

# A Marked Increase in Obstetric Hysterectomy for Placenta Accreta

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## Abstract

**Background:** Obstetric hysterectomy (OH) as a lifesaving measure to manage uncontrolled uterine hemorrhage appears to be increasing recently. The objective of this study was to determine the etiology and changing trends of OH and to identify those at particular risk of OH to enhance the early involvement of multidisciplinary intensive care.

**Methods:** A retrospective study was carried out in patients who had OH in China-Japan Friendship Hospital from 2004 to 2014. Maternal characteristics, preoperative evaluation, operative reports, and prenatal outcomes were studied in detail.

**Results:** There were 19 cases of OH among a total of 18,838 deliveries. Comparing the study periods between 2004–2010 and 2011–2014, OH increased from 0.8/1000 (10/12,890) to 1.5/1000 (9/5948). Indications for OH have changed significantly during this study period with uterine atony decreasing from 50.0% (5/10) to 11.1% (1/9) ( $P < 0.05$ ), and placenta accreta as the indication for OH has increased significantly from 20.0% (2/10) to 77.8% (7/9) ( $P < 0.05$ ). Ultrasonography and magnetic resonance imaging (MRI) have been used to make an exact antepartum diagnosis of placenta accreta. A multidisciplinary management led to improved outcomes for patients with placenta accreta.

**Conclusion:** As the multiple cesarean delivery rates have risen, there has been a dramatic increase in OH for placenta accreta. An advance antenatal diagnosis of ultrasonography, and MRI, and a multidisciplinary teamwork can maximize patients' safety and outcome.

**Key words:** Cesarean Section; Hysterectomy; Placenta Accreta

## INTRODUCTION

Postpartum hemorrhage remains an important cause of significant maternal morbidity and mortality throughout the world. Obstetric hysterectomy (OH) either be planned or emergent has traditionally been performed as a lifesaving measure to manage uncontrolled uterine hemorrhage. OH performed for intractable obstetric hemorrhage appears to be increased by 0.026% in high-income countries and 0.28% in low-income countries.<sup>[1]</sup> The incidence varies depending on the healthcare setting and clinical practice. Identification of the risk factors for peripartum hysterectomy is important. Most of the studies have focused on peripartum risk factors such as uterine atony, uterine rupture, or placenta previa.<sup>[2-4]</sup> However, previous studies have not focused on the association between peripartum hysterectomy and the characteristics of pregnant women or prenatal risk factors. The aim of this study was to determine the etiology

and changing trends of peripartum hysterectomy in our population. We wished to identify the risk factors that may aid in the clinical decision to perform or not to perform hysterectomy. Likewise, we aimed to identify those at particular risk of OH to enhance the early involvement of multidisciplinary intensive care.

## METHODS

### Subjects

This is a retrospective study of data from women who underwent hysterectomy at the time of cesarean delivery or within 24 h following vaginal delivery. The study was approved by the Ethical Committee of China-Japan Friendship Hospital, and written informed consent for participation in the study was obtained from each patient. The study period was from January 2004 to December 2014. Site of the study was in a tertiary care teaching hospital: China-Japan Friendship Hospital. Maternal demographics, medical history, mode of delivery, postpartum blood loss, indication for hysterectomy, neonatal outcome, and puerperal

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complications were recorded. During the study period, every pregnant woman was screened by ultrasonography to locate the placental site. In recent years, if the screening ultrasounds scan revealed placenta accreta, magnetic resonance imaging (MRI) was subsequently performed.

### Ultrasound and magnetic resonance imaging

Sonographic findings suggestive of placenta accreta are as follows:<sup>[5]</sup> (1) Loss of normal hypoechoic retroplacental zone; (2) multiple vascular lacunae (irregular vascular spaces) within placenta, giving “Swiss cheese” appearance; (3) blood vessels or placental tissue bridging uterine-placental margin, myometrial-bladder interface, or crossing uterine serosa; (4) retroplacental myometrial thickness of <1 mm; and (5) numerous coherent vessels visualized with three-dimensional power Doppler in basal view.

The common MRI features suggesting placenta accreta are as follows:<sup>[6]</sup> (1) Uterine bulging, especially into the region of the scar or bladder; (2) heterogeneous signal intensity within the placenta; and (3) dark intraplacental bands on T2-weighted imaging.

### Obstetric management

Postpartum hemorrhage prevention and management were carried out according to the guidelines developed by the Chinese Society of Obstetrics and Gynecology.<sup>[7]</sup> Postpartum hemorrhage was initially treated by conservative procedures, such as administration of uterotonics, pelvic artery ligation, uterine compression suture, intrauterine ribbon gauze packing, and pelvic artery embolization. When attempts at conservative management failed, hysterectomy was considered the last resort for treating massive postpartum hemorrhage.

### Statistical analysis

Statistical analysis was performed using logistic regression analysis and the Mann-Whitney *U*-test.  $P < 0.05$  was considered statistically significant. All analyses were performed using SPSS version 10.0 (SPSS Inc., Chicago, IL, USA).

## RESULTS

During the study period, there were 18,838 deliveries and 19 OHs performed, for a prevalence rate of 1.0 per 1000 deliveries. Age of the OH patients ranged from 25 to 43 years old. The maternal age and the gestational age at delivery did not correlate with the risk of OH. Similarly, gravidity and parity were not found to increase this risk. Cesarean delivery had higher hysterectomy rates compared with vaginal delivery. Two of them were after vaginal births, and 17 were after cesarean births. Among these 19 cases of OH, 14 (73.7%) were performed with the history of cesarean. The difference was statistically significant ( $P < 0.05$ ) [Table 1]. There was one delivery woman died of amniotic fluid embolism, and two cases of intrauterine fetal death due to rupture of uterus and placental abruption. The major operative complication was postoperative fever. No case required further surgical intervention, and no complications were related to the resection of uterus.

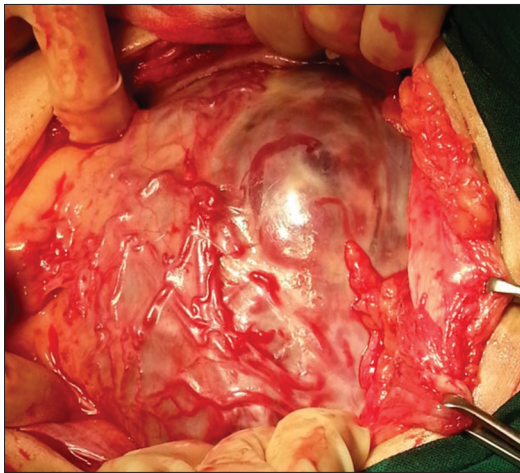
**Table 1: Logistic regression analysis of risk factors associated with OH**

Characteristics	Number of patients ( <i>N</i> = 19, <i>n</i> (%))	<i>P</i>	<i>OR</i> (95% <i>CI</i> )
Maternal age (years)		0.282	0.818 (0.567–1.179)
25–29	5 (26.3)		
30–34	10 (52.6)		
≥35	4 (21.1)		
Gravidity		0.715	1.471 (0.185–11.692)
1–2	7 (36.8)		
3–4	9 (47.4)		
5–6	3 (15.8)		
Parity		0.225	2.957 (0.513–17.046)
0–1	7 (36.8)		
2–3	11 (57.9)		
4–5	1 (5.3)		
Gestational age at delivery (weeks)		0.732	1.054 (0.797–1.326)
<28	1 (5.3)		
29–32	2 (10.5)		
33–37	12 (63.2)		
38–41	4 (21.1)		
Mode of delivery		0.028	20.032 (1.583–254.137)
Vaginal	2 (10.5)		
Cesarean	17 (89.5)		
Previous CS		0.043	4.660 (0.596–36.446)
0	5 (26.3)		
1	10 (52.6)		
2	4 (21.1)		

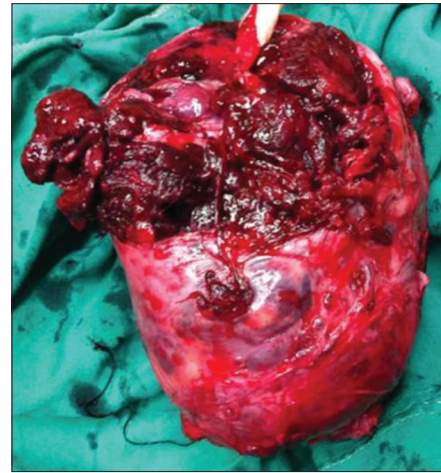
*OR*: Odds ratio; *CI*: Confidence interval; CS: Cesarean section; OH: Obstetric hysterectomy.

Indications for OH were uterine atony 6 (31.6%), uterine rupture 2 (10.5%), placental abruption 1 (5.3%), amniotic fluid embolism 1 (5.3%), and placenta previa and accreta 9 (47.4%). Comparing the study periods 2004–2010 to 2011–2014, OH increased from 0.8/1000 (10/12,890) to 1.5/1000 (9/5948). The overall cesarean delivery rate has decreased from 62.4% to 38.5%, while the percentage of cesarean occurring in the setting of a prior cesarean has increased from 0.7% to 7.0%. Indications for OH have changed significantly during this study period with “uterine atony” decreasing from 50.0% (5/10) to 11.1% (1/9) ( $P = 0.025$ ), and placenta accreta as the indication for OH has increased significantly from 20.0% (2/10) to 77.8% (7/9) ( $P = 0.005$ ).

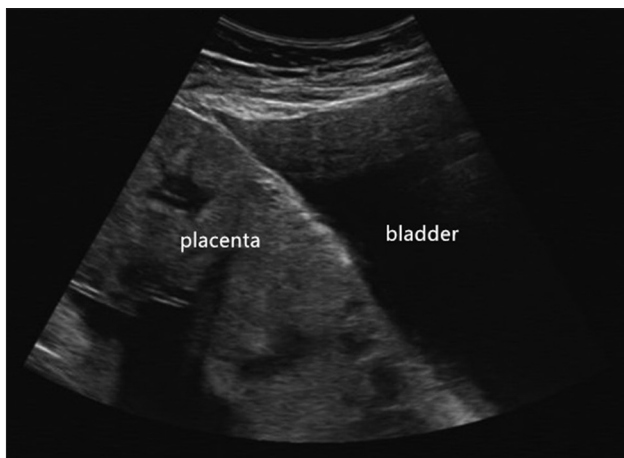
During the study period, ultrasonography and MRI have been used to make an antepartum diagnosis of placenta accreta. Three hundred and ninety-six placenta previa and 21 placenta accreta were prenatal diagnosed. Nine women with a prenatal diagnosis of abnormal invasive placenta were treated with cesarean hysterectomy. All nine women had an anterior placenta previa overlying the scar of the previous cesarean section, and all cases had confirmed the pathological diagnosis of placenta accreta (6 increta and 3 percreta). Figures 1 and 2 show a recent case with placenta accreta. Figures 3 and 4



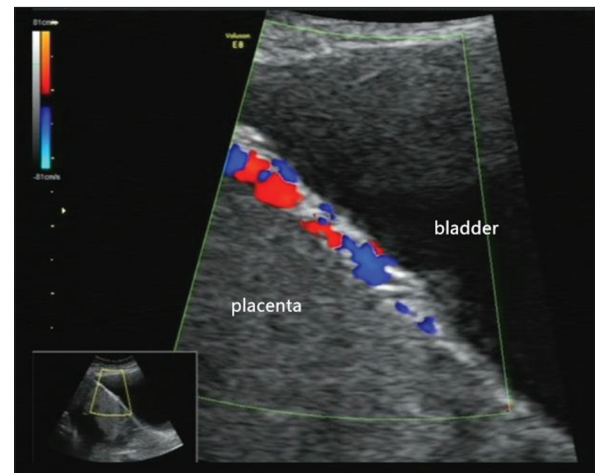
**Figure 1:** Thin and vascular uterine lower segment. The rich vascularity correlates with the position of placentation.



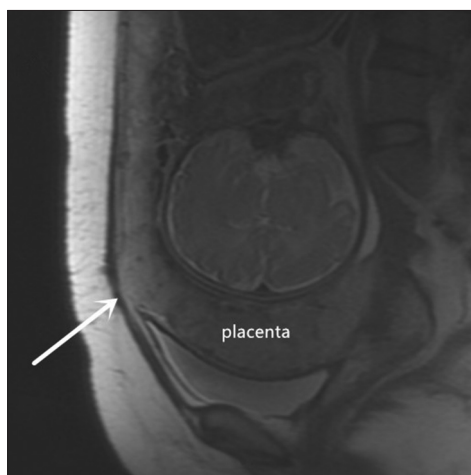
**Figure 2:** Uterus removed with placenta *in situ*. Surface of placenta percreta showing placental tissue extending through the uterine wall.



**Figure 3:** Transabdominal ultrasounds scan showing loss of the retroplacental myometrium and interrupted plane between bladder and placenta.



**Figure 4:** Color Doppler flow image showing the presence of altered blood flow in the retroplacental space and prominent retroplacental vessels that bridge to the bladder.



**Figure 5:** Sagittal magnetic resonance imaging indicated a bulge into the region of the scar and deep myometrial invasion by placental tissue (white arrow).

show the sonographic features suggestive of placenta accreta. A typical MRI scan for the same case is shown in Figure 5.

From January 2004 to June 2013, five cases of placenta accreta were initially treated by cesarean and conservative procedures for postpartum hemorrhage; hysterectomy was subsequently performed due to heavy bleeding. In this group, the mean estimated blood loss was 6750 ml and mean operative time was 260 min. Pathological diagnosis confirmed placenta increta. From July 2013 to December 2014, four cases of placenta accreta were treated with cesarean hysterectomy alone without attempting to remove placenta. In this group, the average amount of estimated blood loss was 2062.5 ml and operative time was 161.3 min. Pathological diagnosis confirmed 1 placenta increta and 3 placenta percreta. Significant differences were found in blood loss ( $P = 0.027$ ) and operative time ( $P = 0.014$ ) between the two groups. Characteristics of these nine patients undergoing OH for abnormal placentation are shown in Table 2.

## DISCUSSION

The incidence of hysterectomy for major obstetric hemorrhage is increasing. A nationwide population-based



**Table 2: Characteristics of nine patients undergoing OH for abnormal placentation**

Case number	Year	Age, years	Previous CS	Auxiliary examination	Pathological diagnosis	Treatment	Blood loss, ml*	Operative time, min <sup>†</sup>
1	2006	29	1	Ultrasound	Placenta previa + accreta	CP + OH	6300	275
2	2008	39	1	Ultrasound	Placenta previa + accreta	CP + OH	7100	250
3	2011	32	1	Ultrasound	Placenta previa + accreta	CP + OH	5500	215
4	2012	31	1	Ultrasound	Placenta previa + accreta	CP + OH	4800	185
5	2013	33	1	Ultrasound + MRI	Placenta previa + accreta	CP + OH	10,050	375
6	2013	32	2	Ultrasound + MRI	Placenta previa + percreta	OH	2500	175
7	2014	31	1	Ultrasound + MRI	Placenta previa + percreta	OH	2200	155
8	2014	35	2	Ultrasound + MRI	Placenta previa + accreta	OH	1500	120
9	2014	32	2	Ultrasound + MRI	Placenta previa + percreta	OH	2050	195

\*Blood loss comparison of CP + OH with OH:  $P=0.027$ ; <sup>†</sup>Operative time comparison of CP + OH with OH:  $P=0.014$ . CS: Cesarean section; CP: Conservative procedure; OH: Obstetric hysterectomy; MRI: Magnetic resonance imaging.

Canadian study showed an increase of obstetric hemorrhage that necessitated hysterectomy from 2.6 per 10,000 deliveries from 1991 to 1993 to 4.6 per 10,000 from 1998 to 2000. A nationwide cross-sectional study in the United States from 1998 to 2005 reported an increase as well.<sup>[8]</sup> The prevalence rate of 1.0 per 1000 deliveries observed in the present study was similar to other reports, among which rates range from 0.17 to 5.4 per 1000 deliveries.<sup>[9]</sup> In our study, uterine atony has remained a significant indication for OH, which is consistent with previous reports.<sup>[10]</sup> However, the number of cases has decreased in recent 4 years. The more effective use of pharmacological therapies and the introduction of new surgical techniques decrease hysterectomies for uterine atony. With the closer supervision of labor in women with a scarred uterus, and with increased elective cesarean rates, we also found a downward trend in the incidence of uterine rupture as the indication for OH.

The present study also found an association between the number of previous cesarean deliveries and the risk of OH. Comparing the study periods 2004–2010 to 2011–2014, the overall cesarean delivery rate has decreased from 62.4% to 38.5%, while the percentage of cesarean occurring in the setting of a prior cesarean has increased from 0.7% to 7.0%. In recent 4 years, the most common indication for OH was placenta previa and accreta. Placenta previa is located in the lower uterine segment, which could result in inappropriate placental development owing to the particular development of their vessels.<sup>[11]</sup> Placenta accreta is a disorder characterized by abnormal placental penetration into the uterine wall. This entity has been historically classified according to the degree of pathological penetration and includes superficial invasions (placenta accreta), middle-layer invasions (placenta increta), and deep invasions (placenta percreta).<sup>[12]</sup> Placenta previa and placenta accreta are two obstetric conditions that are closely linked with massive obstetric hemorrhage.<sup>[13–15]</sup> In this study, previous cesarean delivery with associated abnormal placentation (placenta previa and placenta accreta) is a major contributor to OH. Of the nine women who underwent OH for placenta previa and accreta, six had undergone one previous cesarean delivery, and three had undergone two cesarean deliveries. As more obstetricians have become aware of this condition, early

identification with antenatal imaging diagnostic technology has become possible. During the study period, ultrasound and MRI have been used to evaluate the diagnosis of abnormal placentation. As a result, ultrasonography and MRI made an exact antepartum diagnosis of placenta previa and accreta, which confirmed their important roles in the antenatal diagnosis.<sup>[16,17]</sup>

The management of morbidly adherent placenta is a real obstetric challenge.<sup>[18]</sup> At present, placenta accreta can be managed in three ways: (1) Carry out a hysterectomy; (2) leave the placenta *in situ*; and (3) resect the invaded tissues with the entire placenta restoring uterine anatomy.<sup>[19,20]</sup> Each one of them has weaknesses and strengths and is dependent on the condition itself and the specific preferences taken by the surgeon and the team.

In this study, a standardized multidisciplinary approach was used in managing a patient with placenta accrete (delivery was ideally planned and arranged electively under controlled conditions with appropriate surgical and hematological facilities; the presence of a consultant obstetrician, anesthesiologist, gynecologic oncologist, urologist, and neonatologist at delivery; Preoperative urinary stent placement; Blood products arrangement and prompt delivery and postoperative intensive care unit recovery). Twelve placenta accreta achieved successful conservative surgery. Efforts at conservative therapy with preservation of the uterus and fertility have included a multidisciplinary approach, which has included hemostatic sutures for focal accreta; uterine wedge resection; intrauterine ribbon gauze packing; interventional radiological procedures, such as uterine artery embolization; uterine or internal iliac artery ligation; and control of and support for massive hemorrhage. Another five cases of placenta accreta were initially treated by conservative procedures for postpartum hemorrhage; hysterectomy was subsequently performed due to heavy bleeding. In this group, pathological diagnosis verified placenta increta. From July 2013 to December 2014, four women were antepartum diagnosed large area of increta or percreta by ultrasound and MRI. These four cases were treated with cesarean hysterectomy alone without attempting to remove placenta, and pathological diagnosis verified

1 placenta increta and 3 placenta percreta. In this group, significant decreases were found in blood loss and operative time than the OH group with failed conservative treatment.

In addition to the above discussion, there are some limitations in this study. First, the number of OH cases was small ( $n = 19$ ). There may have been insufficient statistical power to identify some potential risk factors of OH. Second, as most cases of placenta accreta were diagnosed during the second and third trimester of pregnancy, little is known about the natural evolution of this placental disorder. With the development of high-quality ultrasound and MRI, it is now possible to diagnose abnormal trophoblast invasion into the myometrium early in the first trimester of pregnancy. Therefore, early prenatal diagnosis of this placental abnormality and large numbers of OH cases are needed to address this issue.

In conclusion, obstetric hemorrhage is a continuous process and outcome is influenced by underlying etiology and treatment efficacy. Placenta accreta, morbid adherence to the uterus to the myometrium, is the most common in association with placenta previa in women previously delivered by cesarean section. It has become proportionally a greater cause of major maternal morbidity and mortality as the frequency of other serious obstetric complications has declined. In the present study, a marked increase in OH for placenta accreta suggests a decrease of the primary cesarean section incidence will decrease the incidence of OH. Ultrasonography and MRI are useful in the diagnosis of placenta accreta. It is very important that cases of suspected placenta accreta are managed by a multidisciplinary team in a tertiary center.

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