Management of Arterial Occlusion during GDC Coil Embolization of Intracranial Aneurysms

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Purpose
Periprocedural arterial occlusions caused by vasospasm, thromboembolism, or coils are known complications of GDC coil embolization of intracranial aneurysms. The purpose of this report is to describe our experience with these complications, including their management and outcome.

Materials & Methods
GDC embolization of intracranial aneurysm was performed in 145 patients over the last 5 1/2 years. Nine patients had arterial occlusion and for the purpose of description these are divided into three types. Type I - occlusion caused by thromboembolism mainly effecting distal branches. One patient had distal embolus causing occlusion of right anterior cerebral artery during GDC coil embolization of right ophthalmic aneurysm and was treated by intravenous abciximab. Type II - vasospasm in the parent artery or its branches causing occlusion. This category included two patients treated by intraarterial papavarine infusion without further coil manipulation. Type III - position of GDC coil causing occlusion of the branches arising near the neck of aneurysm and further divided in two subgroups. (a) Type IIIa - occurring during the introduction of coil in the aneurysm or immediately after coil detachment (total 3 patients, 2 treated by withdrawal of offending coil and papavarine infusion, 1 treated with tPA and papavarine infusions). (b) IIIb - arterial occlusion caused by immediate postprocedural remodeling of coil mass (total 2 patients with basilar tip aneurysm, 1 treated with tPA infusion, 1 patient treated with urokinase and papavarine infusions).

Results
Type I - complete resolution of thrombus following abciximab infusion was noted within 15 minutes, though the patient developed a retroperitoneal and puncture site hematoma. Type II - complete resolution of vasospasm was noted in these two patients and occluded arteries opened completely. Type IIIa - complete opening of the occluded branches was noted after coil withdrawal and papavarine infusion in two patients but the third patient with left middle cerebral artery trifurcation aneurysm progressed to complete occlusion resulting into infarct. Type IIIb - one patient developed complete occlusion of both posterior cerebral arteries causing bilateral occipital infarcts and the second patient responded partially with opening of superior cerebellar arteries but P1 segment of posterior cerebral arteries remained occluded causing only superior cerebellar infarcts (due to fetal origin of posterior cerebral artery).

Conclusion
We describe various mechanisms causing periprocedural arterial occlusion during GDC coil embolization of aneurysms. While arterial occlusion caused by vasospasm, undetached GDC coil
and distal thromboembolism responds well to the appropriate treatments, arterial occlusion caused by deployed coils or delayed remodeling of coil mass results in progressive occlusion and infarcts.