

Placental pouch closure: a novel, safe and effective surgical procedure for conservative management of placenta accreta

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Abstract

Background: Placenta accreta spectrum (PAS) has become a global problem secondary to the high rate of cesarean delivery (CD). The current study presents an effective surgical procedure (placental pouch closure) for uterine preservation in patients with PAS.

Methods: We applied this procedure in sixty cases at a tertiary university hospital between September 2017 and January 2019. We included women who were diagnosed as PAS based on preoperative ultrasound and Doppler evaluation, and who had the desire for uterine preservation.

Results: The procedure was successful in almost all cases; the uterus was conserved 98.33 % of

participants, with no associated severe maternal morbidities or mortality. In all cases, no additional surgical procedures were needed. The mean blood loss was 1263 ml, and the mean number of units of blood required for transfusion was 2.31 units.

Conclusion: Identifying and meticulously closing the placental pouch is a novel surgical procedure for conservative management of PAS. In well-selected cases with the availability of facilities and expertise, the technique could have a place as a safe and effective surgical technique in women presenting with placenta accreta who desire uterine preservation.

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Introduction

Placenta accreta spectrum (PAS) is a new term used to describe the clinical condition when part or the entirety of the placenta becomes abnormally adherent or invades the myometrium.¹ The incidence of PAS has increased and seems to parallel the increasing cesarean delivery (CD) rate. Researchers have reported the incidence of PAS as 1 in 533 pregnancies for the period of 1982–2002.² Women at greatest risk of PAS are those who have myometrial damage caused by a previous CD with either anterior or posterior placenta previa overlying the uterine scar.³

Limited data exist to guide the optimal conservative management of this condition. The existing literature consists predominately of case reports, and studies undertaken using a retrospective review of medical records in a single hospital or at a small number of tertiary-care institutions.^{4,5}

When considering an ideal treatment for PAS, one might consider hysterectomy as it is thought to be associated with decreased maternal morbidity and mortality. However, hysterectomy is, in fact, inappropriate as it ignores requests to conserve the patient's uterus and preserve her fertility, thereby violating both surgical principals and the patient's rights.

Assiut University Women's Health Hospital is a tertiary referral hospital in Upper Egypt with about 20,000 deliveries

each year. It is also a referral hospital for high risk and complicated cases from the five main governorates of Upper Egypt. The hospital is well equipped and has more than 60 University staff members in Obstetrics and Gynecology, with a dedicated placenta accreta team.⁶

The elective delivery of women with PAS should be managed by a multidisciplinary team, which should include senior anesthetists, obstetricians, and gynecologists with appropriate experience in managing this condition and other surgical specialties (interventional radiology, vascular surgery) if indicated, who have access to a blood bank and a well-equipped ICU. In an emergency, the most senior clinicians available should be involved.⁷

The main aim of any surgical management strategy for placenta accreta is to decrease the risks of severe maternal morbidity during cesarean delivery.⁸⁻¹¹ Successful conservative management strategies will also preserve fertility and thus reduce the impact on a woman's societal status and the loss of self-esteem that is often associated with the loss of a uterus.

In this article, we present our novel surgical procedure (placental pouch closure) for uterine preservation in patients with PAS.

Patients and Methods

Patients

Sixty patients were enrolled between September 2017 and January 2019 at our tertiary university hospital. Written informed consent to participate in the

study, including the possibility of a hysterectomy, was obtained from each patient.

The inclusion criteria included diagnosis of PAS based on preoperative ultrasound and Doppler evaluation, willingness to be electively scheduled for surgery and a desire to conserve their uteri. We excluded emergency cases including those in active labor or those with vaginal bleeding, both of which necessitate immediate intervention, as well as those with known bleeding disorders or on anticoagulant therapy.

A detailed history including maternal age, parity, duration of marriage, number of previous CD, and gestational age was taken by a study investigator. Pre-surgical evaluation included the use of two-dimensional ultrasound to detect the site of the placenta and to determine the type of placenta previa, lacunae grade and myometrial thickening. In addition, color Doppler imaging was used to detect bridging vessels (abnormal vasculature that bridges from the placental mass to the uterine-bladder interface). Ultrasound and Doppler evaluations were performed by an expert level III sonographer in the Advanced Ultrasound unit of our institution. Preoperative investigations were performed, and at least four units of cross-matched whole blood or packed red blood cells (RBCs) were readied.

Surgical procedure

All surgeries were performed by the

same obstetrician (K. M. Zahran) assisted by one assistant lecturer and at least one resident. All operative procedures were done under spinal anesthesia. While patients were in a sitting position, a subarachnoid block was performed with a 25 g pencil-point needle at the level of L 3-4 or L 4-5 vertebral interspaces. Heavy bupivacaine 0.5%, at a rate of 10-12.5 mg, and 0.3 mg morphine sulfate were injected intrathecally. After doing a wide Pfannenstiel incision, the bladder was carefully and extensively dissected from the lower uterine segment to avoid injury during removal of the placenta or repair of the uterus. Incision of the uterus was done transversely at the presumed upper edge of the placenta to avoid cutting through the placenta. After uterine incision, the fetus was delivered.

In all cases, the uterus was exteriorized to allow for a good exposure. Saline containing 30 IU of oxytocin was run over the course of several minutes, and the uterus was continuously massaged to minimize bleeding and give time for placental separation. Then, the placenta was separated, starting from above downward, waiting to separate the most adherent parts until last to keep blood loss as low as possible. After separation, all placental fragments were extracted. The placental bed was then compressed with towels, the cervix was located and a catheter was inserted in the cervix from above downwards to allow identification of the cervical canal and avoid accidental closure of the cervix during repair of the placental pouch.

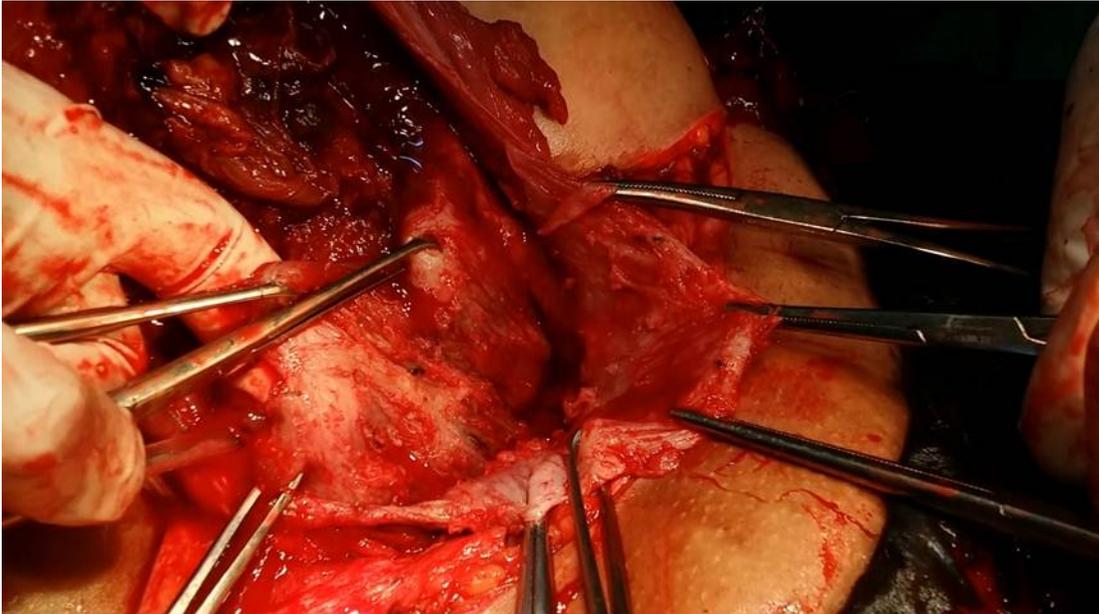


Figure 1: Placenta pouch splitting the uterine wall into two layers, anterior and posterior with clear delineation of its boundaries by the applied Allis's forceps.

A crucial step was identifying the placental pouch followed by application of multiple Allis's forceps to its edges (**Figure 1**). Meticulous closing of the placental pouch was performed by continuous running mass sutures, starting from the deepest point up, including more than one layer if needed (**Figure 2**). During this process, it was important to maintain the uterus contracted and to check for vaginal bleeding. After hemostasis was ascertained, closure of the cesarean incision in double layers was followed by regular closure steps for the laparotomy incision.

Follow up

All patients were kept under close monitoring for 24 hours post-operative with proper fluid and blood replacement and regular checks of vital signs, vaginal bleeding, and the amount of collected blood in intraperitoneal drains, if present. Hemoglobin level was re-checked 24 hours post-operative.

Statistical analysis

All data were analyzed using Microsoft Excel, 2016. The results were expressed as mean \pm SD (minimum, maximum) for quantitative data or frequencies

(percentages) for qualitative data.

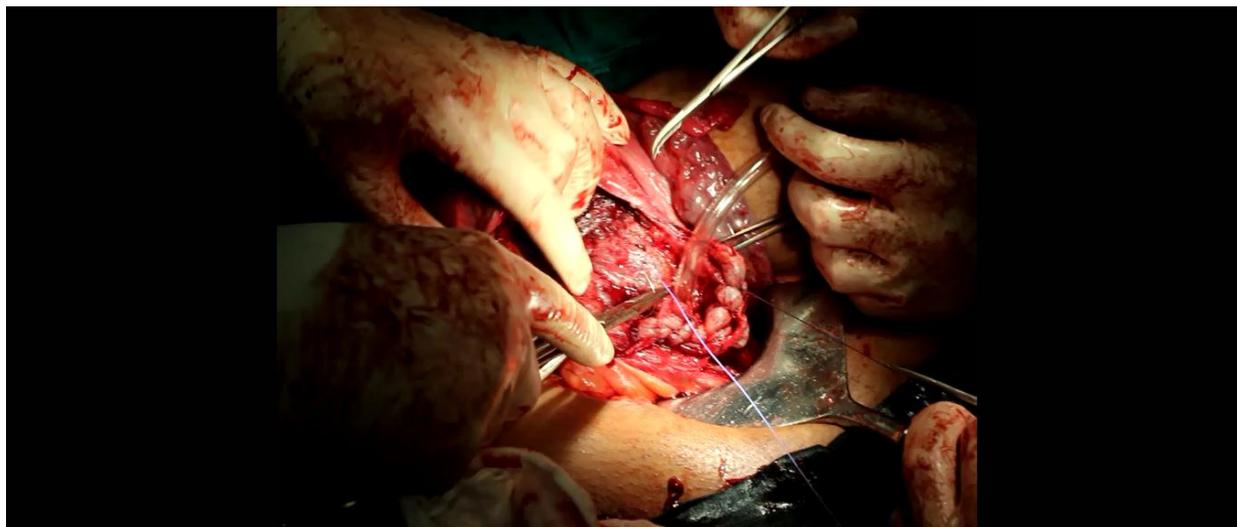


Figure 2: Placenta pouch delineated during surgery.

Results

Table 1 summarizes the demographic data of all study participants. The mean age of the included cases was 30.13

years, parity was 3.06, the mean number of previous CD was 2.6, and the gestational age at planned delivery was 37.35 weeks. The mean preoperative hemoglobin level was 11.71gm/dl.

Table 1: The demographic and clinical data of the study participants (n=60).

Variables	Mean	Standard deviation	Minimum	Maximum
Age (years)	30.13	4.52	23	43
Parity	3.06	1.274	1	7
Number of cesarean sections	2.59	1.09	1	5
Gestational age at time of delivery (weeks)	37.35	1.09	34	39
Preoperative hemoglobin level (gm/dl)	11.71	0.89	10	13
Preoperative hematocrit value	33.41	1.787	30	39

After delivery of the fetus, the placenta was found to be focally adherent in 33 cases (55%) and totally adherent in 27 cases (45%). The mean blood loss was nearly 1263 ml (range from 930 to 1600 ml). The mean number of units of blood

required for transfusion was 2.31 units. The duration of the procedure for placental pouch closure ranged between 3 and 13 minutes depending on the size of the pouch (Table 2).

Table 2: The operative data of the study participants (n=60).

Variables	Mean	Standard deviation	Minimum	Maximum
IV oxytocin units	23.85	4.91	20	30
Blood transfusion (units)	2.31	0.82	1	4
Amount of blood loss (ml)	1263	160.92	930	1600
Duration of cesarean section (minutes)	75.12	9.11	55	90
Duration of placental pouch closure (minutes)	7.13	2.161	3	13
Postoperative hemoglobin level (gm/dl)	10.63	0.67	9	12
Postoperative hematocrit	30.77	1.04	27	34

Intra-operatively, marked bladder adhesions were found in 40 cases (66.7%); however, no cases of bladder injuries were recorded. The current procedure was feasible in all cases. We did not utilize any surgical techniques to control bleeding other than closure of the placental bed or pouch. In 59 out of the 60 enrolled cases, the uterus was successfully conserved. There were no cases of maternal mortality or severe morbidities related to the procedure.

Regarding the perinatal outcome, the mean birth weight was 2.9 ± 0.3 kg, the mean Apgar score at 5 minutes was 9.73 ± 0.07 and no babies were referred to neonatal intensive care unit.

Postoperative recovery was uneventful. Only one case (case No. 53) developed postoperative pelvic hematoma and hypotension for which immediate laparotomy re-exploration and hysterectomy were done. The patient was subsequently admitted to the intensive care unit for two days and discharged from the hospital three days later.

The mean postoperative hemoglobin level was 10.15 gm/dl. The mean duration of postoperative hospital stay was 3.2 days

Discussion

In this article, we propose a novel technique for conservative management of the uterus in women with PAS who desire uterine preservation. Conservative management, including both abnormally adherent placenta (placenta accreta) and invasive placenta (placenta increta and percreta), defines all procedures that aim to avoid peripartum hysterectomy and its related morbidity and consequences. Four different primary methods of conservative management have been described in the international literature: (1) the extirpative technique in which the placenta is manually removed; (2) the expectant approach, which leaves the placenta in situ; (3) one-step conservative surgery, involving removal of the accreta area; and (4) the Triple-P procedure, which involves suturing around the accreta area after resection.

These methods have been used alone or in combination, often with additional procedures proposed by interventional radiology.¹²

Several suture techniques have been used in the lower uterine segment to control hemorrhage during CD for placenta previa or PAS including Cho's hemostatic suturing technique, Hwu's parallel vertical compression sutures, circular isthmic-cervical sutures and Yan's folding sutures.¹³⁻¹⁶ However, each of these techniques creates some difficulties and disadvantages during the operation. Additionally, their use has only been reported in a small case series with no further studies about their efficacy.

We avoided manual removal of the placenta to prevent leaving any retained placental tissues in the uterine cavity. This is recommended in several guidelines as one of the key steps for management of postpartum hemorrhage.¹⁷⁻²⁴ Manual removal of the placenta in cases of PAS should be avoided because forcibly removing an invasive placenta with placental villi that have invaded the deep uterine vasculature increases the risks of severe obstetric hemorrhage and the need for urgent hysterectomy.²⁵ Severe bleeding will lead to coagulopathy with increased risk of bladder and ureteric injuries that can lead to long-term complications such as vesicouterine fistula.⁸⁻¹¹

In our series, we always started placental separation after waiting for the placenta to spontaneously separate. Once this had occurred, we started manual removal of the adherent or invasive parts at the end, which resulted in a dramatic

decrease in blood loss without any bladder or ureteric injuries. This is logical as our technique of placental pouch closure starts with careful, meticulous and downward dissection of the bladder from the uterus before incising the uterus, which was an integral step in our methodology as mentioned above.

The core principle of this procedure was based on our observation that, in many PAS patients, there was a pouch at the site of placental attachment that represented the dead space left inside the myometrium after its invasion by the placenta (in cases of increta variants of PAS). This pouch was the main source of bleeding after placental separation. After delineating the boundaries of this pouch using Allis's forceps, we also noticed that the bottom of the pouch was not the cervical canal, as we had thought before, and that the cervical canal was situated posterior to this pouch.

Taking this observation into consideration when dealing with PAS, we put a catheter in the cervical canal, and we looked for the placental pouch at its origin points for most of the bleeding coming from inside the cervix. Thus, we were able to close this bed with stitches without having to worry about the constant risk of closing the cervical canal.

In 2018, the Green-top guideline advocated conservative management of PAS and reported that when the invasion of placental tissue inside the myometrium is limited in its extent and the entire placental invasion area is accessible when visualized, conservation of the uterus may be applicable, including partial myometrial resection.²⁶

Furthermore, they reinforced that conservative techniques should only be undertaken by experienced surgical teams who can efficiently manage such cases after counseling the patients and collecting their written consent.²

In this study, we opened the uterus immediately above the presumed upper placental edge; this allowed us to easily control bleeding from the placental pouch as the target area of the bleeding became more accessible. This coincides with the 2018 FIGO consensus guidelines on PAS disorders, which state that preoperative ultrasound mapping of the placental site in cases of invasive PAS disorders should be used to determine the site of incision.¹²

In this study, we noticed that there was a dramatic reduction of severe morbidity and mortalities resulting from our focus on placenta accreta. We operated on 60 cases with a variable degree of PAS. The procedure was successful in almost all cases; the uterus was conserved in 98.33 % of them, and there were no associated severe maternal morbidities or mortality.

In this study, all operations were carried out under spinal anesthesia with intrathecal morphine. We used regional anesthesia in order to have time for careful and meticulous bladder dissection without fear of fetal asphyxia. Since intrathecal morphine is hypotensive anesthesia and has no effect on the tone of the uterus throughout surgery, it resulted in less intraoperative blood loss. In addition, it provided excellent postoperative pain relief.

Another technical difficulty that faced us

when discussing all surgical techniques for management of PAS was the high rate of bladder injury due to extensive adhesion resulting from repeated cesarean deliveries and which mandate urologic consultation and bladder repair. This could lead to prolongation of the operative time in critically ill patients. To overcome this difficulty, we carefully and extensively dissected the bladder from the anterior uterine segment before performing the uterine incision, taking advantage of the distended lower uterine segment and the easier identification of surgical planes before uterine incision.

In June 2019, FIGO released a clinical grading system to assess and categorize placental adherence or invasion at delivery²⁷. Our technique could be effective in grades 1 and 2.

The limitations of the current technique include considerable placental bed bleeding. If the technique we used were modified by adding some steps that could result in decreased blood loss, the technique could be mastered by a wider range of skilled obstetricians. Secondly, the technique also needs to be modified to reduce bleeding from the back of the bladder due to extensive bladder dissection from the lower uterine segment, which is a crucial step in this technique. Regarding the generalizability of the technique, since we began this project, many of our colleagues have mastered the technique with excellent results. The learning curve of the technique has been consistently shortening, as reflected by a gradual decrease in both the amount of blood lost and the need for blood transfusions over time. Finally, the issue of patient consent

needs careful consideration. In general, women, particularly in Egypt, want to avoid cesarean hysterectomy and preserve fertility – even after as many as five C-sections. However, they lack evidence-based information about truly invasive PAS, including the 10 – 20% risk of uterine rupture and the effects of PAS in subsequent pregnancies. We include the risks of PAS and uterine rupture in the consent form that patients sign prior to the onset of treatment.

Conclusions

As a result of this study, we are able to present a new, standardized, and effective procedure that reduces maternal morbidity and mortality while still allowing for uterine preservation in women with PAS who desire future fertility. In well-selected cases with the availability of facilities and expertise, the technique could have a place as a safe and effective surgical technique for uterine preservation in cases of PAS.

Future studies should be carried out to compare this procedure with other conservative techniques for management of PAS. Currently, we are working on comparing our technique with other surgical techniques for conservative management of PAS that have been used at our hospital. Additionally, studies to evaluate the uterine cavity and the effect of the procedure on the fertility outcomes should be conducted.

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