NEUROCIRUGÍA

www.elsevier.es/neurocirugia

Case report

Coil embolization of ruptured frontopolar artery aneurysm: Case report

Ana M. Castaño-Leon[a,*], *Marta Cicuendez*[a], *Igor Paredes*[a], *Jose F. Alen*[a], *Pedro Navia*[b], *Alfonso Lagares*[a]

[a] *Departamento de Neurocirugía, Hospital 12 de Octubre, Madrid, Spain*
[b] *Departamento de Radiología, Hospital 12 de Octubre, Madrid, Spain*

ARTICLE INFO

Article history:
Received 26 November 2012
Accepted 2 April 2013
Available online 31 May 2013

Keywords:
Subarachnoid hemorrhage
Frontopolar artery
Aneurysm
Endovascular treatment
Hemodynamic stress
Cerebral vascular anomaly

ABSTRACT

Distal anterior cerebral artery aneurysms are infrequent. The most common location is at the bifurcation of the pericallosal and callosomarginal arteries. Cerebral artery anomalies can sometimes, at least partially, explain aneurysm formation in less common locations in relation to hemodynamic stress caused on the vascular wall. We report a very rare case of subarachnoid hemorrhage due to a ruptured frontopolar artery aneurysm as a part of an anomalous anterior cerebral artery complex that was, for the first time, treated with endovascular coiling.

Tratamiento endovascular de aneurisma roto en arteria frontopolar: caso clínico

Palabras clave:
Hemorragia subaracnoidea
Arteria frontopolar
Aneurisma
Tratamiento endovascular
Estrés hemodinámico
Variante anatómica vascular

RESUMEN

Los aneurismas distribuidos distalmente en la circulación cerebral anterior son infrecuentes. La localización más habitual dentro de este tipo de aneurismas es la bifurcación entre las arterias pericallosa y callosomarginal. Las variantes anatómicas vasculares cerebrales pueden explicar, al menos en parte, la formación de aneurismas en localizaciones menos comunes en relación al estrés hemodinámico que ocasionan en la pared vascular. Describimos un caso infrecuente de hemorragia subaracnoidea debida a la rotura de un aneurisma en la arteria frontopolar y que forma parte de una variante anómala del complejo de la arteria cerebral anterior que ha sido por primera vez manejado mediante tratamiento endovascular.

* *Corresponding author.*
E-mail address: ana.maria.castano.leon@gmail.com (A.M. Castaño-Leon).
1130-1473/$ – see front matter
http://dx.doi.org/10.1016/j.neucir.2013.04.002

Introduction

Distal anterior cerebral artery (DACA) aneurysms are those located after anterior communicating artery, also known as pericallosal artery aneurysms. The incidence of saccular aneurysms in DACA is low, representing about 6% (range 2–9%) of all intracranial aneurysms. The most common location of DACA aneurysms is the A3 segment, accounting for approximately 69–82% of all DACA aneurysms, especially at the bifurcation of the pericallosal (PCA) and callosomarginal (CMA) arteries.[1] Frontopolar artery (FPA) aneurysms are much less frequent, with a few cases reported in the literature.[2] Changes in hemodynamic stress that potentiate aneurysm development are seen in relation to anatomical variations of cerebral arteries branching and radii.[3] In the present case, the presence of the aneurysm was associated to an anatomical variation of the anterior cerebral artery complex, possibly contributing to the formation of an aneurysm in this infrequent location. Surgical treatment has been reported as the principal modality of treatment in these distal aneurysms. This article describes the first case of a saccular aneurysm originating from an anomalous FPA treated with endovascular coiling and discusses the difficulties regarding treatment of aneurysms in this unusual location.

Case report

A 55-year-old woman was admitted after experiencing acute loss of consciousness and tonic–clonic seizure at home. Her past medical history included hepatitis B infection, alcohol abuse and residual schizophrenia. There was no past history of hypertension, smoking, other drug abuse, SNC infection or trauma. On admission, the initial examination showed an unconscious patient (GCS 3) with reactive miotic pupils that diverged to the right (Hunt & Hess classification grade 5, World Federation of Neurosurgeons grade 5). After stabilization, a computerized tomographic (CT) scan was performed (Fig. 1) showing parasagital frontal subarachnoid hemorrhage and bilateral frontobasal intracerebral hematoma (ICH) opened to the ventricular system (Fisher III). Moderate dilatation of the ventricles also appeared as a sign of acute hydrocephalus. AngioCT scan detected an aneurysm arising from right FPA and signs of vasospasm in both ACAs. Before angiography was performed, an external ventricular drainage was placed. Angiography (Fig. 2A, C and E) revealed a saccular aneurysm of 5 mm of diameter, with a neck of 3 mm, at the origin of a right atypical FPA. The anatomical variation of right DACA consisted in FPA arising from the CMA trunk originated from the A2 segment. Right CMA seems to be larger than the PCA after their bifurcation. There was also an associated aneurysm at anterior communicating artery (AComA) of l.4 mm of main diameter that did not show signs of recent bleeding. After selective microcatheteration of the FPA aneurysm, it was completely obliterated with 2 coils (Fig. 2B, D and F) maintaining the distal arterial lumen totally permeable. During her hospitalization a ventriculoperitoneal shunt was placed due to chronic hydrocephalus. Nowadays, the patient is at home and is orientated, able to keep a sensible conversation and walking.

Discussion

DACA aneurysms are very infrequent, comprising about 6% (range 2–9%) of all intracranial aneurysms in different series.[1,4] Among DACA aneurysms, A3 segment aneurysms are the most frequent with an incidence of 69–82%, especially at the CMA–PCA junction.[1] Much more infrequent, A2 segment aneurysms (A2A) have a reported incidence about 5–22% of all DACA aneurysms. They can appear at the main A2 trunk or on its frontobasal branches. Lehecka et al. found in their 35-A2A patients series that the most frequent location of A2A is on the A2 trunk at the origin of the FPA.[1] Few FPA aneurysms have been reported and, up to our knowledge, only eight cases of aneurysms of the FPA, when it arises from CMA have been previously described.[2]

Although aneurysm pathogenesis is not completely understood, congenital variations in the circle of Willis can predispose to the formation of saccular aneurysms due to an increased in hemodynamic stress. Deviation from optimal geometrical parameters (radii, branch and bifurcation angles) creates areas of abnormal wall shear stress level that leads to endothelial injury and a wrong remodeling response that finally initiates aneurysm development.[3] Consistently, a higher incidence of vascular variations in clinical series of patients harboring aneurysms in comparison with anatomic studies without aneurysms has been reported.

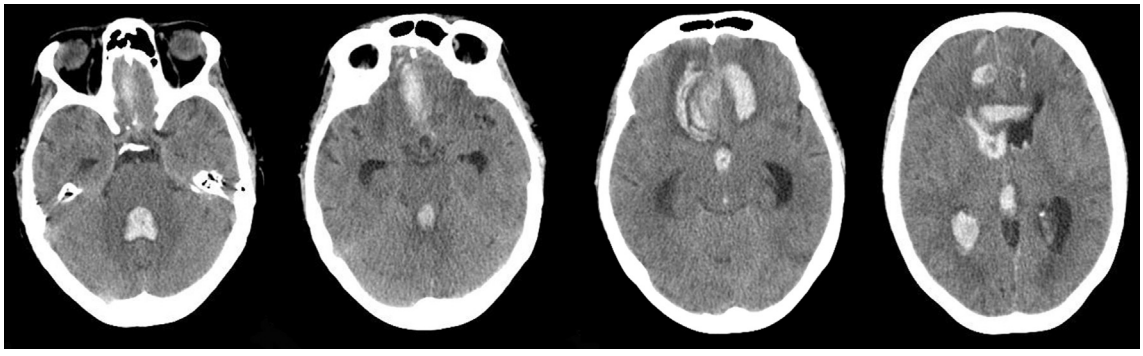

Fig. 1 – Initial axial CT scan, demonstrating parasagital frontal subarachnoid hemorrhage and bilateral frontobasal intracerebral hematoma opened to the ventricular system with signs of acute hydrocephalus.