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Uterine rupture after the uterine fundal pressure maneuver

Abstract

Objective: To clarify the incidence of uterine fundal pressure at delivery and its effect on uterine rupture.

Study design: A questionnaire was sent to 2518 institutions in Japan. We received a response from 1430.

Results: Of reporting institutions, 89.4% used fundal pressure in at least some of their deliveries. Among the 347,771 women who delivered vaginally in this study, 38,973 (11.2%) were delivered with the assistance of fundal pressure. There were six cases of uterine rupture associated with uterine fundal pressure, with one case resulting in maternal death secondary to amniotic fluid embolism.

Conclusion: Since uterine fundal pressure may potentially cause serious injury to either the mother and/or neonates, the indications for application need to be clearly elucidated, and obstetric care providers also need comprehensive education and training.

Keywords: Amniotic fluid embolism; maternal death; postpartum bleeding; uterine fundal pressure; uterine rupture.

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Introduction

The uterine fundal pressure maneuver is usually applied to assist the exclusive force and finish delivery quickly when a non-reassuring fetal status, failure to progress or maternal exhaustion occurs during the second stage of labor. Several complications associated with this maneuver have been reported, including pain and discomfort of the maternal abdomen, maternal rib fracture, maternal anal sphincter tears, amniotic fluid embolism, fetal fractures and brain damage [1–4].

It has been reported that the uterine fundal pressure maneuver is likely to be performed in developing countries, as instrumental delivery is often difficult [4, 5]. Despite the fact that several complications have been reported to be associated with the maneuver, we thought that, since it was believed that the maneuver was a quick procedure with limited complications, it might be performed instead of instrumental delivery in Japan. However, the actual frequency of the application of uterine fundal pressure and its complications in Japan still remain unclear.

The objective of this study was to clarify the incidence of uterine fundal pressure at delivery and its effect on uterine rupture.

Methods

We conducted a population-based postal questionnaire study as an investigation by the Japan Association of Obstetricians and Gynecologists (JAOG). A questionnaire regarding the total number of deliveries, the procedure used for uterine fundal pressure to induce delivery and the detailed clinical courses of cases of uterine rupture associated with uterine fundal pressure at each institution in 2012 was sent to institutions that provide maternity services across Japan. The questionnaire was accompanied by a cover letter outlining the aims of the study and addressed by name to the director, chief obstetrician or consultant in fetomaternal medicine. The answers to the questionnaires were thereafter received via facsimile.

In order to accurately identify the frequency of complications associated with the uterine fundal pressure maneuver, only fully completed answers regarding the number of cases with complications, the number of deliveries and the number of cases involving

the use of the maneuver during the study period were included in the present study. The frequencies and clinical courses of cases with complications associated with the uterine fundal pressure maneuver were analyzed.

This study was performed as an investigation of the JAOG and was approved by its ethics board. Because this was a retrospective analysis based on a questionnaire survey, patient information was anonymized and de-identified prior to the institutions answering the questions. Therefore, the confidentiality of the patients involved was protected, and no personal data were required for the present study.

Results

We sent the questionnaire to 2518 delivery institutions and received responses from 1502 (59.4%) institutions, which had a detailed database of information regarding pregnancies and delivery courses. After excluding incomplete answers, responses from 1430 institutions were assessed (56.6% of all delivery institutions). Care providers performed uterine fundal pressure at 1278 (90.4%) of institutions. A total of 432,516 deliveries at these institutions were analyzed. Among these cases, 347,771 infants were delivered vaginally, and 38,973 were delivered with the assistance of fundal pressure (11.2% of vaginal deliveries).

Of the cases involving uterine fundal pressure, 188 cases of neonatal distress (Apgar score less than 7) were reported. Fundal pressure was associated with 492 cases of severe uterine, cervical, deep vaginal and/or perineal laceration, one case of rib fracture, one case of bladder injury, two cases of uterine inversion, and six cases of uterine rupture.

Data for five cases with a uterine rupture were available for review and are shown in Table 1. None of the women had previous uterine surgery, but four women received labor augmentation. In four of the cases, fundal pressure was applied during instrumental delivery. One case complicated with amniotic fluid embolism resulted in maternal death. Fundal pressure at delivery was also associated with poor neonatal outcomes. One neonate had a fractured clavicle and a low Apgar score (<5), and/or low umbilical pH (<7.00) were observed in four out of the five of cases in our series. There was one case of cerebral palsy which occurred in a woman (case 1) who underwent prostaglandin E₂ induction of labor. At 9 cm dilated tachysystole and bradycardia was noted, and a vacuum-assisted delivery was performed with fundal pressure and resulting uterine rupture. It is unclear if the cerebral palsy was secondary to bradycardia, uterine rupture, or a combination of factors.

Table 1 Cases of uterine rupture after uterine fundal pressure.

Case	Age (years)	Pregnancy history	Previous uterine operation	Height (cm)	Weight (kg)		Induction of labor	Epidural analgesia	Os (cm)	Station	Gestational age (weeks)	Indication fundal pressure	Duration; times of procedure	Instrumental delivery	Neonatal weight (g)	Apgar 1/5 min	Umbilical artery pH	Neonatal outcomes	Maternal outcomes
					Before pregnancy	At delivery													
1	34	4G2P2SA	None	150	45.4	54.0	Yes	No	9	+1	41+2	NRFS	30 min; six	VE	3352	1/2	6.971	Cerebral palsy	Massive bleeding; hysterectomy
2	40	0G	None	161	49.0	58.4	No	No	10	+2	38+4	NRFS	5 min; two	VE	3084	9/10	n/a	No complication	Hysterectomy
3	36	1G0P1SA	None	160	49.7	62.1	Yes	No	10	+3	38+6	Weak labor	26 min; three	VE, FD	3615	3/5	6.923	Neonatal distress	Amniotic fluid embolism; maternal death
4	34	0G	None	151	43.0	55.0	Yes	No	10	+1	37+3	Weak labor	112 min; four	No	2914	3/3	n/a	Neonatal distress	Cesarean section;
5	31	3G2P1SA	None	147	52.0	61.7	Yes	Yes	10	0	39+3	NRFS	6 min; three	VE	3835	4/9	n/a	Fracture of the clavicle	Shock; maternal transport

SA=spontaneous abortion, NRFS=non-reassuring fetal status, VE=vacuum extraction, FD=forceps delivery, CS=cesarean section, n/a=not applicable.

Discussion

An analysis of the questionnaire data revealed the incidence of uterine rupture associated with the uterine fundal pressure maneuver to be 1:6496. There have only been case reports of uterine rupture associated with the uterine fundal pressure maneuver [6–8]; thus, the exact incidence of uterine rupture after this maneuver still remains unknown. To our knowledge, this is the first large case series to demonstrate maternal and neonatal complications in association with uterine rupture after uterine fundal pressure in Japan.

The association between previous uterine surgery and uterine rupture is well known [9]. However, intrapartum rupture of the unscarred uterus is an uncommon event. Instrumental delivery is associated with uterine rupture [1], and the possibility of a strong association between the application of uterine fundal pressure, as well as the concomitant use of instrumental delivery, with uterine rupture is supposed.

In our case series, a case with amniotic fluid embolism associated with the uterine rupture resulting in maternal death was reported. Although an amniotic fluid embolism is extremely rare, with an incidence of approximately 1 in 40,000 deliveries, the reported mortality rate ranges from 20% to 60% [10]. Significant associations with amniotic fluid embolism were observed for the medical induction of labor, cesarean delivery, instrumental vaginal delivery, the application of fundal pressure, and uterine/cervical trauma [11, 12]. In fact, 1.3% (492/38,973) of our subjects who underwent the application of fundal pressure experienced severe uterine, cervical, vaginal, and/or perineal lacerations. With respect to the prevention of an amniotic fluid embolism, the use of the uterine fundal pressure maneuver should be cautiously selected.

However, the use of questionnaire surveys in a large population has some limitations and potential bias in obtaining enough examples of such a rare occurrence. Compared to western countries, there are many small private hospitals that provide maternity services across Japan. Care providers who work at such small hospitals are generally unable to retrospectively obtain detailed obstetric information and did not respond to this questionnaire survey. Therefore, although we believe that the quality of the obtained answers was sufficient, this study is limited by the small number of responses and subjects, which might have been skewed by the incidence at larger, and perhaps more academic, institutions.

In conclusion, it revealed that uterine fundal pressure was applied frequently in Japan. Since uterine fundal

pressure maneuver may cause potential serious injury to either mother and/or neonates, its indication of the use of maneuver needs to be carefully determined.

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Contribution to authorship: Hasegawa J., Sekizawa A., and Kinoshita K. designed the research. Hasegawa J., Sekizawa A., Ikeda T., Ishiwata I., and Kinoshita K. collected the data. Hasegawa J. and Sekizawa A. analyzed and interpreted the data, and drafted the manuscript. Hasegawa J. performed the statistical analyses.

Detail of ethics approval: This study was approved by the ethics board of the Japan Association of Obstetricians and Gynecologists. The present study was a retrospective analysis based on a questionnaire survey.

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