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LETTER TO THE EDITOR

General anesthesia at cesarean section for placenta previa

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To the Editor:

In cesarean section (CS) for placenta previa with suspected placenta accreta (PPA), managing massive hemorrhage is essential. There is insufficient evidence on the primary mode of anesthesia [1, 2], and general anesthesia is the primary anesthetic at our institute. We secure central venous catheters, invasive arterial lines, and large-bore peripheral venous lines to prepare for massive hemorrhage. Furthermore, ureteral stents and femoral artery catheters for interventional radiology are placed before the surgery. To minimize fetal exposure to the general anesthetic, all of the catheters and stent placement are accomplished before the induction of general anesthesia. Epidural anesthesia and local infiltration anesthesia are used. However, some patients request that general anesthesia be induced before catheterization because of their concerns. Traditionally, longer general anesthesia induction to baby delivery time was reported to associate with lower Apgar scores and umbilical artery pH (UApH) [3], we usually make an effort to shorten the interval between inducing general anesthesia and the delivery of the baby at CS. We conducted this retrospective study to compare the neonatal conditions according to the timing of inducing general anesthesia before or after placing the catheters and stent.

Following approval from the institutional ethics review board (21–255), we retrospectively investigated the medical records of women who underwent CS for PPA between 2010 and 2021 at our hospital. We compared the Apgar score, UApH, the rate of tracheal intubation, the duration of intubation, and the stay in the neonatal intensive care unit (NICU) between the induction before catheterization group (group B) and the induction after catheterization group (group A). Statistical analysis was performed using the unpaired *t*-test or Mann–Whitney test for continuous variables depending on the sample distribution. In addition, the Fisher's exact test was used for categorical data.

There were 12 cases of PPA, which consisted of six in group B and six in group A (Table 1). There were no life-threatening diseases in any of the neonates. The mean [standard deviation (SD)] general anesthesia induction to delivery time was significantly longer in group B than in group A (135.5 [25.9] vs. 18.8 [7.5] minutes; $p = 0.002$). The mean [SD] amount of blood loss at surgery was identical (group B: 1152.3 [996.8], group A: 3402.2 [3445.2] ml; $p = 0.155$). Opioids were administered before baby delivery to two of six cases in group A (fentanyl 0.1 mg, remifentanil 0.27 mg). On the other hand, all patients in group B received remifentanil (0.993 [0.415]mg, mean [SD]) before baby delivery. Both groups had cases where the Apgar scores at 1 min and 5 min after delivery were below 7 and the proportion of them are identical (5 in group B, and 4 in group A for Apgar score at 1 min; $p = 0.5$, 4 in group B, and 2 in group A for Apgar score at 5 min; $p = 0.284$). There was no difference in mean UApH (group B: 7.27 [0.09], group A: 7.35 [0.08]; $p = 0.111$) between the groups. The rate of neonates who were intubated (group B: 100%, group A: 50%; $p = 0.091$), the mean duration of intubation (group B: 1.83 [0.41], group A: 3.00 [1.73] days; $p = 0.363$), and NICU hospitalization (group B: 8.3 [5.9], group A: 13.8 [7.4] days; $p = 0.662$) were similar between the groups. 1 month after delivery, the breastfeeding rate was identical between the groups (group B: 83.3%, group A: 75.0%; $p = 0.667$).

We induce general anesthesia before the surgery starts because massive hemorrhage occurs rapidly after delivery of the baby, and intubation, after hemorrhage occurs may be difficult. We discuss the effect of general anesthesia on neonates with patients during the pre-anesthesia visit. If the

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Table 1 Data of anesthesia and neonates

Timing of anesthesia induction	Anesthesia ID time (min)	Blood loss (ml)	GA (week)	Apgar 1 min	Apgar 5 min	UApH	Baby weight (g)	NICU Hospitalization (days)	Duration of intubation (days)
Before catheterization	127	1970	36	2	4	7.164	2944	7	2
Before catheterization	118	595	35	2	3	7.275	2510	13	2
Before catheterization	174	2749	35	2	5	7.248	2434	10	2
Before catheterization	165	360	33	2	8	NA	2178	17	2
Before catheterization	123	970	35	8	9	7.38	2894	1	2
Before catheterization	85	270	33	2	5	NA	1854	45	1
After catheterization	16	9920	36	2	7	7.469	2318	23	2
After catheterization	23	4250	34	2	3	7.396	2806	20	5
After catheterization	28	2384	35	2	8	7.304	2368	12	No intubation
After catheterization	19	465	35	7	8	7.276	2366	16	No intubation
After catheterization	8	1119	36	2	6	7.285	2650	12	No intubation
After catheterization	37	2275	34	6	7	NA	2066	24	2

GA gestational age, *ID* induction to delivery, *NA* data not available, *NICU* neonatal intensive care unit, *UApH* umbilical artery pH

patient wishes to induce general anesthesia before catheterization, we accept the request to avoid psychological stress on the mother. This study showed that the interval between the induction of general anesthesia and delivery time was longer in group B than in group A. However, there were no differences in the proportion of Apgar scores below 7, UApH, the intubation rate of the neonate, the duration of intubation, or the NICU stay. These findings suggested no significant adverse effects in neonates in group B compared with those in group A.

There are limitations to this study, such as the small number of cases, and this was a retrospective study. Perinatal management of PPA is complicated, and we should be prudent in applying our results to other facilities.

In conclusion, the induction of general anesthesia before invasive procedures may be acceptable according to the patient's request. However, future studies with a sufficient number of subjects are required.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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