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Bilateral Ureterovesical Rupture Complicating Total Hysterectomy with Ureteral Neoimplantation for Placenta Accreta Spectrum in a Preterm Multigravida: A Case Report

Afif Naufal Akbarsyah[1*], Abarham Martadiansyah[2]
[1,2] Department of Obstetrics and Gynecology, Faculty of Medicine, Sriwijaya University, Palembang, Indonesia.
Corresponding Author: Afifakbarsyah1995@gmail.com

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Abstract

Placenta accreta spectrum (PASD) is an increasingly common obstetric condition that carries a substantial risk of life-threatening hemorrhage and urinary tract injury, particularly when cesarean hysterectomy is required. We reported a 28-year-old multigravida (G2P1A0) with one previous cesarean delivery who presented at 25 weeks of gestation with recurrent antepartum bleeding and marginal placenta previa. Antenatal sonography yielded a Placenta Accreta Index of 6 (probability of invasion approximately 69%) and an ISUOG score above 3, while magnetic resonance imaging suggested percreta infiltrating the rectosigmoid wall. Because of massive bleeding and threatened maternal and fetal deterioration, an emergency cesarean delivery followed by total abdominal hysterectomy was performed without prior ureteral stenting. During dissection of dense parametrial adhesions, bilateral ureteral ruptures occurred, which were repaired by extravesical ureteral neoimplantation using the Lich-Gregoir technique with double-J stenting. Histopathology confirmed PASD grade II (revised FIGO). The patient later developed a suspected vesicovaginal fistula during follow-up. This case underscored that antenatal diagnosis, multidisciplinary planning, and pre-emptive urological mapping are essential to minimize urinary tract injury in PASD surgery, and that the urological consequences of emergency hysterectomy can be considerable.

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Introduction

Placenta accreta spectrum disorder (PASD) describes the abnormal adherence or invasion of placental villi into the myometrium owing to a deficient decidua basalis. It is currently classified by the International Federation of Gynecology and Obstetrics (FIGO) into three grades ranging from

abnormally adherent placenta (accreta) to abnormally invasive placenta (increta and percreta) (Jauniaux et al., 2019; Silver & Barbour, 2015). The condition has become substantially more frequent over recent decades, a trend driven primarily by the rising global cesarean delivery rate, because a uterine scar is the single most important predisposing factor for defective placentation (Higgins et al., 2013; Committee on Obstetric Practice, 2012).

The clinical importance of PASD lies in its association with catastrophic obstetric hemorrhage, disseminated intravascular coagulation, and the frequent need for peripartum hysterectomy (Bartels et al., 2018; Wortman & Alexander, 2013). Because the lower uterine segment and the urinary tract share intimate anatomical relations, surgery for PASD is also accompanied by a considerable risk of urological injury. A systematic review reported that unintentional urinary tract injury complicated approximately 29% of hysterectomies performed for PASD, of which roughly 78% involved the bladder and 17% involved the ureter (Tam Tam et al., 2012; Liang et al., 2023).

Antenatal identification is therefore pivotal, as it permits delivery to be planned in a tertiary center by a multidisciplinary team and is consistently associated with reduced maternal morbidity (Garmi & Salim, 2012; Fitzpatrick et al., 2014). We report a multigravida with a previous cesarean delivery in whom suspected PASD was managed by emergency cesarean delivery and total hysterectomy, complicated by bilateral ureteral rupture that required extravesical ureteral neoimplantation. This case illustrates the diagnostic pathway, the surgical decision-making under emergency conditions, and the urological sequelae that may follow.

Materials and Methods

The patient was a 28-year-old gravida 2 para 1 abortus 0 woman with a previous cesarean delivery who presented at 25 weeks of gestation with recurrent antepartum hemorrhage and suspected PASD.

Clinical data were obtained from medical records, physical examination, laboratory investigations, ultrasonography, magnetic resonance imaging, operative reports, histopathological findings, and postoperative follow-up evaluations. Placental invasion risk was assessed using the Placenta Accreta Index (PAI) and sonographic criteria proposed by the International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) (Rac et al., 2015).

Management decisions involved a multidisciplinary team consisting of obstetricians, maternal-fetal medicine specialists, urologists, anesthesiologists, and vascular surgeons. Histopathological examination was performed to confirm the diagnosis according to revised FIGO classification criteria (Jauniaux et al., 2019). Written informed consent for publication was obtained from the patient.

Results and Discussions

Case Presentation

A 28-year-old woman (gravida 2, para 1, abortus 0) was referred from an obstetric clinic at 23-24 weeks of gestation with antepartum hemorrhage attributed to total placenta previa, a previous cesarean section, and suspected placenta accreta. She reported recurrent painless fresh vaginal bleeding for approximately 20 days before admission, amounting to about three sanitary pads per episode, accompanied by intermittent mild abdominal cramping. There was no history of trauma, coitus, herbal medication, or abnormal vaginal discharge. Her obstetric history was notable for one previous cesarean delivery in 2013 and a laparoscopic cystectomy in 2014.

On admission, she was hemodynamically stable, with a blood pressure of 120/80 mmHg, pulse rate of 94 beats per minute, and a body mass index of 19.9 kg/m2. Obstetric examination revealed a fundal height between the xiphoid process and umbilicus (20 cm), a positive ballottement, no uterine contractions, and a fetal heart rate of 143 beats per minute. Speculum examination showed a livid

portio with a partially open external os and inactive fresh blood in the vaginal vault; the litmus test was positive, suggesting ruptured membranes (Figure 1). Digital vaginal examination was deferred because of placenta previa.

Figure 1. Clinical photographs on admission. Speculum examination demonstrated a livid portio with inactive fresh blood in the vaginal vault, and the litmus test was positive, consistent with ruptured membranes.

Initial laboratory investigation showed moderate microcytic anemia (hemoglobin 8.9 g/dL, hematocrit 27%, mean corpuscular volume 86 fL), leukocytosis (16.2 x 10^3/uL), and hypoalbuminemia (albumin 2.6 g/dL). Renal function, electrolytes, and coagulation parameters were within normal limits, and screening for hepatitis B, human immunodeficiency virus, and syphilis was negative. The serial laboratory trend is summarised in Table 2.

Table 2

Serial laboratory results before and after surgery

Parameter (unit)	Admission	Postop day 1	Postop day 2	Reference
Hemoglobin (g/dL)	8.9	12.9	–	12.0–16.0
Leukocytes ($\times 10^3/\mu L$)	16.2	27.7	–	4.0–10.0
Platelets ($\times 10^3/\mu L$)	317	211	–	150–400
Albumin (g/dL)	2.6	2.4	2.2	3.5–5.0
Creatinine (mg/dL)	0.6	1.11	2.01	0.5–1.0
Urea (mg/dL)	10	33	57	15–40
Potassium (mmol/L)	4.8	6.5	5.4	3.5–5.0

Note: Postoperative values reflect transient renal impairment and electrolyte imbalance, which were subsequently corrected.

Non-contrast magnetic resonance imaging of the abdomen demonstrated a single intrauterine fetus with total placenta previa and findings suspicious for placenta percreta infiltrating the rectosigmoid wall and narrowing the rectosigmoid lumen (Figure 2).

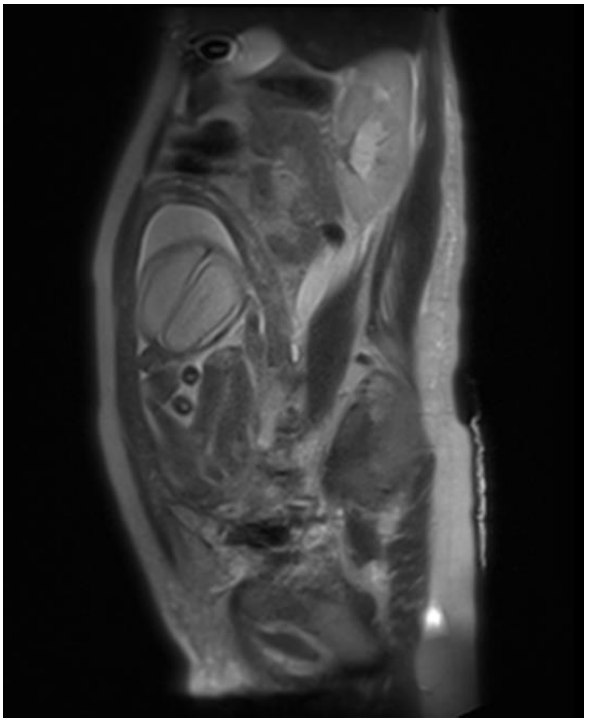

Figure 2. Sagittal non-contrast magnetic resonance image of the abdomen showing a single intrauterine pregnancy with total placenta previa and features suspicious for placental invasion of the lower uterine segment and adjacent rectosigmoid wall.

Targeted obstetric ultrasonography confirmed a single live intrauterine fetus with biometry corresponding to 25 weeks (estimated fetal weight 739 g). The placenta was located on the posterior corpus extending anteriorly to the margin of the internal os, consistent with marginal placenta previa, and the cervical length was shortened (1.11 cm). Sonographic markers of invasion were present, including loss of the clear zone, multiple abnormal placental lacunae (grade 3), myometrial thinning, and bridging and feeder vessels on color Doppler, giving an ISUOG score above 3 (high probability of PASD). The Placenta Accreta Index (PAI) was 6, corresponding to an approximate probability of invasion of 69% (Figure 3).

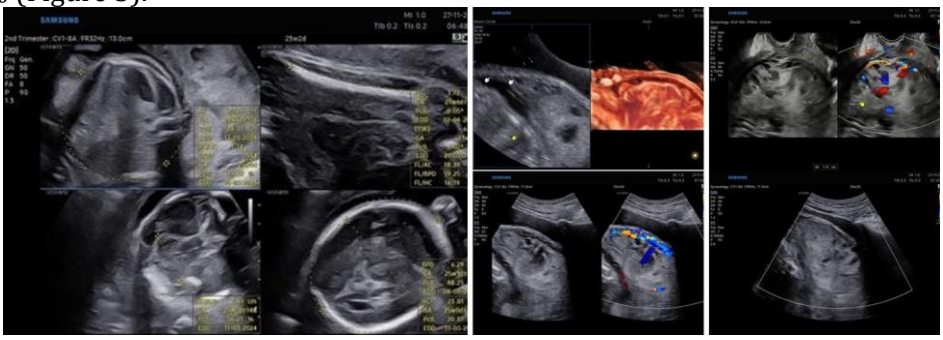

Figure 3. Antenatal ultrasonography. Fetal biometry (left), greyscale and three-dimensional images demonstrating multiple abnormal placental lacunae and loss of the retroplacental clear zone (center), and color Doppler imaging showing hypervascularity with bridging vessels at the uterine-bladder interface (right). The composite findings yielded a Placenta Accreta Index of 6.

Table 1
Components of the Placenta Accreta Index in the present case

Parameter	Finding	Score
Placenta previa (marginal)	Present	1.0
Previous cesarean delivery	1 prior	0.0
Placental lacunae (grade 3)	Present	3.5
Bridging vessels	Present	0.5
Smallest myometrial thickness / clear zone	Reduced	1.0
Total Placenta Accreta Index	Probability ≈ 69%	6.0

Note: PAI calculated according to Rac et al. A score of 6 corresponds to an estimated 69% probability of placental invasion.

Based on these findings, the working diagnosis was G2P1A0 at 25 weeks of gestation with antepartum hemorrhage due to marginal placenta previa, premature rupture of membranes, a previous cesarean section, and suspected PASD (PAI 6, probability 69%), complicated by moderate iron-deficiency anemia and hypoalbuminemia. She was managed expectantly with tocolysis (nifedipine), tranexamic acid, antenatal corticosteroids, albumin infusion, and red-cell transfusion to a hemoglobinhemoglobin above 10 g/dL, and the vascular and urology teams were consulted for planned intraoperative collaboration.

On the third hospital day, the patient developed increasing vaginal bleeding and worsening abdominal pain. Given the massive hemorrhage threatening both maternal and fetal well-being, an emergency (cito) delivery was undertaken. Because of the urgency, preoperative cystoscopic placement of ureteral stents could not be performed.

Operative findings and management

A midline vertical incision was made. The uterus was consistent with a 24-week gestation, and abnormal placental vascularity was evident on the left uterine wall, consistent with PASD. A decision was therefore taken to proceed with cesarean delivery followed by total hysterectomy. Through a classical corporal incision, a live male neonate was delivered by breech extraction, weighing 595 g with a length of 33 cm and Apgar scores of 4 and 6 at one and five minutes (Figure 4). The umbilical cord was ligated, the placenta was left in situ, and the hysterotomy was closed before proceeding with hysterectomy.

Figure 4. The preterm male neonate was delivered by breech extraction through a classical uterine incision, with a birth weight of 595 g.

During total hysterectomy, opening of the vesicouterine fold revealed an ill-defined plane between the placental implantation, the uterine serosa, and the bladder wall. Dense adhesions of both ureters to the uterus were encountered; during adhesiolysis, rupture of both the right and left ureters

occurred. The uterus was removed at the level of the cervix, and the vaginal vault was closed. The resected specimen demonstrated placental tissue densely adherent to the myometrium with abnormal serosal neovascularity, features characteristic of PASD (Figure 5).

Figure 5. Gross appearance of the hysterectomy specimen. The placenta remained densely adherent to the myometrium (left), and the external uterine surface showed abnormal serosal neovascularity (center and right), consistent with placenta accreta spectrum.

Intraoperative urological consultation was obtained. On the right side, the ureter was found to be cleanly transected and avulsed at the ureterovesical junction; right ureteral neoimplantation into the bladder was performed using the extravesical Lich-Gregoir technique with insertion of a double-J stent. On the left side, a retroperitoneal bulge was explored, and the left ureter was found to be ligated together with the uterine artery; the distal left ureter was transected and reimplanted into the bladder, again with the Lich-Gregoir technique and a double-J stent.12,13 A concurrent bladder injury was repaired. Estimated blood loss was 2000 mL, and intraoperative resuscitation comprised packed red cells, fresh frozen plasma, colloid, and crystalloid (Table 3). A stab-wound drain was placed, and the abdomen was closed in layers. The uterus and placenta were sent for histopathological examination.

Table 3
Intraoperative fluid balance

Fluid in	Volume (mL)	Fluid out	Volume (mL)
Packed red cells	800	Estimated blood loss	2000
Fresh frozen plasma	150	Urine output	300
Colloid (gelatin)	500	–	–
Crystalloid	1000	–	–
Total in	2450	Total out	2300

Note: The near-balanced intraoperative input and output reflect aggressive resuscitation in the setting of major obstetric hemorrhage.

Postoperative course and follow-up

Histopathological examination (specimen 6056/A/2023) reported myometrial hypertrophy of the lower uterine segment, a mature third-trimester placenta, and placenta accreta spectrum disorder grade II according to the revised FIGO classification.1 Postoperatively, the patient was monitored in the intensive care unit and developed transient hyperuricemia, hypoalbuminemia, and electrolyte imbalance, which were corrected. Serial postoperative ultrasonography showed mild bilateral hydroureteronephrosis that improved on subsequent imaging. The urethral catheter was maintained

for 2 weeks, and the double-J stents were planned to remain in place for 3 months. The patient was discharged on the seventh postoperative day.

Approximately ten weeks later, she returned to the clinic complaining of urinary leakage through the vagina. Examination raised the suspicion of a vesicovaginal fistula with urinary incontinence, and she was referred for cystography and reconstructive urogynaecological evaluation.

Discussion

This case highlights three interrelated themes in the management of PASD: the importance of accurate antenatal diagnosis, the surgical challenges of emergency cesarean hysterectomy, and the prevention and treatment of urinary tract injury.

Antenatal diagnosis

Antenatal diagnosis of PASD is central to reducing maternal morbidity because it enables multidisciplinary planning and delivery in an appropriately resourced center (Garmi & Salim, 2012; Fitzpatrick et al., 2014). Greyscale ultrasonography is the recommended first-line modality, with characteristic features including loss of the retroplacental clear zone, abnormal placental lacunae, myometrial thinning, and disruption of the uterine-bladder interface, while color Doppler may demonstrate bridging vessels and turbulent lacunar flow (Rac et al., 2015; Berkley & Abuhamad, 2013). To standardize risk assessment, Rac and colleagues developed the Placenta Accreta Index, which integrates the number of prior cesarean deliveries, placental location, lacunar grade, the presence of bridging vessels, and the smallest myometrial thickness; higher scores indicate a greater probability of invasion (Rac et al., 2015).

In the present case, the PAI of 6 corresponded to an estimated 69% probability of invasion, and the ISUOG score above 3 indicated a high probability of PASD. Magnetic resonance imaging was a useful adjunct, suggesting deep invasion of the rectosigmoid wall; MRI is generally reserved for cases with strong clinical suspicion or to assess the depth and topography of invasion (Jauniaux et al., 2018; Baughman et al., 2008). Nevertheless, the definitive diagnosis of PASD remains histopathological, requiring demonstration of chorionic villi invading or embedded in the myometrium with absent intervening decidua, as confirmed in our patient (grade II, revised FIGO) (Jauniaux et al., 2019; Silver & Barbour, 2015).

Surgical management

The recommended management of suspected PASD with completed childbearing is planned cesarean hysterectomy, ideally performed electively at approximately 34-36 weeks of gestation by an experienced multidisciplinary team in order to minimize blood loss and complications (Wortman & Alexander, 2013; Cunningham et al., 2018). Leaving the placenta in situ and proceeding directly to hysterectomy without attempting manual extraction is the preferred strategy when fertility preservation is not intended, as forced manual extraction can provoke torrential hemorrhage (Cunningham et al., 2018; Landon et al., 2021). In our patient, the advanced gestation and confirmed invasion made total abdominal hysterectomy the appropriate procedure; however, the onset of massive hemorrhage converted an intended planned procedure into an emergency one, a scenario that is well recognized to increase blood loss and complication rates compared with elective surgery (Wortman & Alexander, 2013; Cunningham et al., 2018).

Urological injury: mechanisms and prevention

Urological injury is a major source of morbidity in PASD surgery. The unintentional urinary tract injury rate has been reported at approximately 29% in a systematic review, predominantly involving the bladder (about 78%) and less commonly the ureter (about 17%) (Tam Tam et al., 2012; Liang et al., 2023). Injury arises both from direct placental invasion of adjacent structures and from

the surgical dissection of dense adhesions, and the risk increases with the depth of invasion, anterior placentation, prior cesarean deliveries, and intraoperative hemorrhage (Tam Tam et al., 2012; Liang et al., 2023). In our case, bilateral ureteral rupture occurred during adhesiolysis of ureters densely adherent to the uterus, illustrating precisely this mechanism.

Preoperative placement of ureteral stents or catheters is one of the most frequently advocated measures to reduce ureteral injury, as it allows intraoperative identification of the ureters during dissection (Liang et al., 2023; Norris et al., 2016). Antenatal diagnosis combined with surgical technique modifications has been shown to substantially reduce the rate of unintentional urinary tract injury compared with standard hysterectomy (Tam Tam et al., 2012). The reported benefit of stents remains debated, however, because their use has been associated with complications such as stricture formation and inflammatory reactions, and some series have not demonstrated a clear protective effect (Norris et al., 2016; Dannheim et al., 2016). In our patient, the emergency nature of the operation, dictated by life-threatening hemorrhage, precluded preoperative stent placement, and this likely contributed to the bilateral ureteral injury.

Management of ureteral and bladder injury

The management of ureteral injury depends on hemodynamic stability, the site and extent of injury, and the degree of devitalization, with the principal aim of preserving renal drainage (Phillips et al., 2017; Manjunath & Hofer, 2018). When the injury is identified intraoperatively and the patient is stable, immediate repair is appropriate; injuries near the ureterovesical junction are best managed by ureteral reimplantation. Several techniques for vesicoureteral reimplantation have been described. After more than three decades of experience, the extravesical Lich-Gregoir technique has shown excellent outcomes and is technically simpler than the Leadbetter-Politano approach, with a complication rate of approximately 3-5% (Zubieta & Lopez, 2008; Chan et al., 2003). In our patient, bilateral extravesical neoimplantation with double-J stenting was performed; the stents were retained for three months to maintain physiological urinary drainage and to prevent stricture, with planned interval follow-up.

Bladder rupture is relatively uncommon and most often traumatic or iatrogenic; extraperitoneal ruptures may be managed conservatively with catheter drainage, whereas intraperitoneal ruptures require surgical repair, as undertaken here (Phillips et al., 2017). The later development of a suspected vesicovaginal fistula with urinary leakage per vaginam in our patient is a recognized delayed complication of complex lower-urinary-tract injury and reconstruction and warrants cystographic evaluation and reconstructive urogynaecological management (Phillips et al., 2017; Manjunath & Hofer, 2018).

Taken together, this case reinforces that the urological consequences of PASD surgery can be severe and that they are most effectively mitigated by early antenatal diagnosis, transfer to a center with multidisciplinary expertise, planned rather than emergency delivery wherever feasible, and pre-emptive urological mapping. The principal limitation of this report is its single-case nature, and the findings should be interpreted within the established body of evidence on PASD.

Conclusion

Placenta accreta spectrum disorder is a potentially catastrophic obstetric condition whose anatomical proximity to the urinary tract predisposes to bladder and ureteral injury during hysterectomy. In this multigravida with a previous cesarean delivery, suspected PASD was correctly identified antenatally by sonography (PAI 6) and magnetic resonance imaging and was confirmed histopathologically as grade II. Life-threatening hemorrhage necessitated emergency cesarean hysterectomy without preoperative ureteral stenting, and bilateral ureteral rupture ensued, which was successfully repaired by extravesical Lich-Gregoir neoimplantation with double-J stenting. The

case demonstrates that antenatal diagnosis, multidisciplinary planning, and pre-emptive urological protection are essential to minimize urinary tract injury, and that delayed urological complications, such as vesicovaginal fistula, require vigilant follow-up.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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