

MR Angiography of the Persistent Trigeminal Artery Associated with an Aneurysm

Bir Anevrizma Olgusunda Saptanan Persistan Trigeminal Arterin MR Anjiyografi ile Gösterilmesi

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Abstract: This report presents a case of persistent trigeminal artery (PTA) associated with an ipsilateral ICA aneurysm demonstrated by MRA, and DSA. The aneurysm of the ipsilateral ICA located at the origin of posterior communicating artery has a direct physiopathological cause-result relationship with the PTA, unlike the previously reported cases of PTA.

Key Words: Aneurysm, MR angiography, persistent trigeminal artery

Özet: Bu olgu sunumunda internal karotid arter anevrizmalı bir hastada aynı tarafta saptanan embriyonal trigeminal arterin MR anjiyografi ve DSA ile gösterilmesi ile edinilen deneyim bildirilmektedir. Nadir bir patoloji olan persistan trigeminal arterin (PTA) MR anjiyografi ile gösterilmesi açısından önem taşıyan bu olgu, PTA ile anevrizmanın sebep sonuç ilişkisine örnek olması açısından da MR anjiyografi verileri ile sunulmuş ilk olgudur.

Anahtar Sözcükler: Anevrizma, MR anjiyografi, persistan trigeminal arter

INTRODUCTION

Although conventional or digital subtraction angiography (DSA) is still the gold standard method in the neurovascular diagnosis, magnetic resonance angiography (MRA) is gaining a more prominent role in this field (2). Before introduction of MRA, conventional angiography was the only tool for the in vivo diagnosis of persistent carotid-basilar anastomotic vessels; such as primitive trigeminal artery (PTA), being most common of them. Since then, 5 coincidental cases having PTA diagnosed by means of MRA have been published (8,9). In this report, we present the first case of PTA associated with ruptured (ipsilateral internal carotid artery) aneurysm diagnosed by MRA.

CASE REPORT

A 34-year-old man with the complaint of sudden onset of severe headache, which had started 5 days ago without loss of consciousness, was referred to our department. Neurological examination and computerized tomography revealed the diagnosis of subarachnoid hemorrhage (SAH) of Hunt and Hess clinical grade I and Fisher CT grade II. Cerebral MRA (Figures 1,2) showed a 2x2x2 cm acute intrasylvian hemorrhage, localized at the level of supraclinoid segment of right ICA, and an abnormal vessel originating from the petrous portion of the same ICA and joining the basilar artery, a finding consistent with PTA. Cerebral DSA (Figures 3,4) clearly revealed the

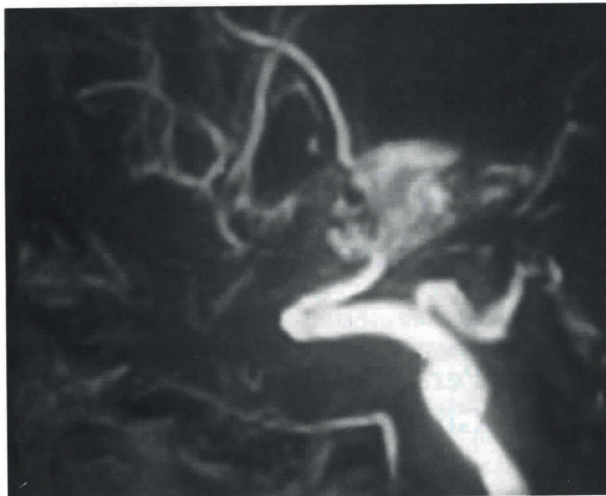


Figure 1: MRA lateral view. PTA originating from petrous segment of ICA and coursing posteriorly is demonstrated. The supraclinoid segment of ICA is interrupted due to hematoma caused by the ruptured aneurysm, located at the origin of posterior communicating artery.



Figure 2: MRA anterior oblique view. PTA is seen as laterally coursing 'S' shaped vessel. The supraclinoid segment of right ICA is tapering into the hematoma seen as a hyperintense area. The aneurysm can be discerned as a hyperintense sac in this hematoma.

diagnosis of right ICA aneurysm, located at the origin of posterior communicating artery and the abnormal vessel seen on MRA was certainly diagnosed as PTA as it was originating from distal petrous segment (just before the foramen lacerum) of right ICA and joining to basilar artery between the origins of superior cerebellar and anterior-inferior cerebellar arteries. The posterior circulation was simultaneously demonstrable on the right carotid arteriograms. This anastomotic artery had a slight concentric constriction at its origin. The patient, then, was operated on and the aneurysm was

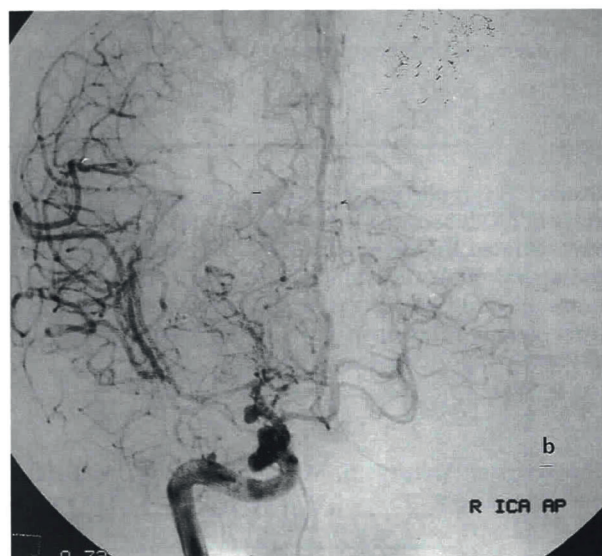
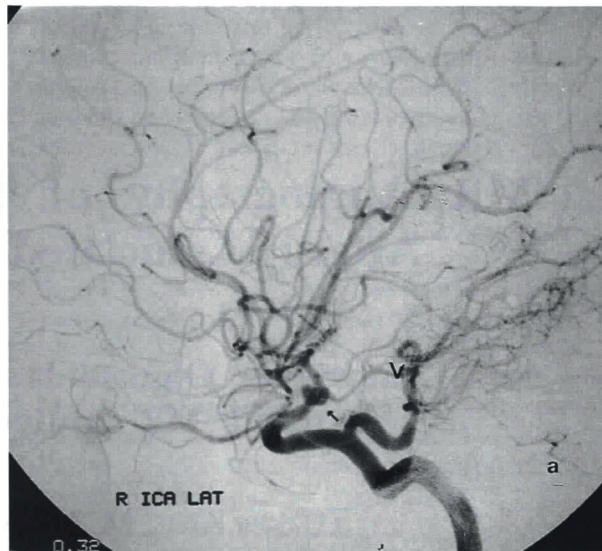


Figure 3: DSA (a) simultaneous opacification of anterior and posterior cerebral arterial circulation is seen; as PTA, branching posteriorly from distal petrous segment (just before foramen lacerum) of the right ICA, joins to basilar artery. At ipsilateral posterior communicating artery origin, bilobulated aneurysm is displayed. DSA A-P projection (b).

successfully clipped. Peroperatively the diagnosis of PTA was confirmed. He was discharged on the 10th postoperative day without any complication.

MRA imaging was performed in sagittal and axial plains with a 3D-TOF (RF-FAST.MAST sequence and flip angle of 20°) with flow compensation in the read-out and slice-select directions on a 1.5-T system (Picker, USA).

DISCUSSION

PTA, although makes 85 % of all persistent carotid-vertebrobasilar anastomoses (4,5,6), is a rare vascular anomaly with a reported maximum angiographic incidence of 0.6 % (3). Embryologically the trigeminal artery appears in the 3-mm stage and like the otic, hypoglossal and proatlantic arteries connects the carotid system with the anterior longitudinal arteries of the embryo, which later fuse and form the basilar artery (4). After birth, these primitive anastomoses disappear in 2 weeks, the trigeminal artery being the most important and last to close and failure of this evolutionary process results in a persistent embryonic artery (5). PTA connects petrosal or cavernous portion of internal carotid artery to basilar artery at the segment between origins of superior cerebellar and anterior-inferior cerebellar arteries. Petrosal segment originating PTA's usually course along the trigeminal nerve, and cavernous segment originating PTA's may cross the sella and display the hypophysis before joining to the basilar artery (8).

From the data in the literature, it is apparent that PTA is almost invariably accompanied by abnormality in the circle of Willis, explaining the reason of higher incidence of aneurysms (3,10). There is either absence or diminution in the size of the ipsilateral posterior communicating artery increasing the risk of aneurysm formation at the origin of posterior communicating artery, as is the case in our patient (3). Unlike the presented case, most of the PTA's (and all 5 cases diagnosed by MRA) reported in the literature (1,3,5,7,8,9,10) were considered to be an incidental finding without any direct cause-result relationship with the primary pathology. The sagittal MRA series with selective reconstruction of the pathologic side demonstrated the PTA with a quality comparable to conventional angiography, and angulated reconstructions (Figure 2) revealed the persistent embryonic anastomosis even more demonstratively. In the presented case, DSA and MRA correlated well as far as the PTA concerned, but DSA showed the associated aneurysm more definitely.

In conclusion, MRA, being noninvasive, is gaining a more significant clinical role in the neurovascular diagnosis. Postprocessing of the data sets allows reconstructions of selected slices and additionally multiple planes which are angiographically uncommon views, without

significant distress or risk to the patient. Despite the inferior spatial resolution relative to the intraarterial DSA or conventional angiography, MRA allows a definite diagnosis and excellent demonstration of congenital anomalous vessels, like the PTA. This report presents the first case of PTA associated with (an ipsilateral ICA) aneurysm demonstrated by MRA, in correlation with DSA. The aneurysm of the ipsilateral ICA (located at the origin of posterior communicating artery) has a direct physiopathological cause-result relationship with the PTA, unlike the previously reported cases of PTA, which have no direct cause-result relationship with the main pathology.

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