Vaginal Delivery under Epidural Analgesia in Pregnant Women with a Diagnosis of Moyamoya Disease

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Background: Moyamoya disease more commonly occurs in young people and women, so patients with this disease may experience pregnancy and delivery. Cesarean section (CS) is often chosen as the mode of delivery for these patients in Japan. No appropriate mode of delivery has yet been established for pregnant women with moyamoya disease in terms of stroke prevention. We have used vaginal delivery under epidural analgesia (EA) in such patients unless CS has been indicated for the maternal or fetal reasons. This study retrospectively analyzed our patients with moyamoya disease who gave birth to confirm the safety of vaginal delivery under EA. *Methods:* Twelve consecutive patients diagnosed with moyamoya disease had 14 deliveries at our hospital between September 2004 and January 2013. The incidences of intrapartum stroke were compared between cases of vaginal delivery under EA and CS cases. *Results:* Ten vaginal deliveries under EA and 4 elective CSs were performed. No intrapartum stroke was observed during either vaginal delivery under EA or CS. Among the patients who underwent vaginal delivery under EA, 1 parturient who experienced 2 deliveries suffered transient ischemic attack during both postpartum periods. All 14 infants were healthy without sequelae. *Conclusions:* Vaginal delivery under EA is an option for patients with moyamoya disease, provided that close cooperation with neurosurgeons, obstetricians, and anesthesiologists is assured. **Key Words:** Analgesia—cesarean section—delivery—moyamoya—stroke—vaginal delivery.

Moyamoya disease causes chronic progressive stenosis of the bilateral intracranial arteries, which may result in cerebral infarction or intracranial hemorrhage.[1] Moyamoya disease more commonly occurs in young people and women, so patients with this vascular disorder frequently undergo pregnancy and delivery. The incidence of stroke during delivery in patients with moyamoya disease remains unclear, and no appropriate mode of delivery has been established in terms of stroke prevention. Based on the results of nationwide surveys conducted in Japan, cesarean section (CS) was the most frequently chosen mode of delivery in patients with a diagnosis of moyamoya disease. Vaginal delivery under epidural analgesia (EA) was chosen in 19% (11 of 59 deliveries) based on a nationwide survey from perinatal medical centers and 3% (2 of 76 deliveries) based on a survey of adult female patients with moyamoya disease.[2] No

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randomized controlled trials have compared vaginal delivery and CS, but CS is generally associated with the following risks: greater length of maternal hospital stay, infection, anesthetic complications, blood transfusion, deep vein thrombosis, operative injury, and maternal death.[3,4]

A division of obstetric anesthesiology has been established at our hospital, and vaginal delivery under EA has been used for approximately 65% of all vaginal deliveries. Therefore, we have been able to choose vaginal delivery under EA, even in patients with moyamoya disease, unless CS was indicated for maternal or fetal reasons.

This study retrospectively investigated the clinical records of patients with moyamoya disease who gave birth to confirm the safety of vaginal delivery under EA.

Methods

Patients Selection

This study included 12 consecutive moyamoya disease patients with 14 deliveries at Kitasato University Hospital between September 2004 and January 2013. Patients with moyamoya disease diagnosed after delivery were excluded. Because of the policy at our institute, we have chosen vaginal delivery under EA in patients with moyamoya disease without recent ischemic symptoms and no maternal or fetal problems. The incidences of intrapartum stroke were compared between patients who underwent vaginal delivery under EA and those receiving elective CS for specific reasons other than moyamoya disease (patient request, 1; fetal distress, 1; previous CS, 2). Moyamoya disease was diagnosed according to the criteria issued by the Japanese Ministry of Health, Labour and Welfare.[5] No antiplatelet agents have been prescribed to any patients in accordance with our policy on moyamoya disease.

Anesthetic Management for Vaginal Delivery under EA

Continuous EA had been maintained using .0625%-.125% bupivacaine and fentanyl 2 mg/mL at a rate of approximately 10 mL/hour since the 1990s. The patient-controlled EA method has been used since 2000, in which, the agents are provided by patient with a pump to control pain. The combined spinal-epidural analgesia technique has also been used with the same agents. The local anesthetic, ropivacaine, which is less cardiotoxic than bupivacaine, was recently introduced. Overall, painless vaginal delivery under regional anesthesia (EA in 57% and combined spinal-epidural analgesia in 43%) was adopted in approximately 65% of all vaginal deliveries. Oxytocin was given to augment uterine contractions. Outlet forceps or a vacuum extraction procedure was applied at delivery if necessary.

Statistical Analysis

Differences in the characteristics of the patients in the 2 groups were evaluated by Student t test for continuous variables (age, gestation, and intrapartum bleeding) and Fisher exact test (history of bypass surgery and pregnancy-induced hypertension) for absolute categorical variables. Differences with a P value of less than .05 were considered statistically significant. All statistical analyses were conducted using JMP software (JMP 10, SAS Institute Inc., Cary, NC).

Results

The 12 patients with moyamoya disease underwent 14 deliveries consisting of 10 vaginal deliveries under EA (8 patients) and 4 elective CSs (4 patients). The patients undergoing vaginal delivery under EA and CS showed no significant differences at parturition in age, gestational age, history of bypass surgery, incidence of pregnancy-induced hypertension, or intrapartum blood loss, as shown in Table 1. Transient ischemic attack (TIA) was observed during both postpartum periods in 1 patient who underwent 2 vaginal deliveries under EA (representative case). No patient suffered intrapartum stroke. Vacuum/forceps was applied in 60% (6 of 10 deliveries) under painless labor. All 14 infants were healthy without sequelae.

Representative Case

A 28-year-old woman had experienced TIAs since age 5 years and was diagnosed with moyamoya disease at age 12 years. She had remained asymptomatic until age 20 years. She underwent a vaginal delivery under EA (blood loss, 426 mL) at age 28 years. TIA manifesting as

Table 1. *Clinical characteristics of the patients at parturition based on the mode of delivery*

	Vaginal delivery under EA (N = 10)	CS (N = 4)	P value
Age (y)	31.2 ± 1.2	34.5 ± 1.9	.1738*
Gestation (d)	271 ± 6.1	251 ± 9.6	.0920*
History of bypass surgery, n (%)	6 (60)	3 (75)	1.0000†
PIH	0	1	.2857†
Intrapartum bleeding (mL)	394 ± 96	426 ± 152	.8588*

Abbreviations: CS, cesarean section; EA, epidural analgesia; PIH, pregnancy-induced hypertension.

*Student t test.

†Fisher exact test.