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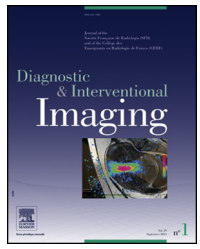

ORIGINAL ARTICLE /*Neuroradiology*

Endovascular management of congenital arteriovenous fistulae in the neck

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KEYWORDS
Arteriovenous fistula;
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Abstract
Purpose: The purpose of this study was to evaluate congenital arteriovenous fistulae in the neck, including vertebrovertebral and carotico-jugular arteriovenous fistula, with their endovascular management.
Materials and methods: Six patients with congenital arteriovenous fistulae in the neck who underwent endovascular treatment between March 2001 and December 2013 at the Department of Radiology, Ege University School of Medicine were enrolled into this retrospective study. There were four men and two women, with a mean age of 8.6 (range 4—17) years. Patients' demographics and symptoms were noted. Diagnostic computed tomography and/or magnetic resonance angiography were available in all patients. Parent artery and vein of the arteriovenous fistula, location of the fistula, the other features of fistula, endovascular occlusion site, number and type of endovascular materials, and length of follow-up were reviewed.
Results: Four patients had vertebrovertebral fistula, while two patients had carotido-jugular fistula (fistula between maxillary artery and external jugular vein). Four patients underwent detachable balloon occlusion together with coil embolization, while two patients underwent detachable balloon occlusion only. The parent artery was occluded in five patients without clinical consequences, and the remaining fistula was occluded with preservation of the parent artery. The patients did not have any complication in the follow-up period (mean follow-up, 9 months).

Abbreviations: CJF, carotico-jugular fistula; CTA, computed tomography angiography; F, female; M, male; MRA, magnetic resonance angiography; VVF, vertebrovertebral fistula.

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Conclusion: Congenital arteriovenous fistulae in the neck are extremely rare. Endovascular fistula occlusion with parent vessel sacrifice appears to be a safe and minimally invasive treatment option with good results during the follow-up period.

Arteriovenous fistulae are defined as abnormal direct communications between an arterial trunk or its branches and the neighboring venous system [1]. Arteriovenous fistulae in the neck include vertebrovertebral fistula (VVF) and carotico-jugular fistula (CJF). Most of the arteriovenous fistulae in the neck region are secondary to trauma (vessel puncture, hyperextension injury, gunshot wound or spinal surgery), but they can be also congenital or spontaneous. Some of the congenital VVF are related with fibromuscular dysplasia, neurofibromatosis or other collagen disorders [1]. Clinical symptoms of the arteriovenous fistulae in the neck. They include cervical thrill and systolic bruit (presented in nearly all cases and found as the only symptom in approximately 70% of the cases), heart failure (mostly in children), nerve root compression into the cervical foramen caused by the increase in venous pressure, and vertebrobasilar insufficiency or spinal cord ischemia caused by the steal syndrome [2].

The etiologies of congenital arteriovenous fistulae in the neck are not completely known, but in the presence of clinical signs they tend to progressively worsen. The most common treatment modality is the endovascular occlusion by detachable balloons and coils. The aim of this study was to evaluate the management of congenital arteriovenous fistulae in the neck and to present our experience in six patients.

Materials and methods

Six patients with congenital arteriovenous fistulae in the neck who underwent endovascular treatment between March 2001 and December 2013 at the Department of Radiology, Ege University School of Medicine were included in the study. Clinical and imaging data of the patients were retrospectively evaluated. There were four males and two females with ages ranging from 4 to 17 years (mean 8.6 years). This study was approved by the Institutional Review Board of our institution, and informed consent was obtained from all patients.

Patients' demographics and symptoms were noted. The patients did not have a history of trauma nor a connective tissue disorder that can predispose to congenital arteriovenous fistulae in the neck. Common symptoms were thrill and bruit that were seen in all patients and one patient with VVF was found to have radiculopathy additional to these symptoms. Diagnostic findings were obtained with computed tomography angiography (CTA) and/or magnetic resonance angiography (MRA). Parent artery and vein of the arteriovenous fistula, the location of fistula, the other features of the fistula, endovascular occlusion site, the number and type of endovascular materials, and length of follow-up were reviewed.

Results

The characteristics of the patients and endovascular procedures are presented in Table 1. VVF (fistula between vertebral artery and vertebral vein) was detected in four patients, while CJF (fistula between maxillary artery and external jugular vein) was detected in two patients. The fistulae of all patients were found to be single shunt fistulae. Endovascular treatments of all these high-flow fistulae were performed under general anesthesia. Four patients underwent detachable balloon occlusion in the assistance of coil embolization, while two patients underwent detachable balloon occlusion only. Detachable coils, which are safer than pushable ones were used in tortuous segments and in segments with high risk of migration. Pushable coils, which are shorter and more trombogenic than the detachable ones were used following detachable coils.

A 6-F long sheath was inserted (Flexor® Shuttle Sheath; Cook, Bloomington, IN, USA) and placed from a right femoral access into the parent artery. After demonstration of the fistula by angiography, the fistula was safely occluded with detachable balloon(s) (Goldball®; Balt Extrusion, Montmorency, France) (Fig. 1). After closure of the fistula with a detachable balloon in 4 patients, a standard microcatheter was then manipulated over a 0.012 inch microguidewire into the parent artery either proximal or distal to the fistula site. Then coil (combination of detachable and pushable) occlusion was achieved to support already placed balloon distally and/or proximally. All 4 patients had eventual fistula occlusion together with parent artery occlusion (Fig. 2). The remaining two patients underwent fistula occlusion with detachable balloon(s) alone. One of them had eventual occlusion of both the fistula and parent artery after successive multiple balloon placement, while the remaining had fistula occlusion with preservation of the parent artery after placement of one detachable balloon.

Control angiographies immediately after the endovascular treatments demonstrated total occlusions of all fistulae. The symptoms of our patients resolved after complete occlusions of the fistulae. Mean follow-up was 9 (range 6–12) months. MRA was performed as follow-up

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