Journal of Neuroradiology (2016) 43, 223—226

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

TECHNICAL NOTE

A new endovascular technique for small anterior choroidal artery aneurysms. A consecutive series using the 3-catheter-protective technique

Hélène Gimonet[a,*], **Hubert-Armand Desal**[a], **Pascal J. Mosimann**[b,c], **Paul Stracke**[b], **Benjamin Daumas-Duport**[a], **Alina Lintia-Gaultier**[a], **Romain Bourcier**[a], **René Chapot**[b]

[a] *Service de neuroradiologie diagnostique et interventionnelle, hôpital Guillaume-et-René-Laennec, CHU de Nantes, boulevard Jacques-Monod-Saint-Herblain, 44093 Nantes cedex 1, France*
[b] *Neuroradiologie Abteilung, Alfried Krupp Krankenhaus, Essen, Germany*
[c] *Service de radiologie et neuroradiologie, centre hospitalier universitaire Vaudois, university of Lausanne, Lausanne, Switzerland*

Available online 4 April 2016

KEYWORDS
Anterior choroidal artery aneurysms;
Coil embolization;
Protective microcatheter technique;
Remodeling balloon

Summary
Introduction: Endovascular treatment of small anterior choroidal artery (AChA) aneurysms can be challenging, especially if the AChA arises from the sac. Preserving its patency during embolization is as important as obliterating the aneurysm. We describe a variant of the ''protective microcatheter technique'' (PMT) in a series of six patients with AChA aneurysms where the AChA emerged from the sac.
Methods: Three different microcatheters (KT) were used. The first microcatheter was placed in the AChA to protect it. A remodeling balloon-catheter was then positioned in the internal carotid artery to stabilize the coils during embolization and to control a potential rupture. The third microcatheter was finally used to coil the aneurysm.
Results: Mean sac size of anterior choroidal artery aneurysms was $2 \times 2 \times 2$ mm. All aneurysms were successfully occluded. There was neither ischemic complication nor ruptured aneurysm during endovascular treatment. A final angiogram demonstrated AChA patency in all cases.
Conclusion: The 3KT-PMT for AChA aneurysms appears to be safe and effective to prevent AChA occlusion during aneurysm coiling, especially when the AChA arises from the sac.

* Corresponding author. Tel.: +33 66 89 51 40 9; fax: +33 (0)2 40 16 56 16.
E-mail address: Helene.gimonet@hotmail.fr (H. Gimonet).

http://dx.doi.org/10.1016/j.neurad.2016.02.004
0150-9861/

Introduction

The anterior choroidal artery (AChA) is a posterolateral branch of the supraclinoid internal carotid artery (ICA) that arises distal to the posterior communicating artery and courses initially in a posteromedial direction. The incidence of AChA aneurysms is reported to be 2—5% of all intracranial aneurysms [1]. Endovascular treatment of AChA aneurysms can be challenging, especially if the AChA arises from the sac. Since AChA occlusion is associated with severe disability, preserving its patency during embolization is as important as obliterating the aneurysm [2]. We hereby describe the 3-catheter-protective technique (3KT-PMT), a variant of the protective microcatheter technique (PMT) in a series of six patients with AChA aneurysms where the AChA emerged from the sac.

Materials and methods

All procedures were performed under general anaesthesia. Full heparinization was obtained following femoral sheath insertion. Candidates for stenting were prepared with aspirin and clopidogrel. All catheters were continuously flushed with heparinized saline.

3D rotational angiography was systematically performed to depict the origin of the AchA and determine the optimal working projection. We then used three different microcatheters (KT): two to protect the AChA and the ICA and one to coil the aneurysm. The first (Echelon-10, EV3, Plymouth, MN, USA) was placed in the AChA over a Traxcess guidewire (Microvention, Tustin, California, USA), either directly or from above via the other side and anterior communicating artery, depending on the angulation of the AChA. A remodeling balloon-catheter (Scepter XC, Microvention, Tustin, California, USA) was then positioned in the ICA to stabilize the coils during subsequent embolization, as well as to control a potential rupture. The third microcatheter (Headway-17, Microvention, Tustin, California) was finally used to coil the aneurysm, while protecting the AChA with the Echelon and the ICA with the inflated balloon. If necessary, a self-expandable stent (Leo+, Balt Extrusion, Montmorency, France; Neuroform, Stryker, Fremont, CA) was released after embolization to hold the coils in place. A final biplane angiogram was always obtained to demonstrate AChA patency.

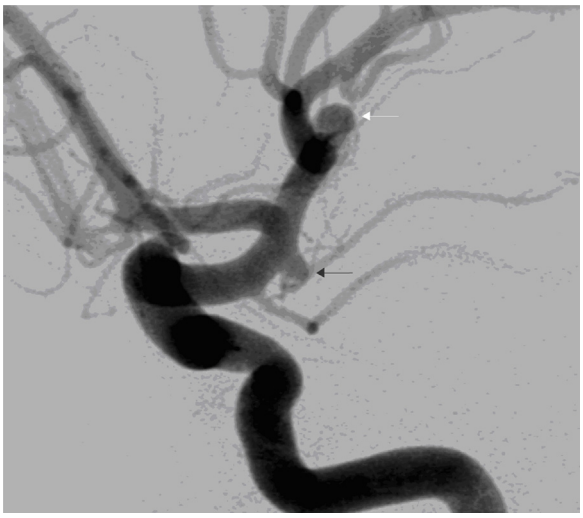

Figure 1 Right ICA angiogram showing the right AChA aneurysm (black arrow) and an incidental MCA bifurcation aneurysm (white arrow).

Results

The 3KT-PMT was used in three men and three women (Table 1). Mean age was 54.3 years. Mean sac and neck sizes were $2 \times 2 \times 2$ mm and 2.2 mm (range: 1.9—3), respectively. In all cases, the AChA arose from the sac. In four cases, the neck of the aneurysm involved both the AChA and the ICA.

A self-expandable stent was released after coiling in two cases. There were no ischemic or hemorrhagic complications. Only one patient was treated during the acute phase of subarachnoid hemorrhage. He later developed hydrocephalus, which required ventricular shunting.

Case illustration

A 45-year-old man presented with sudden excruciating headaches, nausea and photophobia. Computed tomography (CT) of the head revealed diffuse subarachnoid hemorrhage, intraventricular blood and hydrocephalus. Axial CT depicted a ruptured right $2 \times 2 \times 2$ mm AChA aneurysm, as well as an incidental ipsilateral middle cerebral artery (MCA) bifurcation aneurysm. After external ventricular shunting, the patient was brought to the angiosuite for endovascular treatment.

Table 1 Patient and aneurysm characteristics.

	Gender	Age (year)	Ruptured	Size (mm)	Neck (mm)	Microcatheter and balloon	Stent	Procedural complication	Follow-up
1	M	64	—	$3 \times 2 \times 2$	3	+	—	None	—
2	F	55	—	$2 \times 2 \times 2$	2	+	+	None	—
3	F	50	—	$2 \times 2 \times 2$	2	+	+	None	—
4	M	50	—	$3 \times 2 \times 2$	1.9	+	+	None	—
5	M	45	+	$2 \times 2 \times 2$	2	+	—	None	Hydrocephalus
6	F	62	—	$3 \times 2 \times 2$	2	+	+	None	—

M: male; F: female; mm: millimeter.