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Continued Severe Headaches Following Intracranial Hemorrhage from a Combined Aneurysmal and AVM (arterio-venous malformation) bleed in a 17-week G2P1 21-year old pregnant female

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INTRODUCTION

The incidence of intracranial hemorrhage (ICH) from aneurysms (A) or AVMs in pregnancy is 0.03% (1), (2). The consequences are devastating. ICH from known documented A or AVM bleeding accounts steadily for approximately 6% of all maternal deaths in California (3) and likewise, approximately 9% in the literature worldwide (1). However, despite this rare incidence of ICH from congenital vascular lesions in the brain, the incidence of maternal death from stroke in (pre)eclampsia is on the rise in California from 7% (in 2000) to 17% (in 2010)(3)(Fig #1). Together, stroke from A, AVMs and eclampsia accounts for about 25% of all maternal deaths! (3)(Fig #2) Although a pregnant patient may present with a clinical stroke, the treatment for A, AVM, and (pre)eclampsia can be very different.

Thus, are all strokes created equal in pregnancy?

CASE REPORT

A 21-year-old G2P1 female (60 kg, BMI 20) presents at 17 weeks, with a second pregnancy now with severe headaches, nausea and neck pain for 1 day. Vital signs: normal. A head CT/MRI showed a stroke: subarachnoid, intra-ventricular and some intra-parenchymal hemorrhage of the right insular (parieto-temporal) area. Over the next 5 days her headache progressed, nausea worsened, and she developed altered mental status. She was intubated, an EVD (external ventricular drain) placed and angiography showed an AVM and a 2 mm intra-nidal aneurysm (A) within the AVM. The UCSF neurosurgeon, not sure if she bled from the intracranial AVM or the A, clipped the A, which resulted in complete cessation of bleeding. She was later discharged home, neurologically intact.

MRI Right Parieto-Temporal Arterio-Venous Malformation



DISCUSSION

When faced with an intracranial bleed in pregnancy, it is critical to know the exact characteristics of the bleed. An angiogram is critical to make this diagnosis and concerns for fetal radiation exposure should be mitigated with proper metal shielding of the fetus (1). There is often overlap of etiologies: 34% of bleeding A/AVMs can have eclamptic features of hypertension and proteinuria (1). Although many A/AVMs typically present with subarachnoid hemorrhage and intra-ventricular bleed, 40% can have intra-parenchymal bleed features on MRI/CT scans more common in eclamptic patients (1).

Re-bleed risk of an untreated aneurysm or AVM in pregnancy is 45% with a maternal mortality of 60% (1). However, surgical management of aneurysms, not AVMs, was associated with significantly decreased maternal/fetal mortality/morbidity (1) (Fig #3). Conversely, maternal morbidity but not fetal morbidity in pregnancy was often increased with surgical AVM treatment (1). Finally, magnesium and blood pressure control is the mainstay of eclamptic ICH treatment and not definitive surgical intervention.

In our case report, as the bleed was in the right insular area and the surgeon felt that definitive intra-partum surgical operation of the AVM may leave the mother with new neurological deficits, he chose only to clip the aneurysm and treat the AVM with postpartum stereotactic radiosurgery. Neuro-interventional treatment was considered but abandoned for concerns of excessive radiation exposure.

In conclusion, all strokes in pregnancy are not created equally and deserve meticulous attention to discover the etiologies that can be treated intra-operatively.

FIGURES

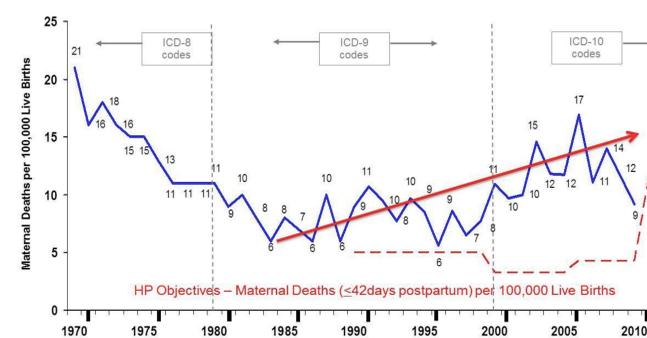


Fig #1: Maternal Mortality Rate, California Residents 1970-2010

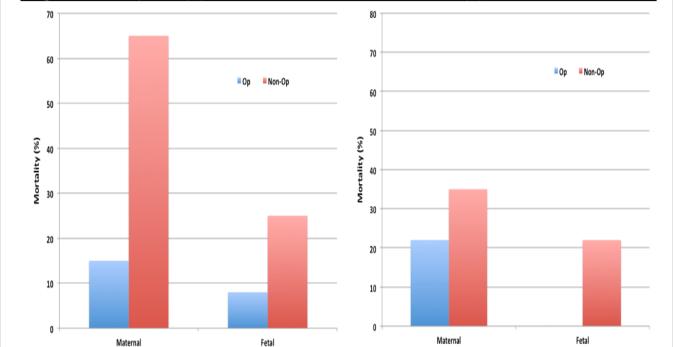
Source: State of California, Department of Public Health, California Birth and Death Statistical Master Files, 1970-2010. Maternal mortality for California (deaths ≤ 42 days postpartum). Produced by California Department of Public Health, Center for Family Health, Maternal, Child and Adolescent Health Division, December, 2013

Grouped Cause of Death	Chance to Alter Outcome			Total N (%)
	Strong / Good (%)	Some (%)	None (%)	
Obstetric hemorrhage	69	25	6	16 (11)
Deep vein thrombosis/pulmonary embolism	53	40	7	15 (10)
Sepsis/infection	50	40	10	10 (7)
Preeclampsia/eclampsia	50	50	0	25 (17)
Cardiomyopathy and other cardiovascular causes	25	61	14	28 (19)
Cerebral vascular accident	22	0	78	9 (6)
Amniotic fluid embolism	0	87	13	15 (10)
All other causes of death	46	46	8	26 (18)
Total (%)	40	48	12	145

Fig #2: Chance to Alter Outcome

CA-PAMR California Preeclampsia Alter Mortality Rate: Chance to Alter Outcome. Grouped Cause of Death 2002-2004. CMQCC= California Maternal Quality Care Collaborative. See reference 3

Fig #3: Aneurysms (A) and AVMs (B)



Effect of surgical management on maternal and fetal mortality after Aneurysmal (A) and AVM (angiomatous) (B) hemorrhage. The differences between the groups having surgery and not having surgery are statistically significant, independent of other covariates, for both maternal and fetal mortality after aneurysmal hemorrhage, but not after angiomatous hemorrhage. From: Dias and Sekhar, *Neurosurgery*, 1990, Vol 27, No 6 (Reference 1 above).

REFERENCES

- (1) Mark S. Dias, Laligam N. Sekhar, *Neurosurgery, Intracranial Hemorrhage from Aneurysms and Arteriovenous Malformations during Pregnancy and the Puerperium*, 1990, Vol. 27, No. 6, p855-866
- (2) Kim YW, Neal D et al, *Neurosurgery, Cerebral Aneurysms in pregnancy and delivery: pregnancy and delivery do not increase the risk of aneurysmal rupture*, 2013 Feb; 72(2): 143-9
- (3) Lecture, Stanford University, Obstetrical Anesthesia Update, Anesthesiology and Perioperative Care Grand Rounds, Dr. Druzin MD, Professor of OBGYN and member of **Preeclampsia Task Force Committee/ Maternal Mortality Review for the State of California Department of Public Health Nov. 2013. CMQCC, California Maternal Quality Care Collaborative**

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