

# A Salient Abnormality In The Circle Of Willis

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## Abstract

A 34-year-old female patient was presented with a headache lasting for a few months. For further evaluation CT, intracranial magnetic resonance angiography (MRA), 3D digital subtraction angiography (DSA) and MRI were performed.

## INTRODUCTION

A 34-year-old female patient was presented with a headache lasting for a few months. For further evaluation CT, intracranial magnetic resonance angiography (MRA), 3D digital subtraction angiography (DSA) and MRI were performed.

Computed tomography of the cranium, detected an enhancing hyperdense mass in the supracellar cistern (not shown here), and the probability of a circle of Willis aneurysm was thought. For further evaluation 3D TOF MRA was performed (Figure 1).

## Figure 1

Figure 1: Axial MIP reconstruction of 3D TOF MRA image: A globular hyperintense lesion just medial to the ICA tip and PCoA of the circle of Willis.



A hyperintense aneurysm was detected, possibly originating from the left ICA, and for actual diagnosis DSA was performed. DSA images demonstrated completely normal findings (Figure-2).

**Figure 2**

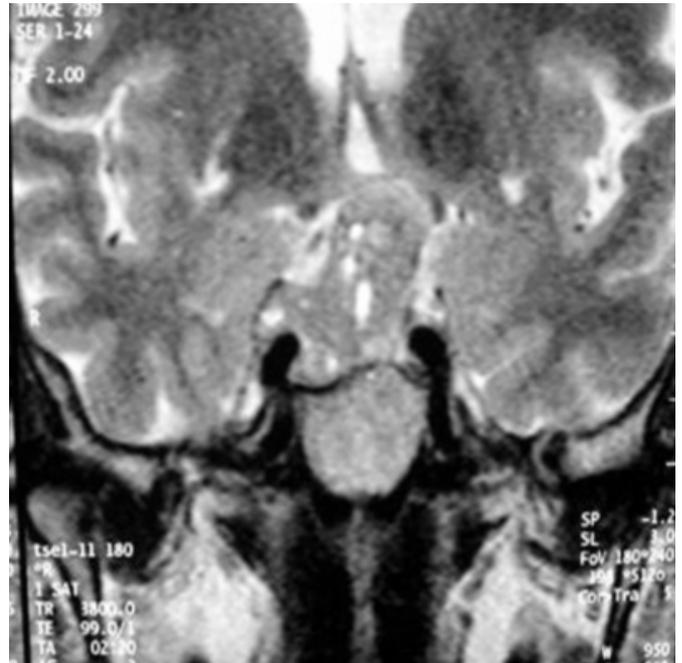
Figure 2: DSA image (selective left ICA): Normal findings.



So, CT images reassessed and a contrast enhanced MRI of the cranium was added to the radiological studies. MRI scans showed a sellar mass lesion, protruding into the sphenoid sinus inferiorly, and obscuring the supracellar cistern superiorly. The mass showed hyperintense subacute blood products both on T1 (Figure 3) and T2 (Figure 4) weighted images.

**Figure 3**

Figure 3: Coronal TSE T2 WI: Asellar mass protruding to suprasellar cisterna



**Figure 4**

Figure 4: Coronal SE T1 WI: Asellar mass protruding to suprasellar cisterna



Finally the radiological diagnosis was hemorrhagic pituitary macroadenoma mimicking an aneurysm on the 3D TOF images. The laboratory examinations revealed, low TSH, increased cortisol and ACTH plasma levels. Also the patient had clinical diagnostic clues such as amenorrhae,

hypertrichosis, and central obesity. The mass was completely removed via transsphenoidal approach. Histopathological examination revealed hemorrhagic macroadenoma.

We have found many reports about circle of Willis aneurysms, and other pathologies such as giant aneurysms, tuberculomas, arteriovenous malformations, dermoids, cysticercosis etc. mimicking pituitary macroadenomas in the literature (1,2). However there was only one case of pituitary macroadenoma simulating aneurysm, in the literature (1). The probable cause of the rarity of the reports resembling to Uberoi's is that the artifacts of TOF imaging is generally known and accepted (3). When performing 3D TOF MRA, a range of problems have been encountered such as short T1 tissues (fat, blood, Gd enhanced regions) can appear the same as flow, and may be incorporated into the maximal intensity projection (MIP) reconstruction and masquerade as vascular abnormalities. Interpretation of MIP reconstructions can also be difficult or impossible in the presence of sizeable haematoma. Conversely, vascular structures may not be appreciated because of loss of signal from saturation effects or dephasing due to slow or complex flow. Local susceptibility artifacts, from aneurysm clips or coils, may reduce the signal from vascular structures. Interpretation of 3D TOF MRA must take account of potential pitfalls which can be minimized by adoption of appropriate imaging and review strategies. This requires careful consideration of MRA source data, the spin-echo axial images as well as the

MIP reconstructions.

In the study of Pant B et al, they have found 25 aneurysms (%5,4) coincidentally in a group of patients with 467 pituitary macroadenomas (4). This study has shown that a suspicion of aneurysm existing in a patient with pituitary macroadenoma, and certainly the hemorrhagic ones should be evaluated with DSA. Also the study comparing the diagnostic accuracy of 3D TOF MRA and DSA, performed by Okahara et al. has shown high rates of false positive and false positive diagnoses of aneurysms with MRA (5).

In conclusion MRA is non-invasive, diagnostic method to evaluate the vascular pathologies however DSA is the gold-standart method. Comperative assessment of the findings of different radiological tools will reduce misdiagnoses.

### **References**

1. Krauss HR, Slamovits TL, Sibony PA. Carotid artery aneurysm simulating pituitary adenoma. *J Clin Neuroophthalmol* 1982; 2: 169-174.
2. Wilcock DJ, Jaspan T, Worthington BS. Problems and pitfalls of 3-D TOF magnetic resonance angiography of the intracranial circulation. *Clin Radiol* 1995;50:526-532.
3. Uberoi R, Murphy P, Jones A. The "pituitary pseudoaneurysm" artefact with 3D TOF MRA of the circle of Willis. *J Comput Assist Tomogr* 1995;19:822-3.
4. Pant B, Arita K, Kurisu K, Tominaga A, Eguchi K, Uozumi T. Incidence of intracranial aneurysm associated with pituitary adenoma. *Neurosurg Rev* 1997;20:13-17.
5. Okahara M, Kiyosue H, Yamashita M, et al. Diagnostic accuracy of magnetic resonance angiography for cerebral aneurysms in correlation with 3D-digital subtraction angiographic images: a study of 133 aneurysms. *Stroke* 2002;33:1803-1808.

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