

Morbidity associated with nonemergent hysterectomy for placenta accreta

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OBJECTIVE: The purpose of this study was to report the morbidity of nonemergent hysterectomy for suspected placenta accreta.

STUDY DESIGN: This was a retrospective study of all patients who underwent nonemergent hysterectomy for placenta accreta at Tampa General Hospital from June 1, 2003 to May 31, 2009.

RESULTS: Twenty-nine patients were identified. Diagnosis was suspected on ultrasound scanning in 26 women (6 women also underwent magnetic resonance imaging) and on direct vision at repeat cesarean section delivery in 3 women. All of the women were multiparous, and 18 women had undergone ≥ 2 cesarean section deliveries. Twenty-one women had a placenta previa, and 8 women had a low anterior pla-

centa. Final pathologic findings revealed accreta (20 specimens), increta (6 women), and percreta (3 women). Mean total operative time was 216 minutes; blood loss was 4061 mL. Two women had ureteral transection (1 was bilateral); 3 women had cystotomy, and 3 women had partial cystectomy. Postoperative hemorrhage occurred in 5 women; 1 hemorrhage resolved after catheter embolization, and the other 4 hemorrhage required reoperation.

CONCLUSION: Nonemergent hysterectomy for placenta accreta is associated with significant morbidity in the forms of hemorrhage and urinary tract insult.

Key words: accreta, hysterectomy

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Placenta accreta, a rare but increasingly common complication of pregnancy, has been associated with significant maternal morbidity.¹ The purpose of this article is to report our experience with nonemergent hysterectomy for suspected placenta accreta.

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MATERIALS AND METHODS

This was a retrospective, institutional review board–approved, chart review of all patients who underwent nonemergent hysterectomy for suspected placenta accreta from June 1, 2003 through June 30, 2009. Cases were identified through a medical records department and labor and a delivery records search with ICD-9 codes and search words (placenta accreta, cesarean hysterectomy). Patients whose surgery was precipitated by bleeding that was nonemergent in nature were included. Cesarean section deliveries were done by an obstetrician and a senior resident. The hysterectomies were done by 2 senior residents who were assisted by the obstetrician or a gynecologic oncologist. Prophylactic arterial catheters and/or ureteral stents were placed at the discretion of the attending physician.

For this study, *major morbidity* was defined as any of the following events: intra- or postoperative transfusion of ≥ 4 units of blood, clinical and laboratory documented coagulopathy that required blood products, ureteral injury, reoperation, major infection (sepsis syndrome, drainage of intraabdominal abscess, nec-

rotizing), thromboembolism, fistula, or arterial catheter complications.

RESULTS

Thirty-seven patients were identified in the database. Eight surgeries that were clearly emergent were excluded, which left 29 patients whose data were available for analysis. Patient characteristics are given in Table 1. Diagnosis was suspected on ultrasound scanning in 26 women (6 diagnoses were magnetic resonance imaging) and on direct vision at repeat cesarean section delivery in 3 women. Nine of the 29 patients were referred from the region based on the suspected diagnosis. Nine of the women were hospitalized for bleeding before the planned delivery date. Although cesarean section delivery was done at an earlier date than originally planned (median, 4 weeks), in no case was it emergent. In 7 cases the surgery was performed on an urgent basis for bleeding (3 women), bleeding and premature labor (2 women), and premature rupture of membranes with suspected chorioamnionitis (2 women). Although a statistical analysis was not performed, a review of the data did not reveal any major differences in outcome between these and the truly elective cases.

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TABLE 1
Patient characteristics (n = 29)

Characteristic	Measure
Mean age, y ^a	33.4 (23–43)
Mean parity, n ^a	3.2 (1–8)
Mean gestational age, wk ^a	33.2 (26–39)
Mean previous cesarean delivery, n ^a	2.3 (1–6)
≥2 previous cesarean deliveries, n	
Placental location	18
Complete previa	21
Low anterior	8

^a Data are given as mean (range).

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Fourteen of the 29 patients had prophylactic placement of bilateral iliac artery catheters (6 common iliac, 8 internal iliac) for the purpose of controlling hemorrhage. Use of the catheters was highly variable: the balloons were never inflated in 7 women, inflated prophylactically in 2 women, and inflated on the onset of hemorrhage in 5 women. Because of the inconsistent placement, location, and use of these catheters, it is not reasonable to attempt analysis of their effectiveness in the present study.

Simultaneously with cesarean section delivery, prophylactic ureteral stents were placed successfully bilaterally in 10 women, unilaterally in 2 women, and unsuccessfully in 2 women. There was no morbidity or additional operative time and minimal cost associated with the placement of these stents. As will be reported later, ureteral transections occurred in patients with and without stents. However, there is not a reasonable analysis of the data that can be done in terms of the relative benefit of the stents.

All patients had a vertical skin incision. Cases were done in the main operating room when available because of more experienced staff and greater accessibility to major surgical equipment. The operative team varied considerably among the cases. Residents and fellows were involved in all cases. A gynecologic

oncologist participated in most of the operations but to a highly variable degree. Because of these variations, it is not possible to analyze the potential effects of level of training or specialty on outcome.

Three patients in whom placenta accreta was suspected based on ultrasound results and despite the desire for sterilization and consent for hysterectomy underwent the attempted removal of the placenta immediately after cesarean delivery. This resulted in immediate severe hemorrhage in 2 women, and hysterectomy was performed promptly in all 3 women. Estimated blood loss for these cases was 700, 2500, and 3000 mL.

During cesarean delivery in a patient with a low anterior placenta and suspected accreta, the placenta was transected extensively. Massive hemorrhage ensued; by the time the uterus was removed, the patient had received 60 units of blood and became severely coagulopathic. The pelvis was packed, and the patient was taken to interventional radiology. Embolization of bleeding vessels was performed, but persistent hemorrhage required reoperation the next day. This patient then had to be kept in the intensive care unit for several days but subsequently did well.

During hysterectomy, 1 patient with placenta percreta had bilateral distal ureteral transection (stents had been placed); in another patient with accreta (but suspected percreta), the distal left ureter was transected (no stents). In both cases, there was complete placenta previa that involved the cervix. In these cases, attempted mobilization of the urinary tract was postponed until the last step of the hysterectomy in hopes of devascularizing, mobilizing, and better defining the area of potential percreta. In both cases, the ureters had been dissected to the ureteric tunnels—but not beyond—because of concerns regarding inciting hemorrhage. The planned line of transection of the cardinal ligaments was deliberately kept lateral to the large vascular mass to prevent massive hemorrhage (all 3 ureteral transections occurred during this part of the operation). In both cases, we attempted to open the paravesical spaces medial to the umbilical ligaments; how-

ever, the large cervical-placental mass made this difficult. It was understood during both hysterectomies (the same technique was used for many of the other hysterectomies in this series as well) that the ureters were at risk, but it was believed that the benefit of the planned approach (in terms of avoiding massive hemorrhage) outweighed this risk. All 3 transections were recognized intraoperatively and repaired successfully by ureteroneocystotomy. The placenta of the patient with suspected percreta invaded to within 1 mL of the anterior cervical margin (increta on pathology) but did not seem to involve the bladder, which was separated without hemorrhage.

One patient who was suspected of having at least placenta increta preoperatively was noted at the time of surgery to have obvious percreta. The placenta extended grossly into the right broad ligament, which necessitated radical hysterectomy.

Incidental cystotomy occurred in 6 patients, all during attempts at careful (to avoid hemorrhage) mobilization of the bladder off a large cervical-placental mass. Three of the cystotomies were unintentional. In the other 3 patients, the bladder muscularis (midline posterior fundus) appeared to be invaded, and an approximately 3–5 cm disc of bladder was resected with the uterus. One of these 3 patients was noted to have placental invasion of the bladder during cystoscopic stent placement. Final pathologic findings confirmed percreta in 2 of the 3 cases and increta in the third case. All 6 bladders were repaired primarily and healed uneventfully.

Mean operative time for the cesarean hysterectomies was 216 minutes (range: 100–400 minutes). Six patients had a successful supracervical hysterectomy. In all of these patients, the placenta was clearly above a well-formed cervix. Twenty other patients had a planned total hysterectomy. Three patients had an initial attempt at a supracervical hysterectomy. However, significant bleeding required the immediate removal of the cervix in 2 patients and removal several hours later in the third patient. In addition to the 2 patients, 2 other patients required reop-

TABLE 2
Major morbidity

Variable	n
Transfusion \geq 4 units blood	12
Coagulopathy	5
Ureteral injury	2
Reoperation	4
Infection	0
Thromboembolism	3
Catheter-related	1
Fistula	0
Death	0

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eration within 24 hours for postoperative bleeding.

Mean and median estimated blood loss for the cesarean hysterectomies was 4061 and 3000 mL, respectively (range, 500–30,000 mL). Twenty-one patients (72%) received a blood transfusion during or after surgery. Twelve of these patients received \geq 4 units of blood. None of the patients experienced major infectious morbidity. Severe coagulopathy that required component therapy intra- and/or postoperatively developed in 6 patients (all after large volume blood transfusion). Component therapy included recombinant factor VIIa in 3 women. Two of these women who received recombinant factor VIIa experienced subsequent thromboembolism (both received 2 doses). One of 14 patients (7%) had a catheter/balloon-related complication, which was asymptomatic bilateral internal iliac artery stenosis (almost complete occlusion on 1 side). In total, 7 patients (24%) experienced major morbidity (Table 2).

Overall mean length of stay after surgery was 9.8 days (range, 3–31 days). Fourteen patients required postoperative admission to the intensive care unit for a mean of 2.75 days (range, 1–8 days).

Five patients were readmitted to the hospital within 6–17 days postoperatively for related issues that included pyelonephritis (1 patient), thromboembo-

lism (2 patients), soft tissue infection (1 patient), and cardiac issues (1 patient).

Histologic examination of the hysterectomy specimens demonstrated unequivocal placenta accreta (15 specimens), increta (6 specimens), or percreta (3 specimens). In 5 patients, the pathologic finding initially was interpreted as no accreta. However, on rereview, it was believed by the pathologist that all of these patients had placenta accreta (clinically, 2 patients were thought to have increta based on visualization of the placenta just beneath the surface of the uterine-cervical outer surface).

COMMENT

Most patients in the present series were suspected preoperatively of having placenta accreta. It is likely that antenatal diagnosis has contributed to the overall drop in maternal morbidity and deaths that has been associated with this condition.^{1,2} Physicians must maintain a high level of suspicion, particularly in patients with risk factors such as multiparity (especially previous cesarean section deliveries) in association with placenta previa.^{3–5}

Antenatal diagnosis of placenta accreta has major advantages that include the ability to plan all aspects of care. In addition, particularly high-risk cases (cervical invasion, bladder involvement) may potentially be identified. A standardized protocol can be instituted that includes the involvement of multiple disciplines (maternal-fetal medicine, neonatology, anesthesiology, nursing, interventional radiology, blood bank, gynecologic oncology), prophylactic placement of arterial catheters and/or ureteral stents if desired, and electively operating at a chosen gestational age with an assembled surgical team and equipment.

Prophylactic placement of arterial catheters for the purpose of preventing or controlling hemorrhage has been reported in a few series of patients with placenta accreta.^{6–10} As is true with the present series, the nature of the available data does not provide conclusive evidence for benefit. Significant catheter-related complications have been re-

ported in other series. Based on our experience and others, we suggest that prophylactic placement of arterial catheters for placenta accreta be limited to very high-risk subgroups (ie, complete previa, cervical invasion, percreta) or less experienced surgical teams. Careful attention to the amount, timing, and duration of balloon inflation is important both to optimize benefit and minimize the likelihood of complications.

Patients with placenta accreta are treated generally with hysterectomy, elective or emergent. There are reports of attempts at uterine preservation, some of which have been successful; a few of these patients have gone on to have another live birth.^{2,11–17} Other patients have experienced serious morbidity. Methods of uterine preservation that have been described include curetting and over-sewing of the invaded placental bed, packing or balloon tapenade of the uterine cavity, leaving the placenta in situ in hopes of spontaneous involution (with or without methotrexate), using the B-Lynch suture technique, uterine wedge resection, and argon beam coagulation.

Uterine preservation is now discussed routinely with our patients who are suspected of having placenta accreta, but it was not attempted in any instance in the present series. Besides the issue of fertility preservation, which we have generally discouraged in multiparous patients with placenta accreta, we inform the patient that leaving the placenta in situ might be the safest option in the circumstance in which hysterectomy is anticipated to be unusually difficult or morbid (extensive percreta). Although this option was not used in the present series, there were some cases for which it was considered (1 patient experienced percreta extended into the broad ligament, 1 patient was morbidly obese). We cannot envision a case in which we would attempt electively to remove the placenta in a patient who is strongly suspected of having accreta.

Performing a cesarean hysterectomy for accreta with the placenta in situ, especially when it is a complete or anterior previa, is challenging in terms of avoiding both hemorrhage and urinary tract

injury.^{1,18} It is now part of our standard treatment to place ureteral stents electively in these patients. This also gives us an opportunity to evaluate the bladder for possible placental invasion (which was seen in 1 patient in the present series). Other institutions have also recommended prophylactic placement of ureteral stents for these women.¹ Although ureteral stents do not always prevent ureteral injury, as seen in the present series, it is easier to recognize. Further, it has been our experience that frequent palpation of the stents during hysterectomy precludes the necessity for more extensive (and potentially hemorrhage-inciting) dissection.

Cesarean hysterectomy with a placenta (particularly previa, cervical invasion, increta/percreta) in situ is clearly more difficult than other elective cesarean hysterectomies. There is a greater need to both keep a margin from the vascular cervical-placental mass and simultaneously protect the urinary system.^{1,2,19} Thus, the operation has features of a modified radical hysterectomy. Particularly in the more difficult cases as described, it is important to include a pelvic surgeon in the operative team who is experienced in this operation. When the placenta is clearly above a well formed cervix and does not extend deeply into the myometrium, the operation is much more straight-forward, and a supracerical hysterectomy is appropriate.

Placenta percreta with bladder invasion deserves special comment. This condition may be suspected preoperatively (based on imaging and, occasionally, hematuria) and/or intraoperatively (cystoscopy and/or gross invasion of placenta into the bladder muscularis). When the diagnosis is suspected and placenta appears to be at least encroaching on the bladder muscularis, the surgeon must make the assumption of possible percreta. In selected cases (eg, anticipated loss of a large portion of bladder, unusual surgical difficulty) consideration can be given to leaving the placenta in place. Attempted separation of the bladder from the uterus and cervix in patients with percreta or even placenta almost breaking through the outer surface

of the uterus may result in massive hemorrhage. The region of percreta will most often involve the lower uterine segment and the mid posterior fundus of the bladder. It is important to devascularize as much of the uterus as is feasible before this region is approached. It is also important to avoid traction or any other type of trauma to this region until planned. With care, it is almost always possible to open hemostatically a space bilaterally that separates the bladder from the parametrial and paracervical tissues.¹⁹ To a limited extent, the ureters will be mobilized laterally with this maneuver but will still potentially be in harm's way (especially distally). The following surgical approaches are our basic approaches in these situations: (1) the ureters are mobilized to the ureteric tunnels; (2) the round ligaments and utero-ovarian pedicles are divided with a stapler; (3) the division of the posterior leaf of the broad ligament is completed to join the previous ureteric dissection, and the ureters are further mobilized laterally; (4) the spaces lateral to the adherent bladder are developed, and the uterine vessel pedicles are stapled just lateral to the uterine-placental mass; (5) the uterosacral ligaments are defined and divided with the Ligasure Impact (Covidien, Boulder, CO) just outside the margin of the cervix-placental mass; (6) if ureteral stents are in place and the surgeon confidently can develop the space between the paracervical tissues and the urinary tract, then these ligaments are stapled as well; (7) dissection of the bladder off the cervix distal to the area of adherence is often possible, and transection of the vaginal fornix at this point can be considered (we do this with the TA 55 Polysorb stapler; US Surgical, Norwich, CT); (8) because the surgeon is able to get more distal in the progress of the hysterectomy, surgically approaching the adherent urinary tract becomes safer and better defined; (9) surgical management of the adherent, vascular region of urinary tract can then proceed as indicated by the gross findings and judgment of the surgeon (ie, separation vs resection).

Alternative surgical approaches that have been reported to reduce potentially the morbidity of hysterectomy for placenta

accreta include abortion hysterectomy (in the rare case in which the diagnosis is suspected strongly early in pregnancy) and delayed hysterectomy.^{20,21}

The most serious morbidity that occurred in this series and that has been associated with placenta accreta in general is hemorrhage. In addition to prophylactic arterial catheters, there are some important surgical principles that should be followed in an effort to reduce massive hemorrhage in these patients.¹⁻³ These principles relate to precise lateral control of blood supply and the "no-touch" technique regarding the placenta. For the former, we have found vascular staplers combined with the Ligasure Impact instrument to be useful. For the latter, we are talking specifically about carefully avoiding the placenta during cesarean delivery, not making any attempt at the removal of the placenta, and keeping a margin away from the vascular cervical-placental mass during hysterectomy.

We acknowledge that, in the present series, significant morbidity occurred. In efforts to continually improve, we have set up a complex obstetric patient multidisciplinary conference, a standard protocol and set of equipment, refined operative techniques, and a carefully orchestrated multidisciplinary approach.

As previously stated, massive hemorrhage was the major morbidity in this and other series of patients with placenta accreta. Although it did not happen in this series, death is not rare. Dilutional coagulopathy is inevitable in such cases. When faced with this situation, especially in the scenario of reoperation and/or ongoing hemorrhage, extreme measures (such as pelvic packing), and/or the use of less standard hemostatic agents (such as recombinant factor VIIa) are considered.² The nature of the data does not allow us to have a good understanding of the effectiveness of recombinant factor VIIa in this series, but anecdotally we believed that it was highly beneficial in reducing hemorrhage for most of the cases in which it was used. However, as has been seen in other series,²² this product is associated with a significant risk of thromboembolic complications. In addition, each dose costs

approximately \$3000 (hospital). We continue to consider the use of recombinant factor VIIa in the circumstances described earlier but try to avoid >1 dose.

The occasional difficulty with histologic identification of placenta accreta is not unique to the present series.¹ Despite clinical suspicions, some patients undoubtedly do not have placenta accreta. However, if the gross specimen is not processed carefully by someone experienced with this entity or if adequate sections are not taken, then the area of accreta might be missed.

The results of this study and others indicate that elective cesarean hysterectomy for placenta accreta is associated with significant morbidity that is related to hemorrhage and urinary tract injury. The lack of deaths is likely in large part due to antenatal suspicion followed by careful preparation. It is hoped, as we continue to gain experience with managing placenta accreta, that there will be a reduction in the morbidity described. ■

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