Maternal Aneurysmal Subarachnoid Hemorrhage During Pregnancy as an Interdisciplinary Task

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Introduction
aSAH during pregnancy is a severe and complex condition demanding interdisciplinary management of different fields such as anesthesiology, obstetrics, neuroradiology and neurosurgery. There are no distinct treatment guidelines available and treatment is normally done on a case-by-case basis. Treatment options can be harmful for the fetus but essential for the mother and vice versa. The critical question of timing in regard to CS versus vaginal delivery in pregnant patients with aSAH needs to be promptly addressed. We report on four cases of maternal aSAH during pregnancy to illustrate the different management strategies, in the end suggesting a practical treatment algorithm.

Methods
Pregnant patients with aSAH treated between 2003 and 2013 in our center were included in this study. Clinical data were analyzed retrospectively by chart review and telephone interview. Results were compared to the current literature on this subject.

Results
In our center, 1020 patients were treated for an aSAH between 2003 and 2013. Four of them were pregnant women (0.4%). Mean age of the patients was 30.8 years. Initial H&H grade ranged from III to V. All patients suffered from aSAH during the 3rd trimester (mean GW 31.8). Aneurysms were localized at the middle cerebral artery (MCA) in three cases (two left-sided, one right-sided) and at the posterior communicating artery (PCOM) in one case. With respect to initial medical imaging, two patients were diagnosed by magnetic resonance imaging/angiography (MRI/A). Two women did not have any medical imaging but initial CS; one was initially diagnosed by clinical symptoms and lumbar puncture. In the other case a highly pathological CTG led to initial emergency CS and secondary cranial computed tomography (CT) with further therapy for the mother. In two cases microsurgical clipping was performed and in one case endovascular treatment was conducted. One patient was in an unstable condition combined with a pathological CTG of the fetus. This patient died due to cardiac arrest after CS before definitive therapy of the aneurysm. The fetal mortality was 0%. The mean follow-up was 83 months.

Conclusions
Concerning maternal mortality due to aSAH, the reported data ranges from 5% to 12% of all maternal deaths during pregnancy [7]. There should be basically no difference in the principal treatment of ruptured intracranial aneurysms in pregnant women compared to non-pregnant patients [7, 25]. Efforts must focus on the mother so that a delay in the best available treatment for the pregnant patient is avoided. Therefore treatment modality should be primarily determined by the aneurysm itself. Endovascular as well as surgical treatment options are practicable. The decision on the type of treatment and time and mode of delivery must be individualized and multidisciplinary, including decisions concerning medication regime on the intensive care unit.

As to the relevance of medical imaging and X-ray exposure in pregnant patients, an algorithm for the management of aSAH during pregnancy has been established at our center. Pregnant women with symptoms of aSAH are diagnosed by primary medical imaging, avoiding CTA. Before treatment decision, the GW should be determined. If GW < 34, continuation of the pregnancy is suggested. If GW ≥ 34, CS should be considered. For an ongoing pregnancy following whichever treatment of the aneurysm, the child’s health status must be monitored continuously until delivery.

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