CAROTID ANOMALY- A CAUSE OF STROKE

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ABSTRACT

The internal carotid artery abnormalities involving it’s trajectory have been documented however their etiology and relationship with stroke is still not clear. Very few cases have been reported regarding the circular loop, kinking and tortuosity of the internal carotid arteries. We report a case of a carotid anomaly who presented with dissection resulting in stroke which was confirmed on Magnetic resonance imaging (MRI) and computed tomography (CT) findings.

Keywords: Carotid Anomaly, Dissection, Stroke, Loop

INTRODUCTION

The internal carotid artery abnormalities in course and geometry (tortuosity, kinking, and coiling) have been found however their etiology and relationship with stroke and stroke like conditions remain unclear (Togay-isikay et al., 2005).

“Tortuosity” has been described as “S” or “C”-shaped elongation or undulation of the carotid arteries whereas “coiling” is defined as an elongation or redundancy of the arteries resulting in a circular/loop configuration; and “kinking” is described as an angulation of arteries. These have been classified according to the severity of the angle between the two segments forming the kink (Razvan et al., 2010).

The Modified Criteria of Morphologic Abnormalities of Internal Carotid Artery (ICA)

Wiebel-Filds and Metz (Weibel et al., 1965; Metz et al., 1961) is given below:

<table>
<thead>
<tr>
<th>Type of CAs</th>
<th>Forms of morphologic abnormalities of ICA</th>
<th>Symptoms</th>
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</thead>
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<tr>
<td>Kinking</td>
<td>Mild – angulation of elongated ICA with an angle &gt; 60 °</td>
<td>-</td>
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<tr>
<td></td>
<td>Medium – angulation of elongated ICA with angle between 30 ° – 60 °</td>
<td>±</td>
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<tr>
<td>Coiling</td>
<td>Severe – angulation of elongated ICA with angle &lt; 30 °</td>
<td>+</td>
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<td></td>
<td>Angulation of elongated ICA with the formation of S or C shape, or appearance of circular formations</td>
<td>±</td>
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</table>

CASES

A 38 year old gentleman not a known case of diabetes or hypertension presented with chief complaints of left sided weakness of face and arm 6 hours post road traffic accident.

Patient was taken up for MRI Brain for suspicion of stroke and scan confirmed the findings consistent with acute infarct- right middle cerebral (MCA) territory.

MR Brain was followed by CT angiography which showed long segment attenuation and irregularity of lumen suggestive of dissection of right Internal carotid artery(ICA) involving the mid part (tonsillar loop)-? Post traumatic/?? secondary to fibromuscular dysplasia. Short segment attenuation of M2 segment of right middle cerebral artery.

DISCUSSION

The incidence of carotid abnormalities (CAs), detected by arteriography varies between 10% to 43% of the cases (Weibel et al., 1965; Metz et al., 1961; Koskas et al., 1993). Kinking has been seen in 5%–16% of patients (Hsu et al., 1956; Vannix et al., 1977).
Case Report

Figure 1: MR Brain (a) T2FLAIR axial showing altered signal intensity involving the right external capsule and adjacent portions of the insular cortex and (b) DWI axial images shows evidence of restricted diffusion at the corresponding site suggesting an infarct

Figure 2: CT angiography 3D reconstructions (a) Maximum intensity projection (MIP) and Volume rendered technique (VRT) Images demonstrating looping of the bilateral internal carotid arteries (ICA) in the region of tonsillar fossa
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The etiology of the carotid abnormalities has been attributed to lowering of the heart in the chest (descensus cordis) during the third trimester of intrauterine development and any difference in speed of growth of the bony skeleton and supraaortic branches can lead to vascular abnormalities of blood vessels, which are usually observed bilaterally (Corso et al., 1988; Desai et al., 1975). Extreme flexion or extension of the neck can result in almost complete occlusion of viable arteries especially in patients with pre-existing kinking. This can manifest with temporary or permanent reduction in flow through the abnormal parts of the vessel which can contributory factor to brain ischemia. Reduction in regional blood flow up to rate of 30-35mL per min have been seen as a result of extracranial elongation of carotid segments (normal range 50–60 mL per min per 100 g. brain tissues). Carotid bifurcation stenosis has significantly increased the importance of kinking if both are present simultaneously (Sanger et al., 1965; Quattlebaum et al., 1973; Ballotta et al., 1997).

Kinking of the carotid arteries has been observed in up to 5% of carotid angiograms obtained in patients presenting with symptoms. In a case reported by Rosenthal–Isikay et al., the patient had no neurologic symptoms and no evidence of increased blood-flow velocities on carotid Doppler imaging. Marked tortuosity and kinking of the carotid arteries has been described most commonly in women and elderly population and is often attributed to systemic hypertension (Robert, 2010).

The increased tortuosity of the internal carotid arteries has been of utmost importance in patients undergoing surgery in the region of nasopharynx (namely adenoidectomy, eustachian tuboplasty, nasopharyngeal biopsies) as aberrant nature of the vessel can result in catastrophic hemorrhage (Ching-Feng et al., 2014).

Treatment

The surgical technique of resection of tortuous segment, with dilatation and reimplantation has become the method of choice in treating carotid kinking and coiling. If there are atherosclerotic changes associated with CAs in the same procedure eversion carotid endarterectomy can be done (Stanton et al., 1978; Ballotta et al., 2005; Stanton, 1987).

Correction of kinking and coiling is performed with peroperative mortality rate below 1% and low postoperative morbidity (Ballotta et al., 1997; Stanton et al., 1978; Najafi et al., 1964; Vollmar et al., 1976).

Conclusion

In conclusion, we found that the aberrant nature and geometry of the internal carotid artery can be a risk factor in carotid dissection contributing to stroke. In these kind of patients, knowledge of the trajectory/course of the internal carotid artery is also of substantial importance in case they plan to undergo nasopharyngeal surgeries such as adenoidectomy, eustachian tuboplasty and nasopharyngeal biopsies.

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