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Sandwich excision in patients with placenta percreta involving maternal bladder

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Abstract. – OBJECTIVE: Our aim is to describe and assess a Sandwich Excision (placenta-uterine-bladder excision together) surgical technique for women with clinically confirmed placenta percreta involving the maternal bladder.

PATIENTS AND METHODS: A retrospective cohort study was performed on all patients with clinically confirmed placenta percreta involving the maternal bladder who underwent Sandwich Excision at our large academic institution from January 1, 2014, to June 30, 2019.

RESULTS: Twenty-three patients were included. Four patients underwent hysterectomy, and one patient underwent subhysterectomy. The mean duration of surgery was 228.04 ± 85.59 minutes (range, 90.00-503.00 minutes). The mean estimated blood loss was 5,269.57 ± 2,745.81 mL (range, 1,000.00-12,500.00 mL). No thromboembolic events occurred, and there were no maternal or neonatal deaths among the subjects in this study.

CONCLUSIONS: Sandwich excision is associated with a low rate of hysterectomy in women with placenta percreta involving the maternal bladder. The procedure is a relatively safe technique and can be performed safely by experienced obstetricians who are familiar with the uterus-bladder space. Meanwhile, the success rates and complications of the Sandwich Excision in these patients also need to be evaluated in prospective studies.

Key Words:
Placenta percreta, Sandwich excision, Placenta-uterine-bladder excision, Hysterectomy, Placenta accreta spectrum.

Introduction

Placenta accreta spectrum (PAS) is a broad term used to characterize the abnormal adherence, including placenta accreta, increta, and percreta, and it has an increasing incidence in relation to the cesarean delivery rate[1-3]. As a life-threatening condition, it can lead to catastrophic consequences including massive hemorrhage, consumptive coagulopathy, organ damage, uterine rupture, hysterectomy, and even maternal death[4]. The severity of complications increases with the severity of placental invasion[5]. Placenta percreta is the most serious PAS disorder and occurs in more than 20% of these patients[4,5]. In rare conditions, the placenta percreta can invade bladder invasion. It is associated with a significantly higher maternal morbidity than the other varieties[4]. Therefore, placenta percreta with bladder invasion is the most dangerous manifestation of PAS.

Immediate cesarean hysterectomy or delayed hysterectomy remains the most widely accepted and preferred approach to severe PAS, such as placenta increta and placenta percreta[1,6]. A previous study[7] described hysterectomy due to the decreased risk of blood loss and potential maternal complications. However, studies[8,9] have also shown that there are significant increases in psychiatric and physiological disorders in women after a hysterectomy. Despite hysterectomy, blood loss might be severe during surgery, especially in placenta percreta cases[10]. Moreover, as the characteristic physiological sign of females and the most important component of the reproductive system, the lack of a uterus, especially in young women, is difficult for patients and their families to accept in some developing countries and regions[11,12]. Meanwhile, hysterectomy inevitably causes infertility, and, thus, every effort to preserve the uterus should be made for women of childbearing age who want to have children again. Therefore, reserved uterus remains a challenge to obstetricians for women with placenta increta or percreta pregnancy in these areas.

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Although the overall incidence of placenta percreta with bladder invasion is extremely low, the appearance of this rare disorder seems to be increasing due to the performance of more cesarean deliveries in the past decades. The use of newer intervention techniques and alternate surgical approaches may decrease hysterectomy and blood loss. Here, we present our experience to evaluate the effect of Sandwich Excision (placenta-uterine-bladder excision together) in decreasing hysterectomy for women with placenta percreta involving the maternal bladder in a single-center cohort.

Patients and Methods

We present a retrospective cohort study from January 2014 to June 2019. This study was supported by the Institutional Review Board at our hospital (Grant No. FSFY-MEC-2019-044). All cases were diagnosed by ultrasound or MRI, and further confirmed with cystoscopy before delivery, as previously described[13-15]. Meanwhile, cases with placental implantation into the bladder were reconfirmed by the surgeon at the time of delivery or by histopathologic examination of the placenta and uterus, when available. All surgical specimens were sent to pathology for review by a placental pathologist to determine a final histopathologic diagnosis. Patients were evaluated and managed by an experienced obstetric team led by Z.-P. Liu at our hospital.

Placenta percreta with bladder invasion women who wanted to preserve their uterus could use this Sandwich Excision. Informed consent was obtained from the patients regarding the procedures including hysterectomy and possible complications. The patients were placed under general anesthesia[16]. An appropriate skin incision was used during cesarean section[17]. The uterus was incised along the edge of the placenta using Ar's incision without any damage to the placenta, as previously described[13,18]. Following the delivery of the fetus, the umbilical cord was tied, and the placenta was left *in situ* without any attempt to remove it. Then, the placenta-uterine-bladder tissue was removed together by using the Sandwich Excision. The brief steps for Sandwich Excision are as follows: (1) incise the upper edge of the placenta percreta in the uterus; (2) gently push the bladder down with the finger to the placental-bladder junction; (3) cut off the placenta-uterine-bladder along the placental-bladder junction; and (4) suture the uterine and bladder incisions (Figure 1). An obstetrician team, who had vesical repair experience, performed bladder repair. Meanwhile, various surgical techniques during cesarean delivery were also used: Ar's incision for safe extraction of the fetus[13]; double incision cesarean section[19]; metroplasty; B_Lych suturing. All cesarean sections were performed by the same surgeon (Z.-P. Liu) with the assistance of other senior obstetricians.

From the hospital medical records, patient demographics, including maternal age, parity, body mass index (BMI), gestational age at delivery, and preoperative risk factors, were collected. Data regarding operative time (in minutes), intraoperative blood loss, and procedure-related complications were also collected. The primary outcome was cesarean hysterectomy.

Statistical Analysis

A descriptive statistical analysis of the baseline characteristics and main outcomes was performed. The count data were expressed as the number of cases and percentage (%). Continuous data were expressed as the means (standard deviations) and range (minimum – maximum). Statistical analysis was performed by using SPSS 21.0 software (IBM, Armonk, NY, USA).

Results

Twenty-three patients with placental implantation into the bladder were diagnosed by obstetricians during cesarean section and confirmed by pathologists. The demographic characteristics and surgical outcomes of the patients are presented in Table I. The mean age of the women was 33.55 ± 4.83 years (range, 22.37-43.25 years), the mean gestational age was 35.33 ± 2.55 weeks (range, 28.57-39.00 weeks), and the mean BMI was 26.75 ± 3.65 kg/m^2 (range, 20.71-38.05). The mean overall gravida and parity were 3.30 ± 1.11 (range, 2-5) and 2.26 ± 0.45 (range, 2-3), respectively. All these patients had prior cesarean deliveries, and the average number of previous cesarean deliveries was 2.09 ± 0.60 (range, 1-4). One patient had uterine curettage.

Four patients underwent hysterectomy, and one patient underwent subhysterectomy. Three patients suffered inadvertent bladder injuries, which were repaired immediately and healed uneventfully. The mean duration of surgery was 228.04 ± 85.59 minutes (range, 90-503 minutes). The mean

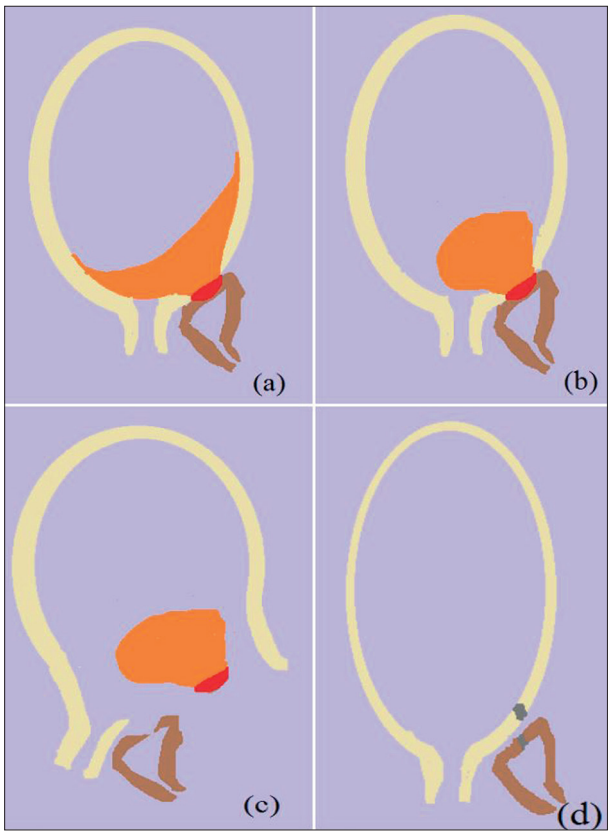

Figure 1. Schematic illustration of sandwich excision. **(a)** Holistic view of placenta percreta involving the maternal bladder. Placenta, uterine and bladder grow closely (Red zone); **(b)** gently push the bladder down with the finger to the placental-bladder junction; **(c)** cut off placenta-uterine-bladder along the placental-bladder junction; **(d)** suture the uterine and bladder incisions. Brownness, bladder; Light Yellow, uterine; Orange, placenta; Gray, suture.

Table I. Details of 23 women with placenta percreta involving maternal bladder who underwent Sandwich excision (placenta-uterine-bladder excision together).

Case	Age	Prior CS	GA at delivery (weeks)	Duration of surgery (min)	EBL (mL)	Complications
1	34.56	3	37.71	228	4000	None
2	38.85	2	34.29	204	5700	None
3	30.29	2	35.14	347	1000	None
4	32.92	3	31.86	226	3300	Bladder injury
5	35.24	2	34.86	257	8000	Bladder injury, Hysterectomy
6	34.61	3	35.33	235	5500	Hysterectomy
7	26.86	2	35.57	90	1400	None
8	43.25	2	36.71	225	4000	None
9	26.88	2	36.86	153	4000	None
10	36.79	3	35.71	165	4000	None
11	22.37	2	36.29	173	4100	None
12	28.95	2	36.14	132	4500	None
13	37.34	2	35.86	168	4500	None
14	31.79	2	35.29	270	5000	None
15	37.37	2	38.00	190	5000	Hysterectomy
16	32.73	2	35.86	270	6000	Bladder injury
17	35.15	1	28.57	235	6500	None
18	32.90	2	35.43	300	6500	None
19	36.18	3	29.00	209	6700	None
20	41.17	2	39.00	235	7000	Hysterectomy
21	31.90	2	35.71	503	12500	Subhysterectomy
22	34.83	1	36.14	300	11000	None
23	28.69	1	37.29	130	1000	None

CS, cesarean section; EBL, estimated blood loss; GA, gestational age.

estimated blood loss was 5,269.57 ± 2,745.81 mL (range, 1,000-12,500 mL). All patients had blood products transfused. There were no cases of neonatal injury. No thromboembolic events occurred, and there were no maternal or neonatal deaths among the subjects in this study.

Discussion

In this retrospective analysis of 23 women with clinically-confirmed placenta percreta involving the maternal bladder who suffered Sandwich Excision, we found that Sandwich Excision is associated with a low rate of hysterectomy in women with placenta percreta involving the maternal bladder.

To the best of our knowledge, this is the first study to report the efficacy of Sandwich Excision in women with placenta percreta involving the maternal bladder. We witnessed the benefits of decreasing hysterectomy with Sandwich Excision in these patients. However, the sample size and retrospective nature are the major limitations of our study. To evaluate the success rates of Sandwich Excision in women with placenta percreta involving the maternal bladder, prospective studies with larger sample sizes are needed in the future.

Placenta percreta, in which the entire uterine wall, including serosa and rarely bladder is invaded, is the most severe variant of the PAS[20,21]. It increases the risk of substantial obstetric hemorrhage and bladder injury. An attempt to separate it following delivery of the fetus may cause excessive bleeding and subsequent complications such as disseminated intravenous clotting (DIC), renal failure and maternal death[19,22]. Although some surgeons choose a conservative management approach to avoid potential intraoperative complications, cesarean hysterectomy is the standard treatment for placenta percreta[1]. Several complications including massive hemorrhage, infection, sepsis, requiring medical or surgical intervention, emergency or delayed hysterectomy, can occur during conservative management of placenta percreta[20].

Artery embolization as well as ligation and chemotherapy are common conservative management strategies for placenta percreta[22,23]. A retrospective study[24] on the conservative management of 18 patients with placenta percreta reported a hysterectomy rate of 44.44% (8 cases). Pather et al[20] analyzed 57 patients with placenta percreta and showed that despite initial conservative management, 40.35% (23 cases) of women subsequently required emergency hysterectomy, and 42.11% (24 cases) experienced major morbidity. Clausen et al[25] reviewed 119 published placenta percreta cases and found that conservative management was associated with severe long-term complications of hemorrhage and infections, including a 55.46% (66 cases) risk of hysterectomy.

A meta-analysis[26] reported that 50 of 54 (92.59%) cases of placenta percreta with bladder involvement underwent hysterectomy. A recent systematic review[22] found that conservative management was hysterectomy in 50 of 70 patients (69.44%) with placenta percreta and 33 of 41 patients (80.49%) with placenta percreta involving the maternal bladder. The hysterectomy rate for placenta percreta involving the maternal bladder was higher than that without involvement of the maternal bladder. In our study, 5 of 23 patients (21.74%) with placenta percreta involving the maternal bladder underwent hysterectomy. Taken together, these results suggest that the hysterectomy rate for placenta percreta involving the maternal bladder is lower than those reported for other conservative management. This provides the possibility of having children again for placenta percreta with bladder invasion.

Using conventional surgery for placenta percreta is often associated with adverse complications. Urologic complications were more common in placenta percreta with the bladder involvement[26]. There were only three bladder injuries, and severe maternal complications were not observed in this study. This is mainly because Sandwich Excision can effectively preserve the integrity of the incision, including uterus and bladder incisions, and reduce the potential risk of subsequent complications.

Placenta percreta was associated with a significantly higher maternal blood loss during delivery. Previous studies[25,26] have reported that blood loss can reach 5,000 ml or even greater during cesarean section in placenta percreta cases. Although the patient undergoes hysterectomy, the amount of bleeding can also achieve 6,000 mL to 17,000 mL for placenta percreta with bladder invasion[27-31]. In our study, the average blood loss was approximately 5,000 ml. The uterus is preserved without increasing blood loss in the use of Sandwich Excision in patients having a cesarean section for placenta percreta involving the maternal bladder.

Conclusions

According to our study results, it was found that Sandwich Excision is associated with a low rate of hysterectomy in women with placenta percreta involving the maternal bladder. The procedure can be performed safely by experienced obstetricians who are familiar with the uterus-bladder space. However, a urinary surgeon should be available to overcome any bladder injury. Further prospective studies are needed to evaluate the success rates and complications of the Sandwich Excision in women with placenta percreta involving the maternal bladder.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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