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Case Series

Clinical profile and maternal outcomes in placenta accreta spectrum disorder: a case series from a tertiary care centre in north India

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ABSTRACT

Placenta accreta spectrum (PAS) disorder, encompassing placenta accreta, increta, and percreta, represents an increasingly prevalent and life-threatening obstetric complication, with its incidence rising sharply in parallel with escalating global caesarean section rates. We present a case series of four patients diagnosed with PAS who were managed at a tertiary care centre in North India between January and March 2026. All four patients had a history of at least two prior lower segment caesarean sections, and presented with varying degrees of placental invasion identified on ultrasonography and magnetic resonance imaging (MRI). The gestational ages at presentation ranged from 15.5 to 37 weeks, with clinical features including antepartum haemorrhage, anaemia, and haemodynamic instability in select cases. All four patients underwent obstetric hysterectomy; bilateral internal iliac artery ligation was performed in three cases to achieve haemostasis, and bladder injury necessitating intraoperative repair was encountered in three cases. Massive transfusion protocols were instituted across all cases. Three patients recovered satisfactorily and were discharged without long-term morbidity; one patient succumbed to refractory haemorrhage and disseminated intravascular coagulation in the postoperative period. This series underscores the critical importance of antenatal suspicion, early radiological diagnosis, timely referral to tertiary centres, and planned delivery by a dedicated multidisciplinary team. Strengthening surveillance in women with prior uterine surgery and ensuring institutional preparedness for complex pelvic surgery and massive transfusion are essential to improving maternal outcomes in PAS.

Keywords: Placenta accreta spectrum, Morbidly adherent placenta, Obstetric hysterectomy, Antepartum haemorrhage, Caesarean section, Maternal mortality

INTRODUCTION

Placenta accreta spectrum or PAS is an increasingly recognised obstetrical complication which is associated with significant maternal morbidity and mortality.

It was first described by Irving et al. In the year 1937 as a pathological entity with failure of separation of placenta from the uterine wall leading to the often-used term morbidly adherent placenta.¹

Once rare, its incidence increased from 1 in 4027 (0.02-0.04%) in 1970s and 1980s to 1 in 588 (0.17%) in 2024.² Observational studies from the 1970s and 1980s described

the prevalence of placenta accreta as between 1 in 2,510 and 1 in 4,017 compared with a rate of 1 in 533 from 1982 to 2002.³

Among the numerous risk factors associated with PAS the strongest one is the history of previous caesarean deliveries with rising incidence seen with increasing number of prior caesarean sections.⁴

Since 2005-06, the rate of C-sections has doubled, from 9 percent to 17 percent in 2015-16.⁵ In a systematic review, the rate of placenta accreta spectrum increased from 0.3% in women with one previous caesarean delivery to 6.74% for women with five or more caesarean deliveries.⁶

Additional risk factors include prior uterine surgeries or curettage and advanced maternal age. Challenges in PAS include the development of neo-vascularisation and possibility of compromise of neighbouring organs gives rise to technical difficulties associated with the treatment of PAS and increases maternal morbidity secondary to obstetrical haemorrhage.⁷

PAS characteristics include abnormal placental adherence to the myometrium and adjacent organs in varying degrees, categorised into placenta accreta, increta and percreta. The most common location of placenta accreta is the anterior lower uterine wall, which implies great technical surgical difficulties including adherent bladder, new vessel formation, myometrial thinning, involvement of adjacent pelvis organs.⁸ The utero-placental tissues of PAS are fragile, high-caliber and tend to bleed profusely. The absence of surgical planes for dissection makes it difficult to apply hemostatic sutures and therefore control bleeding.

Knowing the behaviour and development of placenta accreta is essential in order to plan an appropriate surgical approach. It involves understanding 2 major concepts.

Placental invasion

For many years, the absence of Nitabuch's layer was considered the main phenomenon that led to abnormal placental invasion. However, any recent studies suggest that the absence of this membrane might be a secondary process, rather than the primary cause of abnormal adherence.⁹

Placental invasion involves numerous biochemical processes. A series of myometrial mediators become a physiological limit to invasion of trophoblasts. In cases of extreme myometrial thinning the placenta might not find this limitation and thus invade the myometrium excessively.¹⁰ To ensure sufficient placental flow to the fetus, there would be secretion of vascular growth factors which would promote the opening and hypertrophy of microscopic anastomotic collaterals between the utero-placental tissue, the bladder and the vagina, which would lead us to the next major concept,

Neo-vascularization

Knowledge of the arterial component would be of utmost importance in the management of PAS. In a sagittal section of the female pelvis, a perpendicular imaginary line drawn at the level of the middle sector of the posterior bladder wall identifies two distinct vascular areas. The upper area, called the S1 genital vascular region, includes the uterine fundus and body. This region is irrigated by uterine and ovarian arteries, which favors the success of uterine devascularization techniques and uterine compression sutures. The lower area, called the S2 genital vascular region, is formed by the lower uterine segment, cervix and upper part of the vagina. In PAS, this region receives blood

supply from the internal pudendal, inferior vesical, and middle, superior and inferior vaginal arteries, and an anastomotic system is present between the vaginal and uterine arteries. This explains the ineffectiveness of traditional hemostatic mechanisms in the S2 region and the need for specific procedures for hemorrhagic control (Figure 1).^{11,12}

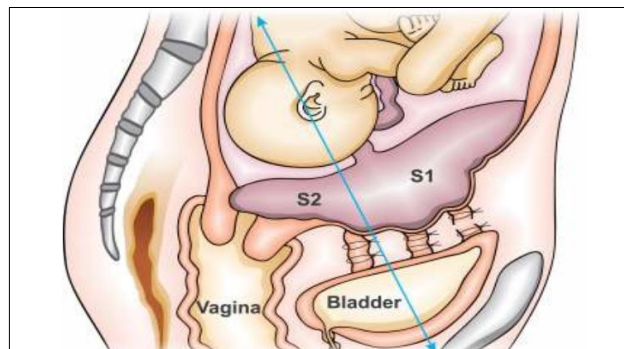


Figure 1: Sagittal section of S1 and S2 genital vascular regions.

These new vessels are mainly present at three anastomotic levels: vesicouterine system (VUS) - involving superficial vessels that connect the uterine artery with the posterior-superior bladder wall and also with the contralateral uterine artery, running transversely, placental-vesical system (PVS) - between the placental vasculature and the vesicular muscular layer, and colpouterine system (CUS)-connects the lower, middle and upper vaginal pedicles to the caudal branches of the uterine artery, located in the thickness of the anterior bladder wall.

The recent topographical classification of PAS includes the following types type 0: uterine "window" or dehiscence, with minimal or no placental invasion, type 1: invasion of the upper uterine segment, type 2: parametrial involvement (2u: upper; 2l: lower), type 3: cervix or lower uterine segment involvement (below the vesicouterine peritoneal reflection), type 4: type 3 pas associated with vesicouterine fibrosis, and type 5: posterior uterine wall involvement (5u: upper; 5l: lower/below the peritoneal reflection).

Precise knowledge of the location of the area of invasion makes it possible to plan efficient vascular control. This knowledge can be gained by the help of MRI. Topographical delineation of invasion can help in controlling haemorrhage intra-operatively. Abnormal placental invasion near the caesarean scar promotes an anterior bulge. This determines that healthy myometrium will move in a cephalic and caudal direction. The myometrium superior to the placental invasion can be seen with ultrasound, but this is not the case with the lower myometrium. This detail is essential when planning a conservative procedure, since the absence of a healthy myometrium below the area of invasion (minimum 2 cm)

reduces the possibility of resecting the invaded myometrium and of performing a safe reconstruction.

Following is the case series of 4 patients who presented to our hospital from January 2026 till March 2026.

CASE SERIES

Case 1

A 26-year-old female who is G5P3L3A1 with 15.5 weeks pregnancy with previous 3 LSCS with USG diagnosed placenta accreta with Rh negative pregnancy referred to our OPD from Bijnor district, with chief complaints of bleeding for one month, weakness for 7 days and on and off spotting since December 2025.

USG reports

USG 1

Single, live, intrauterine pregnancy with 13.1 weeks of gestation with Variable lie with placenta anterior and lower segment covering OS with irregular lacunae s/o placenta previa accreta.

USG 2

Single, live, intrauterine pregnancy with Variable lie with Placenta anterior previa, shows multiple intraplacental lakes, indistinct plane of separation with myometrium.

Magnetic resonance imaging report

Placenta is located along the anterior uterine wall and extended inferiorly into the lower uterine segment, completely covering the internal OS, consistent with placenta previa.

In the lower uterine segment, the placental - myometrial interface appear irregular and indistinct with mark thinning of underlying myometrium. There is a loss of normal hypo-echoic uteroplacental clear zone, with placental tissue seen extending in the myometrium, suggestive of placenta increta (Figure 2).

Focally there is thinning of the uterine serosal interface with placental tissue appearing to abut the uterine serosa, raising suspicion of focal placenta accreta. The urinary bladder wall appears closely opposed to the placenta, however no definite intravesical extension seen.

After all pre-op preparation and counselling of patient and relatives, termination of pregnancy was planned for the next day. All pre-op investigation were done. Her Hb was 9 gm %, WBC-10,000/cmm, platelets- 2.5 lac/cmm, LFT KFT and PT/INR-were within normal limits.

Procedure name

Exploratory laparotomy followed by obstetric hysterectomy with bilateral internal iliac artery ligation under general anesthesia.

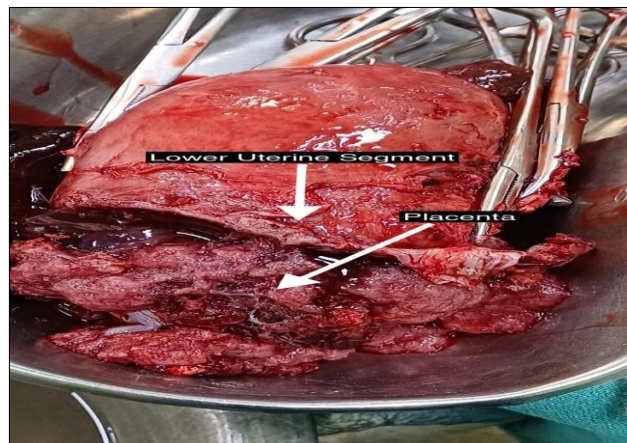


Figure 2: Lower uterine segment with adhered placenta tissue.

Per-operatively

Paramedian vertical incision given, gravid uterus of 20 weeks size seen with lower uterine segment bulging out along-with bridging vessels seen between bladder and lower uterine segment.

Hyper-vascularity seen over lower uterine segment. Clamps applied on round ligament, Tubo-ovarian ligament, uterine vessels, utero-sacral ligament and Mackenrodt's ligament. Gravid uterus with fetus-in-setu and cervix removed.

Due to excessive bleeding, decision for bilateral internal iliac artery ligation was taken. Retroperitoneum opened lateral to infundibulo-pelvic ligament, common iliac artery bifurcation identified, and internal iliac artery dissected free from surrounding tissues.

Anterior division of internal iliac artery identified and ligated 3-4 cm distal to its origin. Abdominal drain was inserted; hemostasis was achieved and Abdomen closed in layers. 2 units packed RBCs were transfused intra-operatively. Patient was shifted to ICU for monitoring and stabilization. Abdominal drain was removed on POD 5 Urinary catheter was removed on POD 7 following which she was discharged.

Case 2

A 25-year-old female, G3P2L3 with 34.4weeks of gestation with severe anemia with previous 2 LSCS in latent phase of labour with antepartum hemorrhage was referred from Bijnor district to our labor room with chief

complaints of pain abdomen for 2 days and bleeding per vaginum for 6 hours.

She was an unbooked and uninvestigated case.

On per-abdomen examination she had a midline vertical scar with term-size uterus with cephalic presentation, fixed head, with occasional uterine contractions with fetal heart rate of 148, with absent scar tenderness. On per-speculum examination she had leaking per vaginum and bleeding per vaginum with passage of around 50 cc fresh blood clots.

All pre-op investigation were done. Her Hb was 9.5 gm %, WBC-12,000/cmm, platelets-1.5 lac/cmm, LFT KFT and PT/INR-were within normal limits. She was shifted for emergency LSCS.

Procedure name

Emergency LSCS f/b obstetric hysterectomy f/b bladder repair under general anaesthesia.

Per-operatively

Pfannensteil incision was given. Abdomen opened in layers. Flimsy adhesions were present between anterior abdominal wall and uterus. Bladder seemed high up and adhered to previous scar. Dissection was performed after which lower uterine segment was identified and nick given slightly higher than usual. Posterior placental lower segment seen covering the OS.

Placenta did not get separated; it was removed in bits and pieces. The bits were adhered to lower uterine segment and urinary bladder. Profuse bleeding from placental tissue and uterine bed present.

Decision for obstetric hysterectomy was taken. Bladder injury discovered intra-operatively for which repair was done. Abdomen closed after homeostasis was achieved. 4 units packed RBCs 4 units platelets 4 units Fresh frozen plasma were transfused to the patient in ICU.

Abdominal drain removed on POD14, urinary catheter removed on POD21. Patient got discharged after stitch removal.

Case 3

A 28-year-old female with G3P2L2 with 37 weeks of gestation with previous 2 LSCS with moderate anemia with placenta previa was referred from private hospital with chief complaints of pain abdomen for 6 days.

USG report

Single, live, intrauterine pregnancy, placenta anterior and lower segment covering Os (placenta previa). Few intraplacental anechoic spaces noted. The placenta appears

abnormally adherent with focal loss of normal hypo-echoic retro-placental line likely S/O PAS.

After all pre-op preparation and counselling of patient and relatives, termination of pregnancy was planned for the next day. All pre-op investigation were done. Her Hb was 8.4 gm %, WBC-10,000/cmm, platelets-1.8 lac/cmm, LFT KFT and PT/INR-were within normal limits.

Procedure name

Emergency LSCS followed by obstetric hysterectomy (in view of placenta percreta) followed by bilateral internal iliac artery ligation followed by bladder repair under general anaesthesia. Per-operatively-midline vertical incision was given.

Abdomen opened in layers. Lower uterine segment seen bulging out, reaching up to urinary bladder. Multiple dilated, engorged vessels seen between bladder and lower uterine segment. Upper segment classical vertical incision given. Baby delivered cephalic, umbilical cord tied with chromic catgut, profuse bleeding was seen. No attempt was made to separate placenta; uterus was closed with placenta in-situ.

Decision for obstetric hysterectomy taken. Bilateral internal iliac artery ligation done. Bladder injury was suspected for which repair was done. Patient shifted to ICU on inotropic support. 2 units of packed RBCs were transfused.

Abdominal drain was removed on POD 5. Urinary catheter removed on POD 7. Patient was discharged on POD 17 after good recovery (Figure 3).

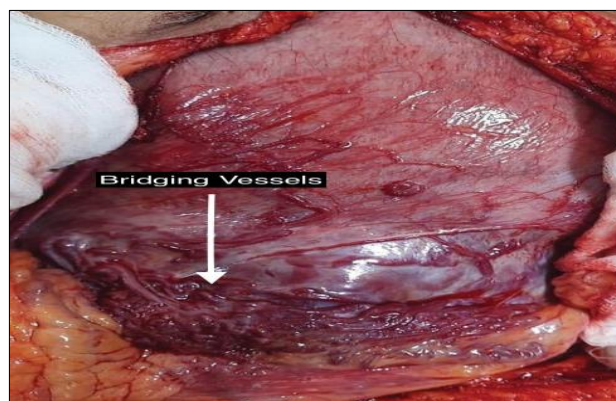


Figure 3: Dilated vessels between urinary bladder and lower uterine segment.

Case 4

A 25 years old female with G3P2L2 with 36 weeks of gestation with previous 2 LSCS with moderate anemia with placenta accreta spectrum presented to our OPD with complaints of pain abdomen for 3 Hours.

USG reports

USG 1

Single, live, intrauterine pregnancy 12.6 weeks of gestation, variable lie, placenta posteriorly, low lying, covering internal Os.

An ill-defined hypo-echoic collection with internal echoes and septations noted along the anterior uterine wall near the fundus S/O subchorionic hematoma (61 cc).

USG 2

Single, live, intrauterine pregnancy, breech presentation, placenta anterior lower segment covering Os. Few vascular channels crossing thin myometrium, placental lacunae, s/o accrete.

All pre-op investigation were done. Her Hb was 7.3 gm %, WBC-9700/cmm, platelets-1.8 lac/cmm, LFT KFT and PT/INR-were within normal limits.

She was transfused 1-unit packed RBC on the same day following which she experienced an increase in pain in abdomen.

Obstetrical examination was performed. She was 2 cm dilated. Decision for termination of pregnancy was taken with all prognoses and risks explained to family members.

Procedure name

Emergency LSCS f/b obstetric hysterectomy f/b bladder repair under general anesthesia.

Per-operatively

Pfannensteil incision given and lower uterine segment seen bulging. Multiple dilated engorged vessels with multiple open sinuses seen over the anterior lower uterine segment. Placenta seemed invading the lower uterine segment, diagnosed as placenta accreta intra-operatively. Baby extracted out followed by profuse bleeding. Placenta seemed to extend laterally and posteriorly covering the Os. No attempt of placental extraction was made.

Decision for hysterectomy taken in view of PAS, persistent bleeding present for which bilateral internal iliac artery ligation was done. Bladder injury suspected and repair was done and supra pubic catheter inserted. Blood loss was around 2.5-3 l. Intraoperatively BP fell to 60/40 mm Hg. Patient shifted to intensive care unit (ICU) on inotropic support.

Her post-op investigations were-Hb-4.6 gm% TLC-72100/cmm, platelets-83000/cmm, LFT KFT-WNL. PT/INR-36/2.97, 5 units packed RBC 4 units platelets 4 units FFP were transfused. Unfortunately; the patient expired 12 hours later.

DISCUSSION

Here, we discussed 4 cases of placenta accreta spectrum which were managed at our centre. Out of which 3 cases had successful outcome with no long-term morbidity or mortality and 1 case had maternal mortality. The groups were similar with respect to maternal age and all the patients in this study had at least 2 previous caesarean sections.

In this case series, all the 4 cases underwent obstetric hysterectomy, out of which 1 female expired post-operatively. However, ongoing research and increasing knowledge on PAS has led to adaptation of conservative procedures and techniques leading to significant reduction in blood loss and patient morbidity and mortality. Numerous advancements have been made in the field of PAS disorders which have the potential of avoiding drastic consequences such as maternal mortality.

Multidisciplinary PAS team approach in order to efficiently manage an emergency of such magnitude. The multidisciplinary team for management of a placenta accreta should comprise of an obstetrician, anaesthetist, neonatologist, interventional-radiologist, urologist and blood bank physician.

Emerging AI-based imaging tools may allow early and precise subtype differentiation of PAS.

Advanced ultrasound + Doppler scoring systems.

Multimodal imaging improves placental assessment versus single modality.

Early detection (11–13 weeks) via transvaginal ultrasound (TVS) and color Doppler is now standard, allowing better risk assessment. MRI is increasingly used to assess the exact extent of invasion.

PAS risk stratification models: Ante-natally categorising PAS pregnancies into high, medium and low risk can lead to stratification and timely preparedness for efficient management of such patients (Figure 4).¹⁴

Advances in intraoperative hemorrhage control include balloon occlusion techniques such as internal iliac artery and aortic balloon occlusion and uterine artery embolization (UAE) done preoperatively or postoperatively. Manual aortic compression can be used in resource-limited settings.

Optimal timing: elective multidisciplinary care is scheduled at 34 0/7 –35 6/7 weeks of gestation to avoid emergency situations and reduce morbidity.¹⁵

Uterus-preserving techniques includes leaving placenta in-situ with serial monitoring of serum beta hCG levels has been done in some cases with regular follow-up to watch for complications such as haemorrhage and septicemia.

Triple-P procedure involves perioperative placental localization and delivery of the fetus via transverse uterine incision above the upper border of the placenta; pelvic

devascularization; and placental non-separation with myometrial excision and reconstruction of the uterine wall.¹⁶

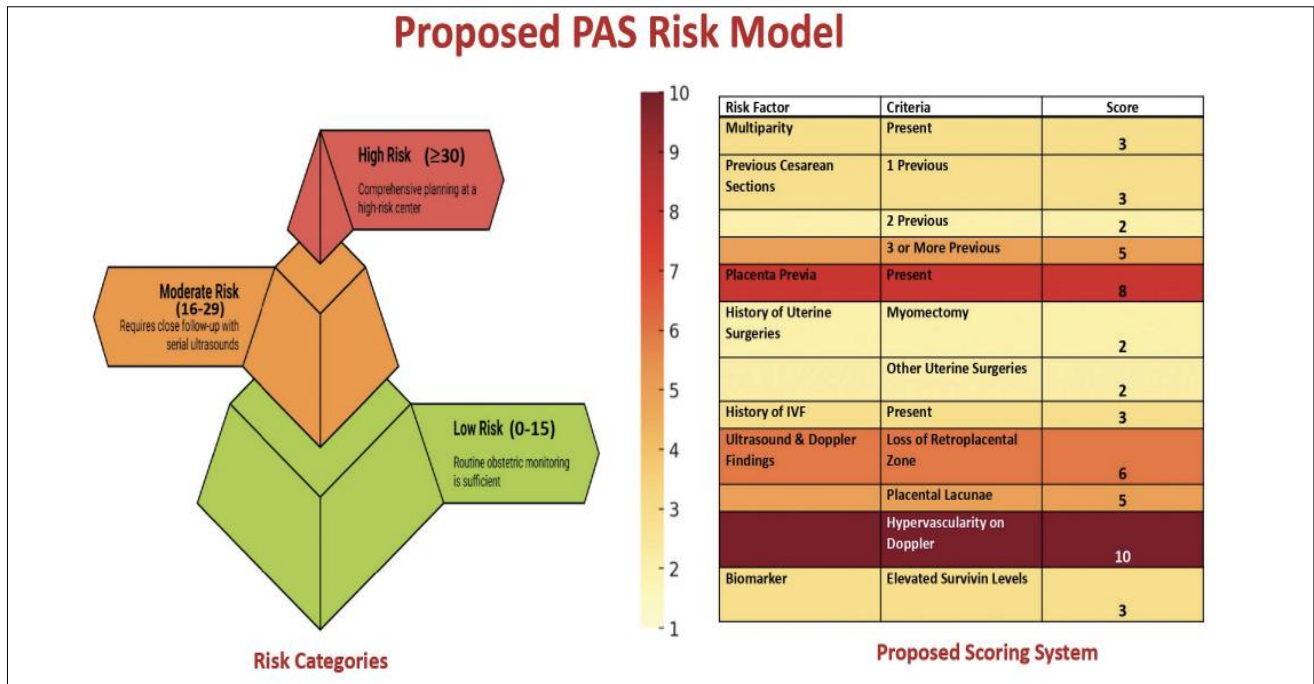


Figure 4: Proposed PAS risk model.

Segmental uterine resection

Uterus-sparing technique used to treat placenta accreta spectrum (PAS) by removing the specific, highly invaded portion of the uterine wall rather than removing uterus as a whole.

Other techniques include Foley catheter tamponade, and stepwise devascularisation.

Cysto-inflation method

A surgical technique involving retrograde filling of the bladder with 200-300 cc of saline through a catheter during difficult C-sections or pelvic surgeries. This method inflates and highlights the bladder, helping surgeons identify its anatomical borders and separating it from the uterus, significantly reducing bladder injuries and other complications.

Conservative/uterine preservation/OSCS

OSCS implies one-step solution to all surgical problems which includes vascular disconnection of the invaded organs (uterus, placenta and bladder), correct compartment exposure of the pelvic organs, total resection of the invaded myometrium and, finally, uterine and vesical reconstruction.

CONCLUSION

PAS disorders are increasing with increasing number of caesarean deliveries and have become a major cause of maternal mortality and morbidity which necessitates active and timely multidisciplinary involvement tailored according to patient's radiological and intra-operative findings. Advance planning of patient management with anticipation of complications and preparedness to deal with them can prove to be helpful. This case series underscores the critical importance of early antenatal diagnosis through targeted imaging, timely referral to tertiary care centers, and planned delivery with a multidisciplinary team approach. Strengthening antenatal surveillance in high-risk women, particularly those with previous caesarean sections, and ensuring preparedness for massive transfusion and complex pelvic surgery are essential to improving maternal outcomes and reducing mortality in PAS.

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