

Number of previous cesarean deliveries and its effects on outcomes of vaginal hysterectomy

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Background: This study aimed to compare the surgical outcomes of vaginal hysterectomy based on the number of previous cesarean delivery. **Methods:** A retrospective chart review was performed for all patients who underwent vaginal hysterectomy for non-prolapsed uterus between January 2016 and December 2019. Women with a history of other abdominal surgeries were excluded. Patient characteristics and surgical outcomes were compared based on the number of previous cesarean deliveries. **Results:** Among 610 women, 541 had no cesarean delivery, 39 had one cesarean delivery, and 30 had two or more cesarean deliveries. Patient characteristics, such as parity, body mass index, and uterine weight were similar, except for age (no section 49.2 ± 8.6 years old vs. one section 46.5 ± 5.2 years old vs. two sections 44.9 ± 4.4 years old; $p = 0.004$) and preoperative hemoglobin level (no section 12.0 ± 1.23 g/dL vs. one section 11.5 ± 1.44 g/dL vs. two sections 11.9 ± 1.13 g/dL; $p = 0.014$). Surgical outcomes, including surgery time, postoperative hospital stay and drop in hemoglobin level, and estimated blood loss were similar among the three groups. The intra- or post-operative transfusion rate was the highest in the one cesarean delivery group (no cesarean delivery 8.1% vs. one cesarean delivery 20.5% vs. two or more cesarean deliveries 3.3%; $p = 0.017$). **Conclusion:** Our data suggest that the number of previous cesarean deliveries did not affect the outcomes of vaginal hysterectomy. Vaginal hysterectomy can be performed safely even in women with two or more prior cesarean deliveries, when patients are selected appropriately by skilled surgeons.

Keywords

Vaginal hysterectomy; Cesarean delivery; Contraindication

1. Introduction

Hysterectomy is one of the most common gynecologic procedures used for the treatment of benign uterine diseases, such as uterine fibroids and adenomyosis [1, 2]. According to the United States surgical data, approximately 600,000 hysterectomies are performed annually and 66%, 22%, and 12% of those are via the abdominal, vaginal, and laparoscopic approaches, respectively [2, 3]. Despite the obvious advantages of vaginal hysterectomy (VH) over total abdominal hysterectomy (TAH), including less postoperative pain, faster recovery, and better cosmetic results, many surgeons are still reluctant to perform VH [4–8]. This is mainly because of the var-

ied contraindications of VH, such as an immobile and large uterus, previous pelvic surgeries, including cesarean delivery, and nulliparity [9]. However, several reports have suggested that these contraindications are meaningless where there are skilled surgeons [10, 11].

This study aimed to investigate whether the number of previous cesarean deliveries affected the morbidity associated with VH, by comparing surgical outcomes among patients with no section, one section, and two or more sections.

2. Methods

According to the database of Hallym University Kangnam Sacred Heart Hospital, a total of 710 women underwent VH for the treatment of benign uterine disease (uterine fibroids and uterine adenomyosis) from January 2016 to December 2019. A total of 100 women were finally excluded from the study group based on the following exclusion criteria: (1) presence of prolapsed uteri; (2) history of other pelvic surgeries, except for cesarean delivery; (3) presence of concomitant malignant diseases.

All procedures were performed by one of three senior surgeons who had performed the VH procedure over 50 times. The route of hysterectomy was selected at the surgeon's discretion, although VH was preferred for a mobile uterus with vaginal accessibility, regardless of the size of the uterus. Uterine mobility was determined on pelvic examination using a tenaculum. If the cervix descended adequately (to more than the lower half of the vagina), the surgeon opted for VH rather than laparoscopic or abdominal hysterectomies.

VH was performed conventionally. Neither specialized retractors nor light sources were used during the surgery. All vessels were tied using Vicryl 1-0. For patients with a history of a prior cesarean delivery and less flexible vagina, a 1 to 1.5 cm perineotomy incision using Mayo scissors was made at the vaginal orifice to access the vagina. For patients with large uteri, debulking was performed during the extraction of the uterus via the vaginal route. Most VHs were performed under epidural anesthesia, except in patients who had undergone spinal surgery or were not compliant.

Table 1. Patients' characteristics.

	No c/sec (N = 541)	c/sec *1 (N = 39)	c/sec *2 or more (N = 30)	p value
Age, years old	49.2 (±8.6)	46.5 (±5.2)	44.9 (±4.4)	0.004
Parity	2.17 (±1.0)	1.97 (±0.8)	2.07 (±0.3)	0.397
Body mass index, kg/m ²	23.6 (±2.9)	23.9 (±3.2)	23.9 (±2.7)	0.672
Uterus weight, g	216.3 (±125.6)	217.7 (±103.9)	223.0 (±114.7)	0.958
Preoperative Hb, g/dL	12.0 (±1.23)	11.5 (±1.44)	11.9 (±1.13)	0.014

Data presented as number (%); Hb, hemoglobin.

Table 2. Comparison of surgical outcomes according to number of cesarean deliveries.

Surgical outcomes	No c/sec (N = 541)	c/sec *1 (N = 39)	c/sec *2 or more (N = 30)	p value
Surgery time, min	96.6 (±46.6)	93.2 (±30.8)	85.0 (±30.2)	0.367
Postoperative hospital stay, day	6.9 (±1.1)	6.7 (±0.8)	6.6 (±0.8)	0.235
Postoperative Hb drop, g/dL	1.04 (±0.9)	0.76 (±0.9)	0.79 (±0.9)	0.056
EBL, mL	346.5 (±107.6)	334.2 (±112.2)	380.0 (±121.5)	0.193

Data presented as mean (±SD); EBL, estimated blood loss; Hb, hemoglobin.

Table 3. Comparison of surgical outcomes according to number of cesarean deliveries.

Surgical outcomes	No c/sec (N = 541)	c/sec *1 (N = 39)	c/sec *2 or more (N = 30)	p value
Transfusion				0.017
Yes	44 (8.1)	8 (20.5)	1 (3.3)	
No	497 (91.9)	31 (79.5)	29 (96.7)	
Postoperative Hb drop, g/dL				0.902
≥2.0	65 (12.0)	4 (10.3)	3 (10.0)	
<2.0	476 (88.0)	35 (89.7)	27 (90.0)	
Postoperative hospital stay, day				0.184
>7 days	84 (15.5)	3 (7.7)	2 (6.7)	
≤7 days	457 (84.5)	36 (92.3)	28 (93.3)	

Data presented as number (%); Hb: hemoglobin.

Patient characteristics (age, parity, body mass index [BMI], previous pelvic surgery including cesarean delivery, uterine weight (recorded on the pathology report), and preoperative hemoglobin level) and surgical outcomes (surgery time, estimated blood loss, drop in the postoperative hemoglobin level, and postoperative length of hospital stay) were retrospectively retrieved from the medical records. Surgery time was defined as the time from incision to the final vaginal closure suture, and postoperative drop in the hemoglobin level was determined by the difference between the pre- and postoperative day 1 hemoglobin levels. The estimated blood loss was evaluated and reported by an anesthesiologist.

All statistical analyses were performed using SPSS for Windows (version 18.0; SPSS Inc., Chicago, IL, USA). Categorical and continuous variables among the three groups were compared using ANOVA and Student's *t*-tests, respectively. Data are reported as mean ±1 standard error, or number (percentage). Statistical significance was set at *p* < 0.05. The study protocol was approved by the Institutional Review Board of Hallym University Hospital (IRB file No. 2016-11-143).

3. Results

Among 610 women, 541 had no cesarean delivery, 39 had one cesarean delivery, and 30 had two or more cesarean deliveries. The patient characteristics are described in Table 1. The mean age of women was higher in the no cesarean delivery group than in the other two groups, although parity and body mass index were similar among the three groups. In addition, preoperative hemoglobin level was lower in women in the one cesarean delivery group than in those in the other two groups. The mean uterine weight did not differ among the three groups.

The surgical outcomes are shown in Tables 2,3. Surgery time and estimated blood loss did not differ among the three groups. The number of cases with postoperative hemoglobin drop ≥2.0 g/dL was not different among the three groups.

However, intra- or post-operative transfusion rates were significantly higher in women in the one cesarean delivery group than in those in the other two groups (*p* = 0.017). Length of postoperative hospital stay did not differ among the three groups. In addition, the number of patients with more than 7 days of postoperative hospital stay was similar among the three groups.

No significant complications, such as injuries to the bladder, ureters, or bowel, occurred in any group during the study

period. In addition, there were no cases of conversion to laparotomy in any group.

4. Discussion

Hysterectomy is the most frequently performed surgical procedure in gynecology and can be performed via abdominal, vaginal, or laparoscopic-assisted routes. However, which route should be the standard is still debatable. Many gynecologic surgeons now prefer minimally invasive procedures for the treatment of benign uterine disease because of their promising cosmetic effect, less postoperative pain, and early recovery [4, 12].

VH is the oldest and least invasive technique. Apart from a better cosmetic effect with no abdominal incision, VH is also very cost-effective [13]. Several reports have suggested that hospital costs for VH are significantly lower than those for TAH or TLH [10, 11, 14]. Moreover, consistent vaginal surgery, such as anterior or posterior colporrhaphy, and anti-incontinent surgical procedures can be performed easily during VH [8].

Despite these advantages, the rate of VH is still approximately 20% of all hysterectomies [2, 3]. This is mainly due to the relatively wide range of contraindications for VH and insufficient training during residency [15]. In the United States of America, majority of gynecologists perform fewer than four hysterectomies per year, and many do not perform VH at all [16].

Traditionally, a large uterus (larger than 12 weeks' gestational size [280 g]), nulliparity, morbid obesity ($\text{BMI} \geq 40 \text{ kg/m}^2$), previous pelvic surgery, and previous cesarean delivery were believed to be the main contraindications for VH. Specifically, women with a history of previous cesarean delivery are more likely to have low vaginal flexibility than women with previous vaginal delivery; low vaginal flexibility can cause mechanical difficulties and complications during surgery. In addition, probable adhesion of the bladder to the uterus can cause bladder injury during surgery. Therefore, gynecologic surgeons generally accept these contraindications.

However, several reports have disagreed with these beliefs [8, 10, 11, 17]. A retrospective study comparing surgical outcomes of VH and TLH in 103 women with large uteri weighing more than 500 grams, showed that VH could be safely performed even in women with extremely large uteri [11]. Another retrospective study of 102 women with morbid obesity ($\text{BMI} \geq 40 \text{ kg/m}^2$) reported that surgical and anesthetic complications did not differ between the VH and TAH groups. They suggested that the vagina could be the primary route for hysterectomy in morbidly obese women [17]. In addition, a recent prospective study comparing surgical outcomes of VH ($n = 47$) and TAH ($n = 61$) indicated that VH could be performed with less morbidity in patients with benign gynecological diseases, even in those with large, immobile uteri and a history of previous pelvic surgery [8]. Similarly, in our study, the number of previous cesarean deliveries

undergone by the women did not affect the surgical outcomes of VH, except in intra- or postoperative transfusion rates. We believe that these differences could have resulted from the lower preoperative hemoglobin levels in women in the one prior cesarean delivery group than that in women in the other groups ($p = 0.014$). According to our data on estimated blood loss and postoperative decrease in hemoglobin level, it is possible that there were more patients who needed blood transfusion in the one prior cesarean delivery group, given that the extent of blood loss during the surgery was similar among the study groups.

The widening of the spectrum of indications for VH is considered to have resulted from the increase in the number of skilled surgeons and their liberal use of techniques, such as debulking, myomectomy, bisection, and wedge resection of the uterus [8, 11]. In women with less vaginal flexibility, we artificially widened the vaginal orifice with a perineal incision using Mayo scissors. Therefore, vaginal accessibility was obtained, and hysterectomy was performed safely. In addition, the debulking method was actively used for women with large uteri to ensure vaginal mobility and accessibility during surgery. Patient selection is more important than anything. Patients with immobile uteri and possibly severe pelvic adhesions were identified by skilled surgeons, using tenaculum and pelvic examination. There were no severe complications, such as organ injury or severe bleeding, that required conversion to abdominal hysterectomy.

Therefore, appropriate patient selection and adequate use of techniques by skilled surgeons are vital to successfully performing VH. VH is a patient-friendly procedure that has cosmetic advantages and is cost-effectiveness. In our data, surgical outcomes in women with 2 or more prior cesarean deliveries were not different from those in women with less than two prior cesarean deliveries. In addition, the mean uterine weight was approximately 220 g, which means that a relatively large uterus could be removed by VH.

There are some limitations in our study. First, As the retrospective nature of the study, we did not consider possible postoperative long-term symptoms like urinary incontinence; second, the relatively small number of women with a history of prior cesarean delivery; third, factors like indications for prior cesarean delivery and vaginal descensus that can affect uterine mobility were not considered. To clarify that VH should be the preferred treatment not only for prolapsed uterus, but also for benign uterine disease, more large-scale prospective studies are required. In advance, constant training for the development of skilled surgeons and new techniques will be prerequisite.

5. Conclusions

The number of previous cesarean deliveries did not affect the surgical outcomes of VH. VH can be performed safely even in women who have had two or more prior cesarean deliveries, when appropriate patient selection by skilled surgeons is done.

Abbreviations

BMI, body mass index; Hb, hemoglobin; TAH, total abdominal hysterectomy; TLH, total laparoscopic hysterectomy; VH, vaginal hysterectomy.

Author contributions

SHP and STP conceived and designed the manuscript; SHP and STP performed the review and editing; HYC and HSK analyzed the data; HYC and HSK wrote the paper.

Ethics approval and consent to participate

Waiver of Informed consent was obtained from all study participants, and the study protocol was approved by the Institutional Review Board (IRB) of Hallym University Kangnam Sacred Heart Hospital (IRB file No. 2016-11-143).

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Conflict of interest

The authors declare no conflict of interest.

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