Malformations of the Internal Carotid Artery: Case Report

Karotis Arter Malformasyonları

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ABSTRACT Internal carotid artery (ICA) malformations and their effects on carotid artery stenosis and cerebrovascular diseases are still under investigation. Unilateral and bilateral variation in the course and elongation of the cervical (extracranial) part of the ICA leading to its tortuosity, kinking and coiling or looping is not a rare condition, which could be caused by both embryological and acquired factors. Some patients with such variations may be asymptomatic while others can develop cerebrovascular symptoms due to carotid stenosis affecting cerebral circulation. The risk of transient ischemic attacks in patients with carotid stenosis is high and its surgical correction is indicated for the prevention of ischemic stroke. Detection of developmental variations of the ICA and evaluation of its stenotic areas are very important for surgical interventions and involve specific diagnostic imaging techniques for vascular lesions including contrast arteriography, duplex ultrasonography and magnetic resonance angiography. The surgical technique of resection of tortuous segment, with dilatation and reimplantation has become the method of choice in treating carotid kinking and coiling. Common morphological pathologies such as kinking and coling must be treated surgically.

Key Words: Carotid artery, endarterectomy, malformation, ultrasonography, Doppler; magnetic resonance angiography; vascular surgical procedures

ÖZET İnternal karotis arter malformasyonları ve etkilerinin karotis arter stenozu ve serobrovasküler hastalıklarla olan ilişkisi üzerine çalışmalar devam etmektedir.Tek taraflı ve bilateral servikal bölgede oluşan kıvrılma,bükülme ve katlantılar nadir değildir ve doğumsal nedenlere bağlı olabilir. Bu tür varyasyonlara sahip bazı hastalar asemptomatik olabilirken, diğer hasta grupların semptomatik olup, serebrovasküler hadiseler karotis stenozuna bağlı olmaktadır. Karotis stenozuna sahip yüksek riskli hastalarda cerrahi müdahale yapılması inme riski için çok önemlidir. Bu nedenle cerrahi müdahale yapılacak hastalarda internal karotis arterin değerlendirilmesi çok önemlidir.Vasküler lezyonların değerlendirilmesi için konvansiyonel anjiyografi, Doppler ultrasonografi ve magnetik rezonans anjiyografi önemli yer tutmaktadır. Cerrahi teknik kıvrılma veya bükülme yapan karotis arter seviyesinin rezeksiyonu ve tekrar uç yan anostomoz edilmesidir. Asemptomatik ve semptomatik internal karotis arter malformasyonları cerrahi olarak tedavi edilmelidir.

Anahtar Kelimeler: Karotid arter, endarterektomi, malformasyon, ultrasonografi, Doppler; manyetik rezonans anjiyografi; damar cerrahisi uygulamaları

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The occurrence of carotid abnormalities (CAs) verified by arteriography varies between 10% to 43% of the cases.[1,2] Kinking occurs in 5%-16% of patients[3,4] mostly elderly men, and is associated with atherosclerotic pathology. Coiling is more common in younger women.[5] Up

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to 75% of morphological abnormalities were localized 2-4 cm proximal to the bifurcation of carotid artery.[6] The use of Doppler ultrasound in the ongoing clinical practice has enabled rapid, morphological and also functional studies of carotid artery (CA).[7] Del Corso et al.[8] reported that more than half of the patients with cerebrovascular symptoms had some forms of CAs diagnosed by ultrasound technique.

CASE REPORT

An 80-year-old female patient with dizziness and transient loss of vision was referred to our clinic. Doppler ultrasound (USG) showed 70% stenosis of the distal part of the left ICA. In this area, calcified plaque was observed extending 14 mm in length and thickening was 2.6 mm. Moreover, the middle-distal part of the left common carotid artery (CCA) had 50% stenosis and 32 mm length and 2.6 mm thickness. Doppler USG revealed no stenosis or insufficiency in vertebrobasilar system and total volume measured more than 200 ml. Magnetic resonance angiography showed total occlusion of the right common carotid artery from the origin.

There were wall irregularities and loss of focal calibration in the proximal portion of left ICA. Bilateral vertebral arteries had tortuous atherosclerotic plaques. Furthermore, right vertebral artery had loss of calibration (Figure 1).

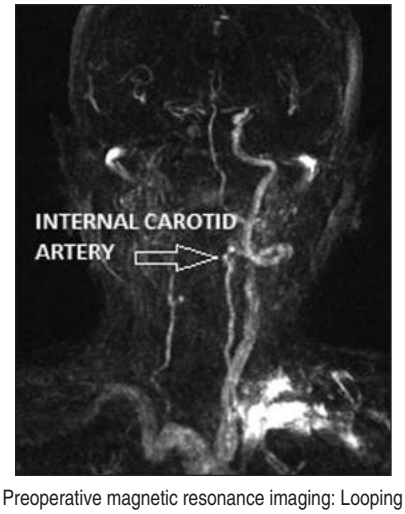

FIGURE 1: Preoperative magnetic resonance imaging: Looping of left internal carotid artery can be seen on the left side of the image.

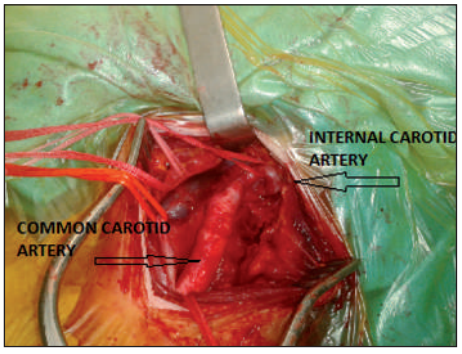

FIGURE 2: Intra-operative view of the common and internal carotid arteries.

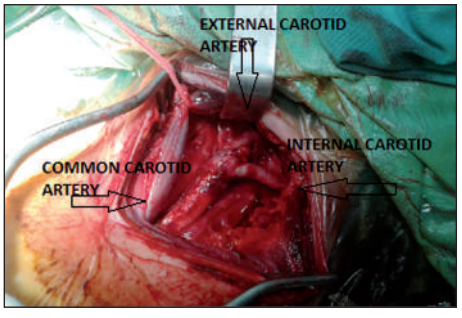

FIGURE 3: Intra-operative view of the completed anastomosis between common and internal carotid arteries.

The patient was operated for the left ICA stenosis using combined servical block. After incision of the skin, the common, internal, external carotid arteries and distal portion of the ICA were prepared to get enough length. Loop of the left ICA (Figure 2) was released gently. 5000 IU of heparin was given intravenously. Internal carotid, external carotid and common carotid arteries were clamped subsequently. After each clamp, the patient's awareness and motor/neurological status was evaluated. As seen in this case, we did not use carotid shunt because the patient had no neurological deficit. Endarterectomy was applied to CCA and ICA, tortuous segment of the left ICA was resected and reimplanted to its native side by using end-to-side technique (Figure 3).

Internal, external and common carotid arteries were declamped. There was no neurological deficit postoperatively. The patient had anti-hypertensive and anti-platelet therapy. She was discharged on postoperative fifth day.

DISCUSSION

Anatomic variations in the course of cervical ICA have been reported to occur in 4-66% of general population.[9] Paulsen et al.[10] reported that kinking of ICA was found 4.3% of cases. The etiology of ICA aberrations is unknown, but it is likely the result of a combination of embryological maldevelopment and acquired diseases. Atherosclerosis and the fibromuscular dysplasia of tunics of the carotid arteries are the acquired factors, and they may result in cerebral emboli or intermittent stenosis in elderly patients.[11] An aberrant ICA may enlarge the pharyngeal wall and narrow the diameter of airway. This altered anatomy may result in obstructive sleep apnea.[12]

Surgical correction of CAs is indicated in patients with symptoms and when magnetic resonance angiography demonstrates hemodinamically significant kinking and/or coiling. However, bilateral high kinking with distal dissection of ICA is indicated for surgical repair only in cases with cerebral symptoms. This type of intervention is associated with frequent peripheral nerve lesions and a high mortality rate.[13]

CONCLUSION

Common morphological pathologies such as kinking and coiling must be treated surgically.

Conflict of Interest

Authors declared no conflict of interest or financial support.

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