

Hysterectomy prevention using the uterine hollow obliterations (HYUNHO) method for placenta previa

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Summary

Objective: We have invented a method of hysterectomy prevention called the uterine hollow obliteration (HYUNHO) method to preserve the uterus and fertility after treating placenta previa or accreta. **Methods:** Eighty patients underwent cesarean section because of placenta previa between January 2003 and December 2009. All patients eligible for the study were evaluated by follow-up and a telephone questionnaire about fertility, menstruation recovery, and complications. **Results:** The success rate on preserving the uterus with the HYUNHO method was 96.2%. Three cases required additional procedures, including a cesarean hysterectomy or uterine artery embolization (UAE), two cases underwent a cesarean hysterectomy after delivery, and one case underwent UAE. **Conclusion:** The HYUNHO method is a safe, easy method for placenta previa, although it should be evaluated in a randomized controlled trial.

Key words: Hysterectomy; Placenta previa; Uterine artery embolization.

Introduction

Postpartum hemorrhage (PPH) is a serious complication in patients with placenta previa and a leading cause of severe maternal morbidity and mortality. Placenta previa is a dangerous condition due to massive PPH before delivery. Obstetricians evaluate the severity of placenta previa by ultrasonography (US) and color Doppler US using the vascular invasion of the placenta implantation site before a cesarean section. Placenta previa is an indication for cesarean section, but if conservative management fails, cesarean hysterectomy or uterine artery embolization (UAE) is a choice. If effective methods are developed for placenta previa during a cesarean section, it may reduce cesarean hysterectomy.

Materials and Methods

After obtaining approval from the institutional review board, we performed a prospective observational study including all pregnant women who underwent hysterectomy prevention using the uterine hollow obliteration (HYUNHO) method for placenta previa between January 2003 and December 2009 at a tertiary university hospital. The HYUNHO method was performed on 80 patients by the same obstetrician.

We classified the patients into two groups; group 1 included patients with marginal, and partial placenta previa, and group 2 included patients with total placenta previa with or without accreta. In all cases, fetal growth and fetal well-being were assessed by routine US and color Doppler US before delivery after the second trimester. The same obstetrician operated on all patients and routinely used the HYUNHO method. All patients were treated with uterotonic medical management such as oxytocin, ergot derivatives, prostaglandins, and bimanual uterine massage during cesarean section. Patients were monitored with continuous pulse oximetry, as well as for heart rate and blood

pressure, and for urine output with an indwelling catheter. Two large-bore intravenous cannulae were inserted in the central vein, and immediate rapid fluid replacement with crystalloids, Ringer's lactate, or Hartmann's solution was continued. Transfusions of blood and coagulation factors were performed in every patient if the hemoglobin level was less than 7 g/dl, or if vital signs were unstable according to hypovolemia. We followed-up all patients at the first week, first month, and at one year. We checked the history and conducted pelvic and US and color Doppler US examinations.

Clinical data were collected from medical records. Major complaints, clinical, and laboratory findings as well as comorbidity data were collected, analyzed, and investigated. We attempted to contact all patients from the cohort to determine the long-term outcome of the HYUNHO method. Patients were asked about breastfeeding duration, menstruation history, pelvic pain, dysmenorrhea, and vaginal discharge. Additionally, patients were asked about their desire for subsequent pregnancies, attempts to conceive or contraception, and fertility by telephone.

Statistical analyses were performed using the Student's *t*-test, chi-square test, and Fisher exact test, as appropriate. A *p* value < 0.05 was deemed statistically significant. Statistical analyses were performed using SPSS.

Description of the HYUNHO method

- 1) Patients were placed in a supine position under anesthesia.
- 2) The abdomen was opened with an appropriately sized Pfannenstiel skin incision.
- 3) Upon entering the abdomen, a lower transverse segment incision was made after dissecting the bladder.
- 4) The bleeding points were identified after manually delivering the baby and placenta.
- 5) The operator classified the delivery as group 1 or 2 after delivery of the baby and placenta.
- 6) The multiple heavy bleeding points in the endometrium were sutured with chromic gut 1-0 and in the myometrium with no. 1 Vicryl (Ethicon, Somerville, NJ, USA).

The obstetrician determined whether there was a marginal or partial placenta previa without placenta accreta (group 1). For

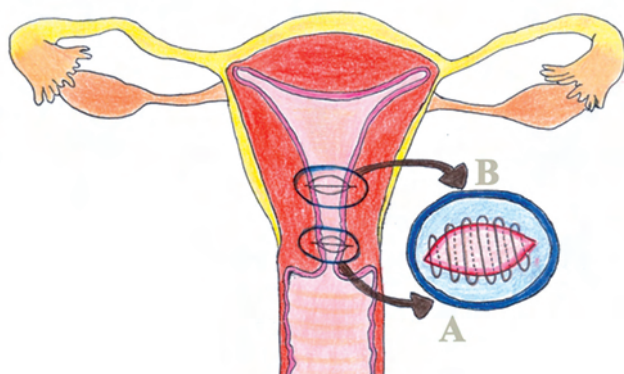


Figure 1. — Hysterectomy prevention by the uterine hollow obliterations (HYUNHO) method.

A) The uterus was obliterated from the cervix to the closest lower incision site by chromic gut 1-0. The cavity of the uterine cervix was obliterated with chromic gut 1-0.

B) The posterior uterine wall was sutured to the anterior uterine wall by chromic gut 1-0. The 1/2 lumen of the uterus was obliterated with sutures.

Group 1: A, Group 2: A+B.

group 1 cases we only sutured from the anterior uterine endometrium to the posterior uterine endometrium including the half of the myometrium which is located on the upper segment of the cervical region.

The upper uterine cervix cavity was sutured with chromic gut 1-0 from the endometrium to half of the myometrium without extending beyond the uterine serosa (Figure 1A).

7) If the patient was classified as group 2 (total placenta previa or with placenta accreta), the uterine cavity of the upper segment of uterine incision was sutured in the same way facing the myometrium in front of the uterus and the one at the back of uterus using chromic gut 1-0. The uterine fundus was compressed by an assistant, and hemostatic sutures were added from the middle portion of the uterus to the upper lower transverse segment. The operator sutured the posterior uterine wall to the anterior uterine wall using chromic gut 1-0. The half lumen of the uterus was obliterated with sutures (Figure 1A, 1B).

8) The lower segment of the transverse uterine incision was closed in one layer with no. 1 Vicryl.

9) A Jackson-Pratt drain (JP drain) was inserted into the posterior cul-de-sac.

10) After the HYUNHO method, we inserted a Hegar dilator to the cervix and the endometrium at one week and one month without anesthesia.

Rationale for the HYUNHO method

1) The HYUNHO method blocks the uterine artery blood supply from the cervix.

2) The HYUNHO method blocks the uterine artery blood supply from the utero-ovarian vessels.

3) The HYUNHO method results in compression and tamponade on the placental implantation site.

4) Suturing using the HYUNHO method creates a small uterine cavity. After the remaining uterine fundal cavity is filled with blood, blood and hematoma control the blood by their own limited space.

5) We sutured with absorbable suture materials (chromic gut or Vicryl), which may be cut by tension of the uterine cavity and are easily absorbed to reduce the endometrial cavity defect.

Table 1. — Comparison of clinical variables between the primary treatment group and the failure group.

	*HYUNHO method (n = 77)	Cesarean hysterectomy or uterine artery embolization	p
Age (years \pm SD)	32.1 \pm 3.8	29.7 \pm 4.0	0.231
Gravida (\pm SD)	2.7 \pm 1.8	3.0 \pm 1.7	0.831
Parity (\pm SD)	0.6 \pm 0.8	0 \pm 0.0	0.193
Hemoglobin level at initial (\pm SD, g/dl)	11.5 \pm 1.4	9.5 \pm 1.9	0.009
Hemoglobin level at discharge (\pm SD, g/dl)	9.9 \pm 1.4	10.5 \pm 1.6	0.437
Hematocrit level at discharge (\pm SD, %)	29.8 \pm 4.0	31.2 \pm 4.3	0.483
Amount of blood loss (\pm SD, cc)	828.9 \pm 443.7	3125.0 \pm 2868.6	< 0.001
Blood transfusion (\pm SD, pints)	1.8 \pm 2.3	9.0 \pm 6.0	< 0.001
Operation time (\pm SD, minutes)	59.5 \pm 17.8	276.5 \pm 51.6	< 0.001

*HYUNHO, hysterectomy prevention by uterine hollow obliteration method.

Table 2. — Patient follow-up data after the HYUNHO method.

	N	Average \pm SD, change parameters (%)
Lactation duration (months)	68	4.6 \pm 3.6
Menstrual restart after delivery (months)	73	2.6 \pm 1.7
Dysmenorrhea change after delivery	73	More severe dysmenorrhea 5 (7.1)
Menstrual amount change	73	No change 73/73 (100)
Menstrual duration change	73	More longer 2/73 (2.7)
Fertility	73	
Contraception	54	54/73 (73.9%)
No pregnancy	1	1/73 (1.3%)
One child and one spontaneous abortion	2	2/73 (2.7%)
One gravity (pregnancy 1 time)	11	11/73 (15.0%)
Two gravity (pregnancy 2 times)	5	5/73 (6.8%)

After finishing the operation, we followed-up the patients at one week, one month, and one year later using color Doppler US (Figure 2A-C).

Results

From January 2003 through December 2009, 80 patients who gave birth at a tertiary university hospital were diagnosed with placenta previa. Their mean age was 32.0 ± 3.8 years, and the mean parity was 0.5 ± 0.7 ; 34 patients (42.5%) were primiparous. The mean gestational age was 35.6 ± 1.9 weeks, with 18 (22.5%) preterm deliveries (< 37 weeks). Group 1 placenta previa occurred in 23 cases, 19 marginal, four partial). Group 2 included 57 cases (45 total placenta previa, 12 total placenta previa with accreta). Among group 2, two patients (cases A and B total placenta previa) underwent cesarean hysterectomy, and one patient (case C total placenta previa with placenta accreta) was treated with UAE for bleeding refractory to the HYUNHO method. The overall patient mortality rate was 0%. Two patients were admitted to the intensive care unit (2.5%), and the mean length of hospital stay was 7.5 days. The success rate of the HYUNHO method was 96.2%. We evaluated complications of fever, necrosis

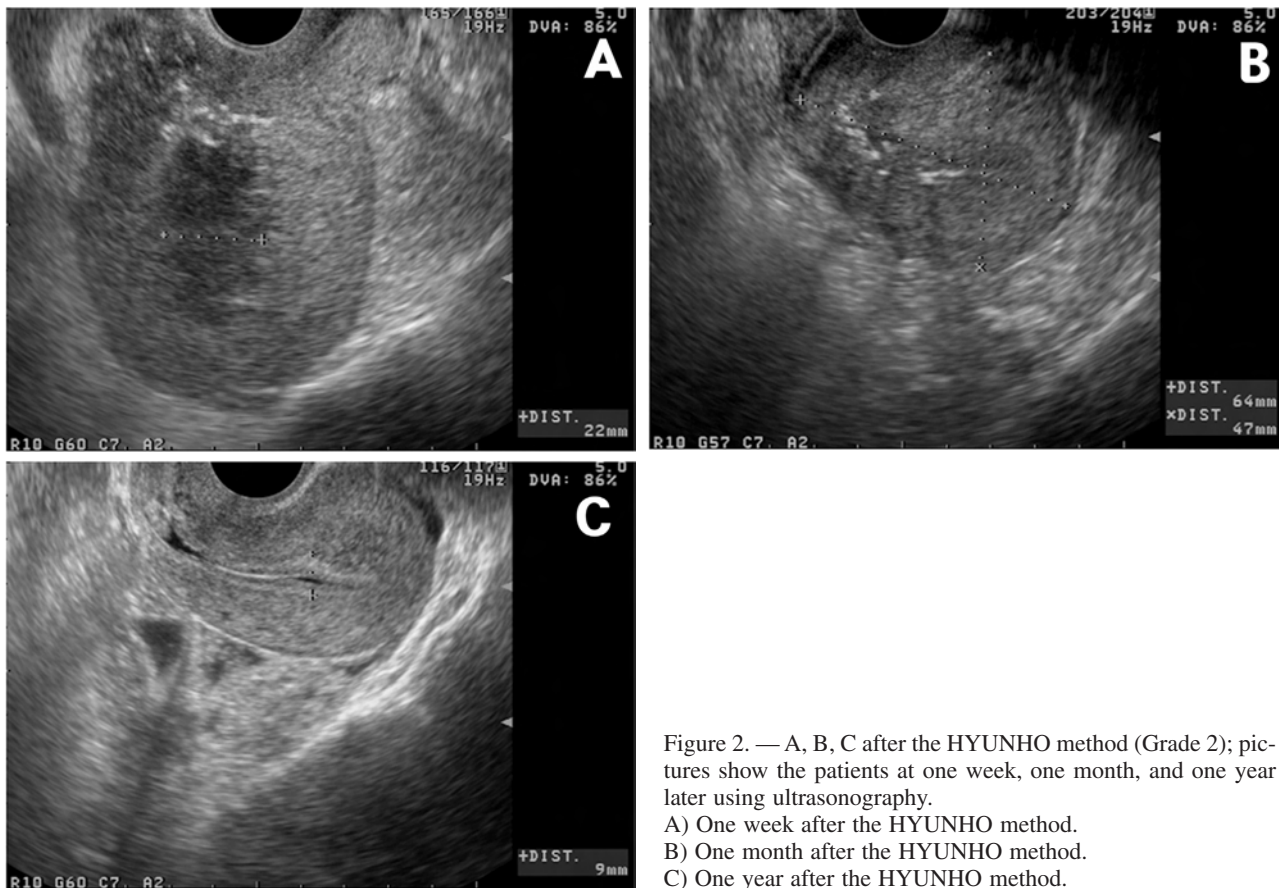


Figure 2. — A, B, C after the HYUNHO method (Grade 2); pictures show the patients at one week, one month, and one year later using ultrasonography.

A) One week after the HYUNHO method.

B) One month after the HYUNHO method.

C) One year after the HYUNHO method.

of the uterine cavity, infection, and wound disruption. No patient had a fever ($> 38.5^{\circ}\text{C}$), and the mean operating time was 59.5 ± 17.8 minutes. The mean estimated blood loss was 828.9 ± 443.7 ml. One patient had subcutaneous wound disruption, so we resutured without another complication. All patients were administered prophylactic intravenous antibiotic therapy with 3 g cefazolin. We conducted a pelvic examination and examined US and color Doppler US (Figure 2). Clinical variables were compared between the primary treatment group and the failure group (Table 1).

Failure group

Three cases (cases A, B, and C) were failed by the HYUNHO method. Cesarean hysterectomy was performed in two cases (cases A and B) after the HYUNHO procedure. One case (case C) received additional UAE after the HYUNHO procedure. Two cases (cases A and B) had total placenta previa, and both had severe pelvic endometriosis with adhesions on the cu-de-sac. Thus, the uterus was distended after the HYUNHO procedure, and bleeding occurred due to an adhesion on the uterine posterior wall, so a hemoperitoneum occurred. One case (case C) had total placenta previa with placenta accreta. The patient wanted another method performed to preserve the uterus, so we decided on UAE after the HYUNHO procedure.

Follow-up evaluation

We interviewed 73 patients by telephone questionnaire and follow-up. Of the 73 patients who had undergone the HYUNHO procedure, all had returned to normal menstruation, with the timing depending on breastfeeding and contraceptive use (Table 2). Three patients underwent bilateral tubal ligation during the operation, and 51 of the 73 patients used condoms. No other urinary problems occurred. Eighteen cases had a healthy baby after the HYUNHO procedure (10 males, 8 females), and the mean body weight of the newborns was $3,044 \pm 327$ g. After 1 and 5 min, all groups had Apgar scores of 8.8 ± 0.4 and 10.0 ± 0.0 , respectively. None of the 18 cases had placenta previa at the second operation.

Discussion

We provide the following management algorithm for placenta previa [1]. Placenta previa severity was suspected by US and color Doppler US before cesarean section [2]. Group 1 and group 2 were divided after delivery of the placenta [3], and we routinely performed conservative management with uterotonics [4]. For group 1 cases, we only sutured from the anterior uterine endometrium to the posterior uterine endometrium including the half of the myometrium which is located on the upper segment of the

cervical region [5]. For group 2, we sutured the uterine cavity of the upper segment of the uterine incision in the same way facing the myometrium in front of uterus and the one at the back of the uterus facing the myometrium in front of the uterus and the one at the back of the uterus [6]. After the HYUNHO method, we inserted and dilated the cervix and endometrium by Hegar at one week and one month.

The HYUNHO method was applied only for placenta previa. The HYUNHO method includes compressing the uterine cavity with sutures. We confirmed menstruation pattern, urinary problems, and fertility after the operation using a telephone questionnaire. The HYUNHO method was easy and resulted in a short operation time with few complications. The success rate for preserving the uterus was 96.2%.

The B-Lynch surgical technique for postpartum bleeding, which uses a brace for external compression, was reported in 1997 [1]. Many combined methods have been reported for placenta previa including the B-Lynch suture with the Bakri balloon method, Affronti suture, and B-Lynch suture [1]. The B-Lynch suture method and recombinant activated factor VII have been used simultaneously for placenta increta [2]. Uterine cavity packing is controversial for placenta previa due to the risk of infection or concealed hemorrhage; however, some have reported that it is successful for placenta previa when used with other methods such as internal iliac artery ligation or suturing the placental bed [3]. Despite the introduction of new surgical techniques to control postpartum hemorrhage, a previous cesarean delivery with placenta previa or accreta is a major risk factor for an emergency cesarean hysterectomy [5]. UAE has been performed for over 30 years and is a safe and effective procedure that preserves a patient's reproductive capacity. However, 50-60% of UAE failures are due to placenta accreta rather than uterine atony [6]. Furthermore, UAE cannot be performed in every hospital. Uterine compression suture techniques provide an alternative to cesarean hysterectomy for postpartum hemorrhage. The HYUNHO method is expected to result in success. Our two cases of failure had severe pelvic endometriosis with cul-de-sac adhesions. After suturing and emptying, the upper portion of the uterus was distended, and the posterior uterine cul-de-sac and the serosa vessels started bleeding, which was a very rare failure factor. We experienced no accreta or pyometra with the HYUNHO method. Our patients wanted to have additional children, and placenta previa did not recur at the second delivery time after the HYUNHO procedure. However, it is necessary to be cautious using the

HYUNHO method for an endometriosis adhesion in the posterior cul-de-sac, as deep infiltrated endometriotic lesions create bleeding. Therefore, if endometriosis with a cul-de-sac adhesion is observed during the operation, we recommend that other methods be added.

PPH is a serious complication for obstetricians and patients. The HYUNHO method should be used only for placenta previa or placenta previa with accreta. We confirmed that the HYUNHO method was simple and safe, and preserved the uterus and fertility during follow-up but randomized controlled trials should be carried out.

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