are observed in at least half of these patients.^[4,5] However, the literature does not provide data on incidence of concomitant carotid artery kinking and carotid artery atherosclerosis. Symptomatic patients show symptoms similar to those of carotid artery disease, including transient ischemic attacks, strokes, and transient loss of vision.^[6] Most symptoms are due to turbulent flow caused by ulceration and embolism due to carotid artery kinking.^[6] Carotid artery kinking has various causes. The pathology is thought to be associated with degenerative processes, especially in elderly patients. Greater elongation of the muscular layer compared to the adventitia establishes kinking of the artery.^[1] These lesions are four times more common in women than men.^[6] Chronic hypertension is thought to be one of the risk factors.^[1] Carotid artery kinking is most commonly mistaken with ICA aneurysm. Ultrasonography easily distinguishes these lesions. Digital subtraction angiography (DSA) is the gold standard diagnostic method. Computed tomography angiography also provides good results.^[6]

There are varying opinions on whether or not cerebrovascular hemodynamics are affected in the presence of kinking in the carotid artery without atherosclerotic plaque.^[2] Kinking of the artery, unlike coiling, may cause neurologic symptoms such as paresthesia, weakness in the arms, or speech disorders without atherosclerotic plaque in 4-20% of patients.^[1] Correction of the affected carotid artery segment as well as anatomical reconstruction is thought to reduce morbidity and mortality by preventing cerebrovascular symptoms.^[7] There is no consensus on the surgical treatment of patients with carotid artery kinking without atheroma plaque. There are a few publications that state that isolated kinking of the artery occurs naturally and related neurologic symptoms rarely

justify surgical treatment.^[3,8] However, some publications argue that ICA kinking is a potentially harmful condition and that ICA revascularization achieves good results.^[9-11] However, according to the 2018 guidelines of the European Society for Vascular Surgery, surgical treatment of carotid artery kinking in asymptomatic patients is considered controversial and not recommended.^[12] In addition, in patients with no other risk factor for transient or irreversible stroke, surgical treatment is recommended according to the evaluation by a multidisciplinary team.^[12] In our patient, surgical treatment was performed due to carotid artery stenosis requiring intervention and ICA kinking was corrected to its anatomical position in the same session. Had the patient been asymptomatic or if severe carotid stenosis had not been detected, the patient would have been informed of the pathology and taken into a follow-up program in accordance with guidelines as planned.

Carotid artery stenosis is one of the major causes of ischemic stroke in elderly patients.^[13] The best treatment option is surgical approach in over 50% of patients with symptomatic carotid artery stenosis.^[13] When coexistence of kinking and carotid stenosis is observed, both pathologies must be simultaneously treated in order to ensure secure revascularization.^[3] In adults with symptoms due to cerebrovascular insufficiency, carotid artery kinking is usually associated with atheroma plaque in the bifurcation.^[3] Carotid endarterectomy is an effective method in the treatment of stenotic and symptomatic plaques.

There are various options in the surgical treatment of internal artery kinking. Internal carotid artery segment resection and end-to-end reanastomosis, shortening and reimplantation of the ICA to the CCA, and bypass grafting are among these techniques.^[1]

Carotid artery stenting, which is considered an alternative option, may complicate the procedure in arteries with severe kinking, but may be considered a safe and alternative treatment in patients who do not accept surgery or who cannot be operated due serious risk of morbidity and mortality.^[14]

Surgical method in treating symptomatic and asymptomatic patients with severe carotid artery kinking together with carotid artery stenosis is an effective and reliable form of treatment.^[15] Some publications have found eversion carotid endarterectomy, ICA resection, and reimplantation techniques to be superior to ICA resection with patch reconstruction and prosthetic repair after endarterectomy.^[16]

Our patient had severe carotid artery stenosis together with carotid artery kinking. In order to simultaneously treat both pathologies, the proximal ICA segment with atheroma plaque was resected and reimplanted to the CCA to correct ICA configuration. The main goals of treatment are to eliminate the possibilities of morbidity and mortality that may occur in patients with internal carotid artery stenosis together with kinking and ensure revascularization. Therefore, preferring techniques that will also eliminate kinking in the surgical treatment of atherosclerotic carotid artery stenosis is presented as a reliable therapy option, especially in the elderly population.

Declaration of conflicting interests

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