Human Pathology (2009) **40**, 1803–1807

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Human PATHOLOGY

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Case study

Intravascular polymer material after coil embolization of a giant cerebral aneurysm☆,☆☆

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Received 30 March 2009; accepted 22 April 2009

Keywords:
Hydrophilic polymer;
Embolization coil;
Guidewire;
Cerebral saccular aneurysm;
Granulomatous inflammation;
Cerebral infarct

Summary We report the case of an 87-year-old female who died after coil embolization of an intracerebral giant aneurysm. Guglielmi detachable (Boston Scientific Neurovascular, Fremont, CA) and Matrix2 coils (Boston Scientific Neurovascular, Fremont, CA) were used during the procedure to occlude the surgically untreatable left supraclinoid carotid artery aneurysm. Postprocedure imaging studies showed scattered areas of acute infarct involving multiple bilateral vascular territories. Autopsy confirmed widespread infarction due to embolized foreign material, morphologically consistent with hydrophilic polymer originating from the coated Matrix coil and Terumo glidewire (Terumo Medical, Somerset, NJ). Polymer gel is now widely used on several medical devices for interventional procedures worldwide, and we suspect that risks associated with iatrogenic embolization of this substance are underrecognized.

☆ The authors have no conflicts of interest to disclose.

☆☆ This work is supported by the Translational Research Fund (TRF) sponsored by the Department of Pathology and Laboratory Medicine at University of California, Los Angeles, CA (R.I.M., R.I.M., H.V.V.). HVV is supported, in part, by the Daljit S. and Elaine Sarkaria Chair in Diagnostic Medicine. HVV and WHY are supported, in part, by University of California, Los Angeles, SPOTRIAS grant NS044378.

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doi:10.1016/j.humpath.2009.04.027

1. Introduction

Hydrophilic polymer materials of various composition have long been applied as coating to endovascular devices to ease navigation within tortuous vessels, decrease endothelial trauma, and reduce intraprocedural thrombotic phenomena. Their use has allowed for advancements in transradial approach during cardiac catheterization. Polymer-coated aneurysm coils, such as Hydrocoils (Terumo Medical, Microvention, Aliso Viejo, CA), have been shown to facilitate volumetric occlusion of aneurysms by inducing inflammation and thrombus organization, which according to some studies, allows for use of less total coil material, decreasing associated risks [1].

A prospective randomized trial has shown that endovascular embolization of ruptured aneurysms is associated with reduced morbidity/mortality compared with surgical clipping [2]. However, iatrogenic embolization of polymer gel is associated with endovascular surgeries, and the frequency of resulting tissue infarction may be underrecognized. We describe the first case of coil embolization in which widespread deposition of polymer gel occurred within intracerebral blood vessels, contributing to death of the patient.

2. Case summary

The decedent was an 87-year-old female (nonsmoker) with a history of hypertension, peripheral vascular disease, chronic renal insufficiency, coronary artery disease, and congestive heart failure, and a 20-year known history of a surgically untreatable intracranial aneurysm. She presented to an outside hospital 14 days before death, reporting acute onset of severe headache and neck stiffness. Imaging studies showed Fisher grade 4 subarachnoid hemorrhage, with a ruptured left supraclinoid carotid artery giant aneurysm (Hunt-Hess grade 2) (Fig. 1A-B). The patient (who was unresponsive after the computed tomographic study) was intubated; treated with dexamethasone, mannitol, and phenytoin; and was transferred to our institution.

She was treated with routine subarachnoid hemorrhage management strategies and, being a poor surgical candidate, underwent embolization of the aneurysm 12 days before her death. During the procedure, a 6F 80-cm shuttle sheath (Cook Inc, Bloomington, IN) was inserted into the right common femoral artery over a 0.035 Cook Bentson guidewire (Cook Inc, Bloomington, IN). A Simmons 2 catheter (Terumo Medical, Somerset, NJ) was inserted and advanced into the aorta. However, due to an excessively tortuous aortic arch, it was not possible to select the left common carotid artery. A 5F VTK catheter (Cook Inc, Bloomington, IN) and 0.038 Terumo glidewire (Terumo Medical, Somerset, NJ) were instead used to advance the shuttle sheath into the left common carotid artery. An Echelon 10 microcatheter (ev3 Neurovascular, Irvine, CA) and fasDasher 14 microguidewire (Boston Scientific Neurovascular, Fremont, CA) were used to catheterize the aneurysm. A total of 7 Guglielmi detachable coils (Boston Scientific Neurovascular, Fremont, CA) and 12 Matrix2 coils (Boston Scientific Neurovascular, Fremont, CA) were used to fill the aneurysm. After the procedure, the aneurysm showed no residual contrast filling.

Postprocedure, the patient was slow to regain consciousness but was symmetric in spontaneous movements. The day after the procedure, she developed right hemiparesis. She never fully regained consciousness and was clinically diagnosed with a left middle cerebral artery (MCA) territory infarct. MRI (postoperative day 2) revealed areas of hyperintense signal on T2-weighted and FLAIR sequences with associated diffusion restriction within the left frontal, temporal, parietal, and occipital lobes, with involvement of the left insular cortex, caudate nucleus, and putamen, representing acute infarcts in the left MCA and posterior cerebral artery (PCA) territories (Fig. 1C). Multiple small scattered areas of acute infarct were visualized in the cerebellum (bilateral hemispheres, Fig. 1D), pons, right

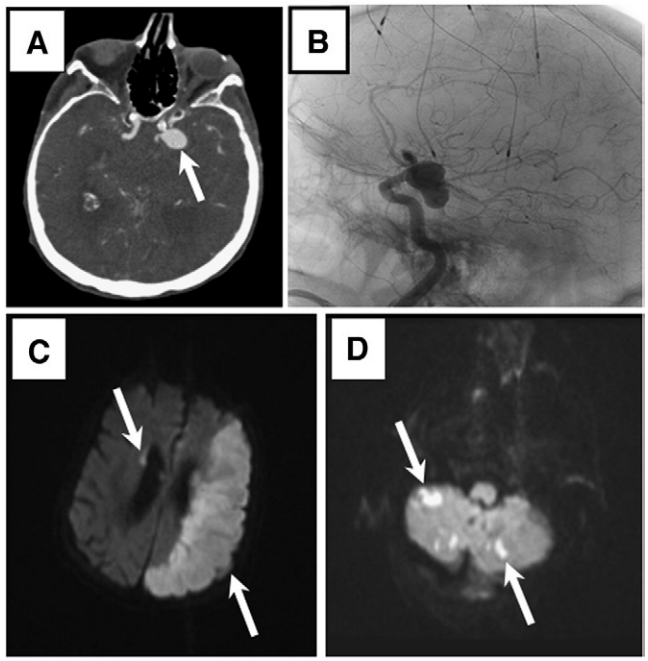

Fig. 1 Preprocedure imaging. A, Postcontrast computed tomography angiography (CTA) of the brain source image shows laterally projecting enhanced saccular aneurysm in the left supraclinoid internal carotid artery (ICA) (arrow), and (B) conventional cerebral angiogram (lateral projection of selective left internal carotid artery angiogram) shows the bilobed aneurysm, projecting posteriorly from the communicating segment of the left supraclinoid carotid artery (the left posterior communicating artery is patent). Postprocedure imaging. Diffusion-weighted images from noncontrast MRI of the brain (postprocedure day 2) demonstrate foci of acute infarcts, with associated diffusion restriction, involving (C) a large portion of the left MCA territory and right caudate nucleus, and (D) the bilateral cerebellar hemispheres (arrows).