We report a case of peripartum asymptomatic cerebral hemorrhage (hereafter “PEACH”) in the frontal lobe, which was not diagnosed until postpartum day 8. A 35-year-old woman underwent cesarean section at 40 weeks of gestation due to non-reassuring fetal status during labor and gave birth to a healthy female baby. Her general conditions during labor, cesarean delivery, and postpartum period were uneventful. However, she developed hypertension 8 days after delivery, had headache and vertigo, and could not maintain a sitting position. Computed tomography revealed an edematous lesion in the vicinity of a hemorrhagic lesion in the right frontal cortex. Diffusion-weighted magnetic resonance imaging confirmed these findings, suggesting that several days or more had passed since the occurrence of asymptomatic cerebral hemorrhage. PEACH may occur in normotensive patients and cause nerve compression symptoms and hypertension over the course of a few days.

Introduction

Peripartum intracranial hemorrhage is a multifactorial, uncommon, and unpreventable complication of pregnancy. An association has been reported between intracranial hemorrhage and hypertensive disorders of pregnancy and cesarean delivery. Hemorrhagic stroke usually presents with headache, which leads to early diagnosis. Here we report a case of peripartum asymptomatic cerebral hemorrhage (hereafter “PEACH”) in the frontal lobe, which was diagnosed with delay on postpartum day 8 due to the absence of both increased blood pressure and headache.

Case report

A 35-year-old gravida 1 para 0 woman was admitted to our hospital with labor pain at 40 weeks of gestation. Her pregnancy had progressed uneventfully. During the pregnancy, her blood pressure varied from 105 to 120 mmHg systolic and from 70 to 80 mmHg diastolic. On admission, her initial blood pressure was 121/80 mmHg. During the latent phase of labor, fetal heart rate tracings showed repeated, severe prolonged decelerations. She underwent cesarean section under spinal anesthesia and gave birth to a 3,562-g female baby. At birth, Apgar scores at 1 and 5 minutes were 9 and 10, respectively. During the operation, spinal anesthesia was achieved with 2.4 ml 0.5% hyperbaric bupivacaine following lumbar puncture involving a single prick with a 25-gauge spinal needle at the L3-L4 interspace. During labor and cesarean delivery, her blood pressure varied from 80 to 115 mmHg systolic and from 35 to 55 mmHg diastolic. Total blood loss was 900 ml. Although blood coagulation tests were not performed preoperatively, no intraoperative findings indicated difficult hemostasis. Fore-lying of the umbilical cord was considered the possible cause of non-reassuring fetal status, as no abnormalities in the placenta or amniotic fluid volume were noted. She was returned to the recovery room in good condition. The postpartum course was uneventful until 7 days after delivery, but on the 8th day, she complained of headache and vertigo and was unable to maintain a sitting position. At that time, she showed no obvious left-right difference in motor function. Her blood...
pressure was increased to 170/110 mmHg. Computed tomography revealed an edematous lesion in the vicinity of a hemorrhagic lesion in the right frontal cortex (Figure 1A). Diffusion-weighted magnetic resonance imaging (MRI) showed a high signal intensity area 2–3 cm in diameter with a low signal intensity area (Figure 1B), leading to a diagnosis of PEACH (mimicking the nucleus of a peach) (Figure 1C). These findings suggested that several days or more had passed without any symptoms since the occurrence of cerebral hemorrhage. There were no abnormal findings indicating the presence of cerebral abnormalities such as cerebral aneurysms, arteriovenous malformations, or moyamoya disease. She was treated with an antihydropic antihypertensive agent and an anticonvulsant, and discharged on day 17 with left hemiplegia. She is currently undergoing rehabilitation following conservative treatments.

**Discussion**

We present a rare case of pregnancy-associated cerebral hemorrhage diagnosed on postpartum day 8. The lesion occurred peripartum without clinical events under normotensive conditions, and caused hypertension and nerve compression symptoms over the course of a few days. We named it “PEripartum Asymptomatic Cerebral Hemorrhage (PEACH)” given its clinical features and MRI characteristics.

Why did PEACH occur asymptotically in the present case? While the frontal lobe of the cerebrum has been called a ‘silent area’, it has been shown to have many cognitive functions in recent years. Today, the frontal lobe of the cerebrum is considered to play a very important role in human cognition. On admission, her blood pressure was maintained at normal levels during labor and postpartum, but she subsequently developed asymptomatic cerebral hemorrhage. Some case reports have described cerebral hemorrhage following spinal anesthesia as an unusual complication associated with the development of subdural hematoma/subarachnoid hemorrhage or a sudden lowering of intracranial pressure after cerebrospinal fluid leak through the puncture site. In the present case, however, the patient presented with no symptoms indicating these episodes. If a hemorrhagic mass develops in the frontal lobe of the cerebrum, it usually causes no symptoms at sizes 2 cm or smaller. In the present case, a small hemorrhage probably occurred under normotensive conditions, and edema around the hematoma over the course of a few days caused nerve compression symptoms. During pregnancy, blood vessel autoregulation may be disturbed even in normotensive patients. Despite hemorrhage risk appears no significantly increase even in pregnant patients with cerebral cavernous malformation, we did not find any signs of congenital cerebral abnormalities. In addition, the influence of fluctuations in blood pressure associated with mild spinal hypotension and its recovery could not be ruled out. PEACH may suddenly develop in pregnant women with or without suspected congenital cerebral abnormalities; in such cases, its prevention is very difficult even under careful peripartum management.

A further accumulation of case reports will be necessary to elucidate the mechanisms of PEACH development.

**Conflict of interest statement**

All authors declare no conflicts of interest related to this report.
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References

1. Witlin AG, Mattar F, Sibai BM. Postpartum stroke: a twenty-year experience. Am J Obstet Gynecol. 2000; 183: 83–88.
2. Negro A, Delanuelle Z, Ivanova TA, et al. European Headache Federation School of Advanced Studies (EHF-SAS). Headache and pregnancy: a systematic review. J Headache Pain. 2017; 18: 106.
3. Maeshima S, Osawa A, Tanahashi N. Assessment of cognitive impairment due to frontal lobe damage (in Japanese). Higher Brain Function Research. 2012; 32: 21–28.
4. Lee SJ, Lin YY, Hsu CW, Chu SJ, Tsai SH. Intraventricular hematoma, subarachnoid hematoma and spinal epidural hematoma caused by lumbar puncture: an unusual complication. Am J Med Sci. 2009; 337: 143–145.
5. Sharma K. Intracerebral hemorrhage after spinal anesthesia. J Neurosurg Anesthesiol. 2002; 14: 234–237.
6. Miyasato W, Yoshii Y, Tominaga D, Ishiuchi S. Studies on higher brain function of frontal lobe in patients with brain tumor (in Japanese). Jpn J Occupational Ther. 2010; 44: 1412–1416.
7. Suzuki S. Maternal blood pressure before the onset of eclampsia and stroke during labor at term. Hypertens Res Pregnancy. 2016; 4: 65–67.
8. Witiw CD, Abou-Hamden A, Kulkarni AV, Silvaggio JA, Schneider C, Wallace MC. Cerebral cavernous malformations and pregnancy: hemorrhage risk and influence on obstetrical management. Neurosurgery. 2012; 71: 626–630.