Neuroradiology (2002) 44: 600–603
DOI 10.1007/s00234-002-0786-y

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Intraorbital ophthalmic artery aneurysm associated with basilar tip saccular aneurysm

Received: 15 April 2001
Accepted: 7 January 2002
Published online: 7 May 2002

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Abstract We present a rare case of intraorbital ophthalmic artery aneurysm found incidentally, together with a ruptured aneurysm of the tip of the basilar artery. The intraorbital aneurysm was asymptomatic, and no treatment was offered. Angiographic control was recommended to detect any progression. Treatment may be indicated for documented enlargement or significant mass effect of the aneurysm.

Keywords Ophthalmic artery · Intraorbital aneurysm

Introduction

An intraorbital ophthalmic artery aneurysm is extremely rare, compared with carotid-ophthalmic aneurysms arising from the wall of the internal carotid artery [1, 2]. We report an intraorbital ophthalmic artery aneurysm found incidentally in a patient with a basilar artery tip aneurysm presenting with grade II subarachnoid haemorrhage. This association has not been described previously.

Case report

A 34-year-old man presented with acute neck pain, nausea and vomiting; he was confused and disoriented. On admission, he was in WFNS grade II, conscious, obeying orders and opening his eyes spontaneously. CT revealed subarachnoid haemorrhage (Fisher grade III). A 4-mm basilar tip aneurysm was shown on CT angiography (CTA), as was small unruptured extradural intraorbital aneurysm of the right ophthalmic artery, below the optic nerve (Fig. 1). Endovascular embolisation of the basilar artery aneurysm was performed successfully. The right intraorbital ophthalmic artery aneurysm was confirmed by angiography, lying at the first bifurcation of the intraorbital ophthalmic artery, 3 mm in diameter, projecting anteriorly (Fig. 2).

One week after the embolisation, neurological examination was normal apart from a minimal field defect on computerised perimetry of the right eye. Temporal sector hypotonia of the pupillary sphincter suggested hypoperfusion of the right iris [3]. Fundoscopy of the right eye showed slight attenuation of retinal arteries and thinning of the superficial axonal layer of the retina. The cup/disc ratio was larger on the right side, indicating loss of optic nerve axons due to haemodynamic dysregulation or a direct compressive effect of the aneurysm (Fig. 3). An angiogram on day 10 after embolisation showed a complete exclusion of the basilar artery aneurysm and no vasospasm.

Discussion

Risk factors for multiple intracranial aneurysms presumably include congenital and familial susceptibility

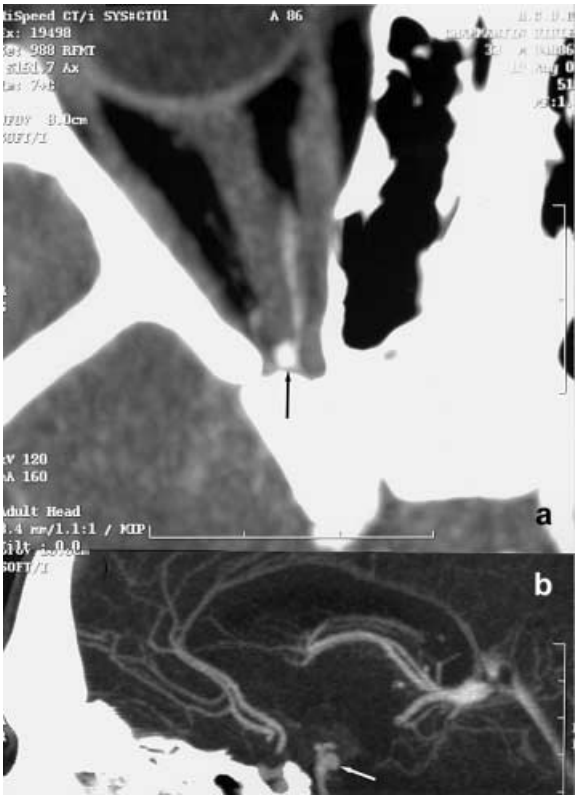

Fig. 1a, b. CT angiography shows **a** the small, unruptured aneurysm at the first bifurcation of the intraorbital part of the right ophthalmic artery, below the optic nerve *(black arrow)* and **b** the ruptured basilar tip aneurysm *(white arrow)* projecting posterosuperiorly

and exposure to factors promoting degenerative arterial wall changes [4]. Associations between multiple aneurysms and rare hereditary connective-tissue diseases, intracranial arteriovenous malformations and sickle cell disease have been reported [5]. Aneurysms of the middle cerebral, internal carotid and pericallosal arteries are more frequently associated with multiple intracranial aneurysms [6, 7]. The association of intraorbital ophthalmic artery aneurysm in a patient with multiple aneurysms has not been reported.

The ophthalmic artery is the first major branch of the internal carotid artery, as it emerges from the cavernous sinus, i.e., the C6 segment [8]. It is divided into intracranial, intracanalicular and intraorbital segments [9, 10]. The intraorbital course can also be divided into three parts. The first part extends from the point at which the artery enters the orbit to where it bends to become the second part. It is 10–15 mm long, generally straight and gives off the central artery of the retina. As a rule, the second part crosses over the optic nerve from inferolateral to superomedial. The tortuous third part extends from the point at which the second part bends to its termination and gives off two groups of terminal major branches, ocular and orbital. The ocular branches are the central retinal, lateral and medial long posterior ciliary, and short ciliary arteries. The orbital branches are the lacrimal, supraorbital, supratrochlear, and anterior and posterior ethmoidal arteries [1].

Intraorbital ophthalmic artery aneurysms appear to occur on the first part or the second intraorbital segments [11], especially the ophthalmic artery crosses over the optic nerve [12]. Wheeler and Baker [13], Rubinstein [12] and Meyerson and Lazar [14] each described an aneurysm in this location. Rengachary et al. [1] defined the vascular anatomy as the formation of a complex arterial ring around the optic stalk by transient anastomoses between the primitive dorsal and ventral ophthalmic arteries and the stapedial artery. If one or more of these channels remains patent, a blind sac (aneurysm) attached to the parent vessel may form. This could explain the frequency of congenital aneurysms on this segment of the artery [1].

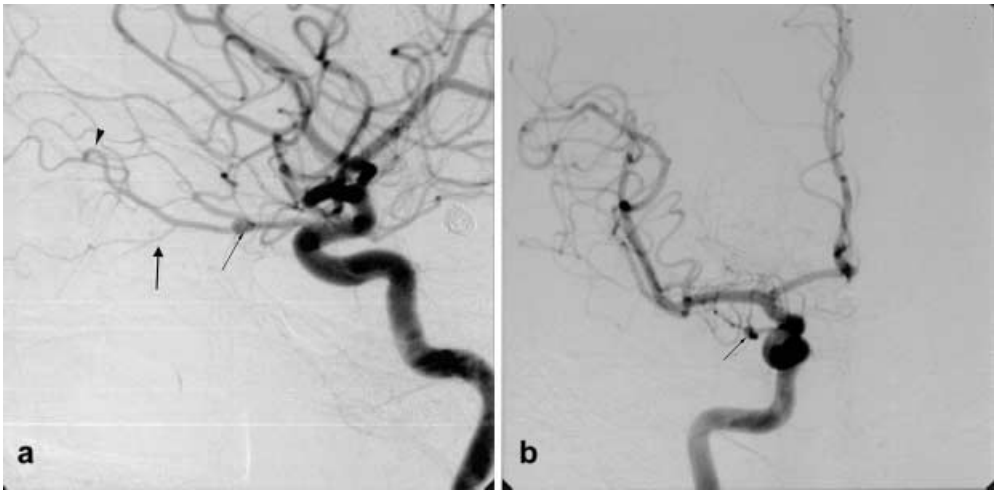

Fig. 2a, b. Cerebral angiography confirms the anteriorly projecting intraorbital aneurysm of the ophthalmic artery *(arrows)*. Note the central retinal artery passing below the origin of the aneurysm *(broad arrow)*. The second part of the intraorbital ophthalmic artery passes across the optic nerve to the superomedial quadrant *(arrowhead)*

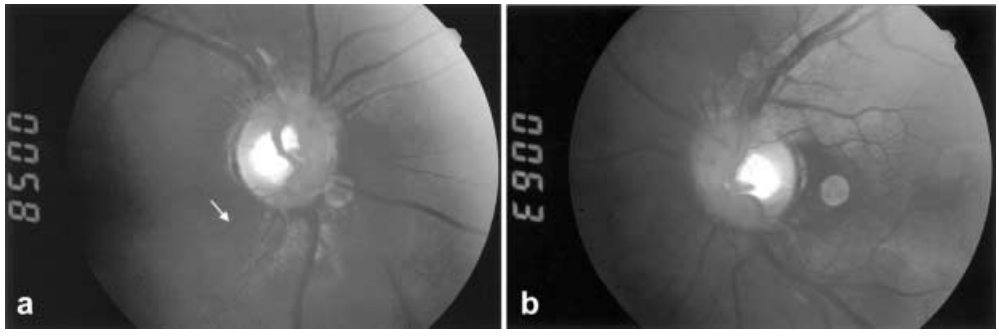

Fig. 3a, b. Fundoscopy shows a larger cup/disc ratio on the **a** than the left **b** suggesting chronic haemodynamic insufficiency on the rights. There is slight attenuation of the right retinal arteries (arrow)

The natural history of ophthalmic artery aneurysms is not completely clear, but, they seem to follow a rather benign course with slow growth and relatively minor symptoms. Because there have been very few detailed reports on intraorbital ophthalmic artery aneurysms, the clinical features are not fully understood. Common symptoms and signs include progressive reduction of visual acuity, visual field defects and exophthalmos, all due to mass effect.

Rupture of an intraorbital ophthalmic aneurysm is extremely rare. Meyerson and Lazar, however, reported a case which showed a sudden onset of blindness and total ophthalmoplegia with massive subconjunctival and periorbital haemorrhage [14]. Recovery of the visual acuity occurred in this case.

In our patient, whose aneurysm was on the first intraorbital part of the artery, visual acuity was normal. The patient gave a history of intermittent bilateral visual disturbance which that we could not attribute to the right-sided aneurysm. Conversely, the neuro-ophthalmological findings of the right eye could be explained by reduction of ocular perfusion or a compressive effect of the intraorbital aneurysm.

CT and CTA clearly defined the aneurysm, showing its size and site within the orbit. Many studies have proven the efficacy of CT angiography for detecting intracranial aneurysms [15, 16], but not those in the orbit. We think that digital subtraction angiography is still required to confirm the presence of intraorbital aneurysms and to evaluate collateral supply of the ophthalmic artery and its branches [17, 18].

The embolisation of asymptomatic intraorbital ophthalmic artery aneurysms do not justify the potential risk of ocular ischaemia. Surgical treatment is indicated in cases with symptomatic mass effect or rupture. Surgical options depend on size, and site especially on collateral supply from the external carotid artery to the distal ocular and orbital branches of the ophthalmic artery. The anastomoses between the branches arising from the third part of the ophthalmic artery and the branches of the external carotid arteries form a major collateral channel between the internal and external carotid arteries [17], which is adequate to prevent permanent blindness after occlusion of the ophthalmic artery in 90% of patients [18]. Clipping, trapping-resection without sacrifice of the central retinal and ciliary arteries and occlusion of the ophthalmic artery in cases with good collateral supply are the three surgical possibilities. With aneurysms on the second part of the ophthalmic artery, distal to the origin of the central retinal and ciliary arteries, resection has not led to ocular ischaemia [2, 9]. In one case, an attempt to ligate the carotid artery failed to achieve total thrombosis of the aneurysm [19]. However, clipping the neck of such aneurysms is difficult [14, 19]. Ogawa et al. [9] described an symptomatic intraorbital ophthalmic aneurysm treated by trapping and resection. The visual acuity was initially impaired but follow-up showed satisfactory recovery attributed to adequate collateral supply. Rengachary et al. [1] reported a patient with an intraorbital ophthalmic aneurysm and arteriovenous fistulae who developed swelling of the eye, with diplopia, treated conservatively; follow-up at 4 years showed no worsening of the clinical status.

In our case, there was no development of collateral circulation from the external carotid artery to the intraorbital part of the ophthalmic artery, so a surgical or endovascular treatment of the aneurysm seemed to carry a high risk if the ophthalmic artery were occluded [1, 13]. The patient was scheduled to be followed up by 3-monthly neuro-ophthalmological examinations, with angiography after 1 year.

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