

**BRAIN AVM RECURRENCE AFTER APPARENT MICROSURGICAL CURE:
INCREASED RISK IN CHILDREN WHO PRESENT WITH AVM RUPTURE**

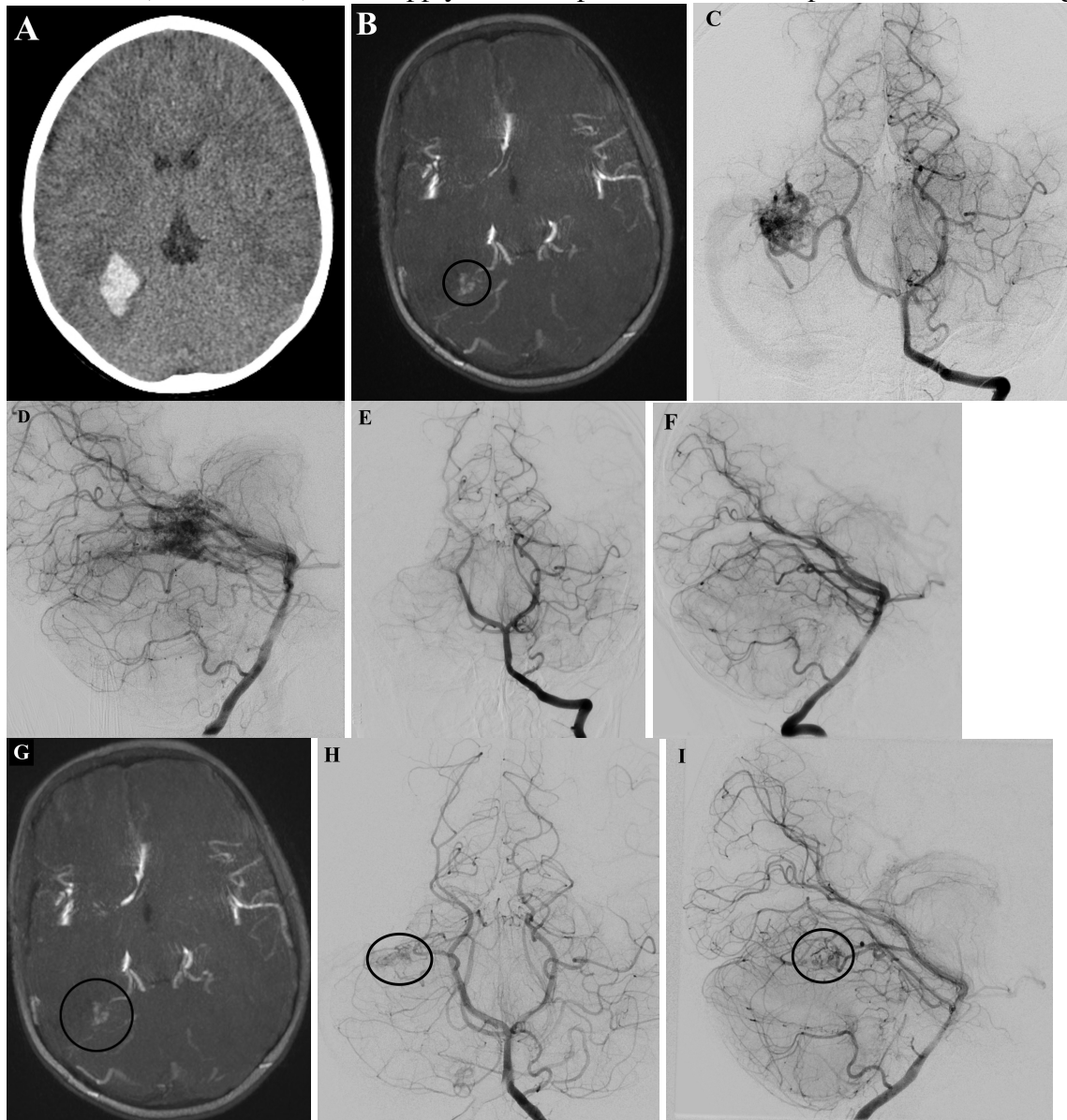
SUPPLEMENTAL MATERIAL

Supplementary Table. Characteristics of patients with AVM recurrence.

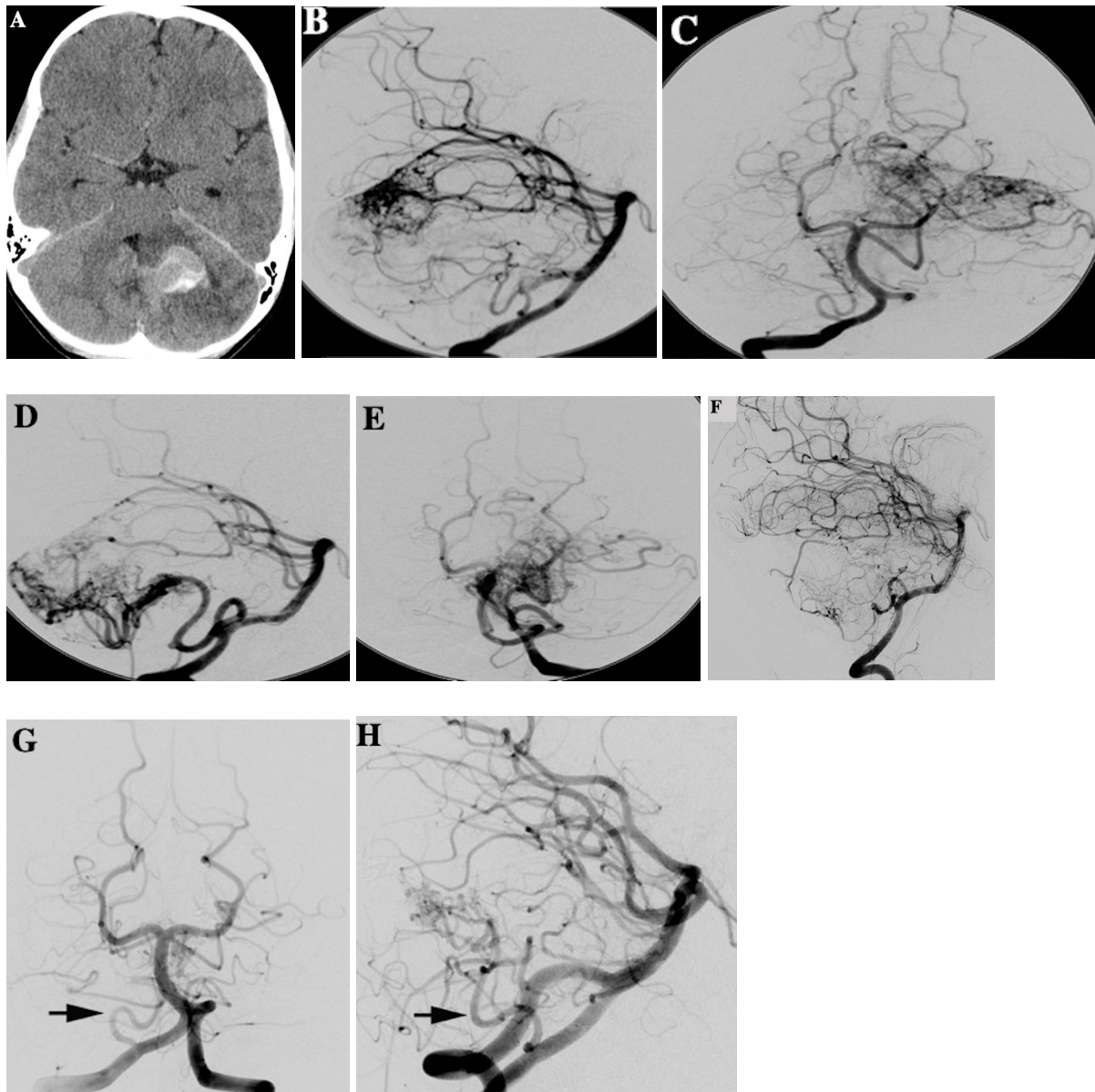
Patient No.	Sex	Age at First Presentation (Years)	Initial Clinical Presentation	AVM Location	Time to Recurrence (Months) [†]	Presentation at Recurrence	Location of Recurrence (relative to resection site)	Size of Recurrence (longest axis)	High risk features [§]	Venous drainage
1	M	15	ICH	Perimesencephalic Left Parietal/Occipital	65	Asymptomatic	anterior-inferior	0.4cm	-	Deep
2	M	12	ICH	Left Temporal Lobe	56	Asymptomatic	anterior-lateral	1.2cm	-	Superficial
3	M	5	ICH	Left Caudate Basal Forebrain	4	Asymptomatic	anterior-inferior	1.5cm	Venous varix	Deep
4	F	21	ICH	Left Frontal Lobe Basal Ganglia Insula	45	ICH	anterior-inferior	1.4cm	-	Deep
5	M	23	ICH	Left Medial Temporal Lobe	71	Headache	deep/medial	1.5cm	Venous stenosis	Superficial
6	M	11	ICH	Left Cerebellum	61	Asymptomatic	anterior-medial	1.5cm	-	Deep
7	M	17	ICH	Left Frontal Lobe	62	Asymptomatic	inferior-deep	1.4cm	-	Deep
8	M	21	ICH	Left Frontal Lobe	104	Asymptomatic [‡]	superior-medial	1.2cm	-	Deep
9	M	22	ICH	Right Medial Temporal Lobe	80	Headache	posterior-medial	1.3cm	-	Deep
10	F	10	ICH	Left Temporal Lobe	60	Headache	lateral	<0.5cm	-	Superficial
11	F	14	Incidental [*]	Right Temporal + Parietal	20	Seizure	inferior-deep	0.7cm	-	Superficial
12	M	8	Seizure/ICH	Left Posterior Temporal	28	Headache	inferior-deep	1.3	-	Superficial

^{*}Detected during workup of cerebral cavernous malformation with perilesional hemorrhage
[†]Recurrence defined by angiographic confirmation of AVM following a previous negative diagnostic angiogram
[‡]Screening performed routinely for hereditary hemorrhagic telangiectasia
[§]Risk features including intranidal aneurysm, venous varix, venous stenosis

Supplementary Figure I. Eight year-old boy who initially presented 2 years prior (at 6 years of age) with intraparenchymal hemorrhage secondary to ruptured AVM which was subsequently surgically resected. (A) Unenhanced head CT at presentation demonstrates right posterior temporal hematoma with small amount of adjacent vasogenic edema. (B) Time-of-flight MRA reveals small tangle of vessels (black circle) in region of hematoma suggestive of underlying vascular malformation. (C&D) AP and later digital subtraction angiography (DSA) images at initial presentation demonstrate a right temporal lobe AVM with supply from inferior temporal branches of the right posterior cerebral artery (PCA). (E&F) Immediate post-operative AP and lateral DSA images demonstrate complete angiographic cure. (G) Two-year follow-up MRA demonstrates serpiginous flow related enhancement (black circle) in the posterior right temporal lobe suspicious for AVM recurrence. (H&I) DSA performed three weeks later confirms AVM recurrence (black circles) with supply from the posteroinferior temporal branch of the right PCA.



Supplementary Figure II. Six year-old boy who presented with headache and altered mental status. (A) Unenhanced head CT demonstrates a deep left cerebellar hemispheric hemorrhage with local mass effect and surrounding edema. (B, C) Lateral and AP right vertebral artery DSA images demonstrate a left cerebellar hemispheric AVM nidus with dominant arterial supply from ipsilateral superior cerebellar artery. Note there is no supply via the contralateral posterior inferior cerebellar artery (PICA). (D, E) Lateral and AP left vertebral artery DSA images demonstrate supply to the AVM via the ipsilateral PICA. (F) Post-operative left vertebral artery DSA image reveals no evidence of residual nidus or arteriovenous shunting. (G, H) Five-year follow up angiogram with AP and lateral left vertebral artery DSA images reveals recurrence of the deep left cerebellar hemispheric AVM with dominant supply via branches of enlarged right PICA (black arrows). Recall the right PICA was previously uninvolved.



Supplementary Figure III. Eight year-old boy who presented with headache and episode of emesis. (A) Coronal T1-weighted image reveals heterogeneous T1 hyperintense signal in the anterior left temporal lobe in keeping with hematoma. (B) AP left internal carotid artery DSA image demonstrates AVM nidus (black oval) within the left temporal lobe with dominant supply from the anterior temporal artery. (C) Post-operative left internal carotid artery DSA image reveals no evidence of residual nidus (black arrow) or arteriovenous shunting. (D) Five-year follow up contrast-enhanced MRA demonstrates prominent collection of vessels within the anterior temporal pole adjacent to prior hemorrhage site. (E) AP left internal carotid artery DSA image reveals recurrence of AVM nidus (black oval) at the site of prior surgical resection supplied by anterior and mid-temporal arteries.

