



# Italian Journal of Gynæcology & Obstetrics

March 2023 - Vol. 35 - N. 1 - Quarterly - ISSN 2385 - 0868

## Bladder invasion of placenta percreta: review of literature and our experience

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### ARTICLE INFO

#### History

Received: 03 November 2021

Received in revised form: 12 March 2022

Accepted: 17 March 2022

Available online: 21 March 2023

DOI: 10.36129/jog.2022.26

#### Key words

Placenta percreta; bladder invasion; metrorrhagia; hematuria; placenta accreta.

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### ABSTRACT

Placenta percreta is the most severe form of placenta accreta spectrum with a reported prevalence up to 1 in 1,000 pregnancies and a much lower rate of concomitant bladder invasion, occurring in approximately 1 in 10,000 births. Here we report a case of a 40-year-old woman who presented at 30 weeks of gestation with metrorrhagia and haematuria because of placenta percreta invading the urinary bladder. At 34 weeks she underwent a caesarean section through a fundal uterine incision, a consequently hysterectomy and partial cystectomy with prophylactic balloons in the hypogastric arteries. In order to unravel the disease complexity and to ease the management of this controversial topic, we performed a narrative review of the relevant evidence brought by literature in the last 10 years.

### INTRODUCTION

Placenta accreta spectrum (PAS) is a complex obstetric condition characterized by abnormal trophoblast invasion into the uterine wall during placentation. The increased use of either caesarean delivery, uterine curettage, manual placenta removal or previous endometritis have direct effect on the incidence of accreta placentation [1-4]. The most important pre-

dictor of PAS is placenta previa, a placenta lying directly over the internal os. Few cases of cervical pregnancy combined with Placenta Accreta Spectrum (PAS) are reported in literature. This disorders can be explained by the absence of protective decidua basalis in the cervical stroma, which results in trophoblastic invasion into the cervical tissue [5]. Like reported on 2018 FIGO consensus guideline, when stratified by the number of previous caesarean de-

liveries, the ORs for PAS disorders in a subsequent pregnancy increased from 8.6 (95%CI 3.5-21.1) after one prior caesarean to 17.4 (95%CI 9.0- 31.4) after two previous caesareans, and to 55.9 (95%CI 25.0-110.3) after three or more prior caesarean deliveries [6]. A classification based on the depth of placental invasion into the uterine wall, distinguish three PAS grades: placenta “accreta” with villi in direct contact with myometrium (75%), placenta accreta with myometrium invasion (“increta”) (18%) and placenta percreta with villi invading the uterine serosa and surrounding tissues (7%) [7]. An interesting clinical-based PAS disorders classification recognizes an “abnormally adherent placenta” which does not separate from uterus with conservative manual approach requiring mechanical or surgical procedures to stop bleeding; an “abnormally invasive placenta (increta)” which shows macroscopic hypervascularity features and when gentle cord traction is made, uterus retraction without placental detachment follows (dimple sign) and an “abnormal invasive placenta (percreta)” with macroscopic aspect of uterine serosa invasion (IIIA), bladder invasion (IIIB) or even distant pelvic structures invasion (IIIC) [8, 9]. Placenta percreta is the most severe form of the three entities with a reported prevalence up to 1 in 1,000 pregnancies. The prevalence of concomitant bladder invasion is much lower, occurring in approximately 1 in 10,000 births [10].

The neo-vessels of the growing placenta percreta may soften the tissues of the adjacent organs (bladder, intestines, parametrium) and simulate invasion or, less often, lead to eventual uterine rupture [11]. Women with placenta percreta have a higher prevalence of urologic injury and postoperative complications such as pulmonary embolism and cardiopulmonary arrest. They risk emergency transfusions and require intensive care admission [8]. Mortality rates have been estimated as high as 9.5% and 24% for mother and child, respectively [12]. Here we present a case of a 40-year-old at 30 weeks of gestation with metrorrhagia and haematuria because of placenta percreta and bladder invasion. In order to unravel the disease complexity, we also performed a narrative review of literature to ease the management of this controversial topic.

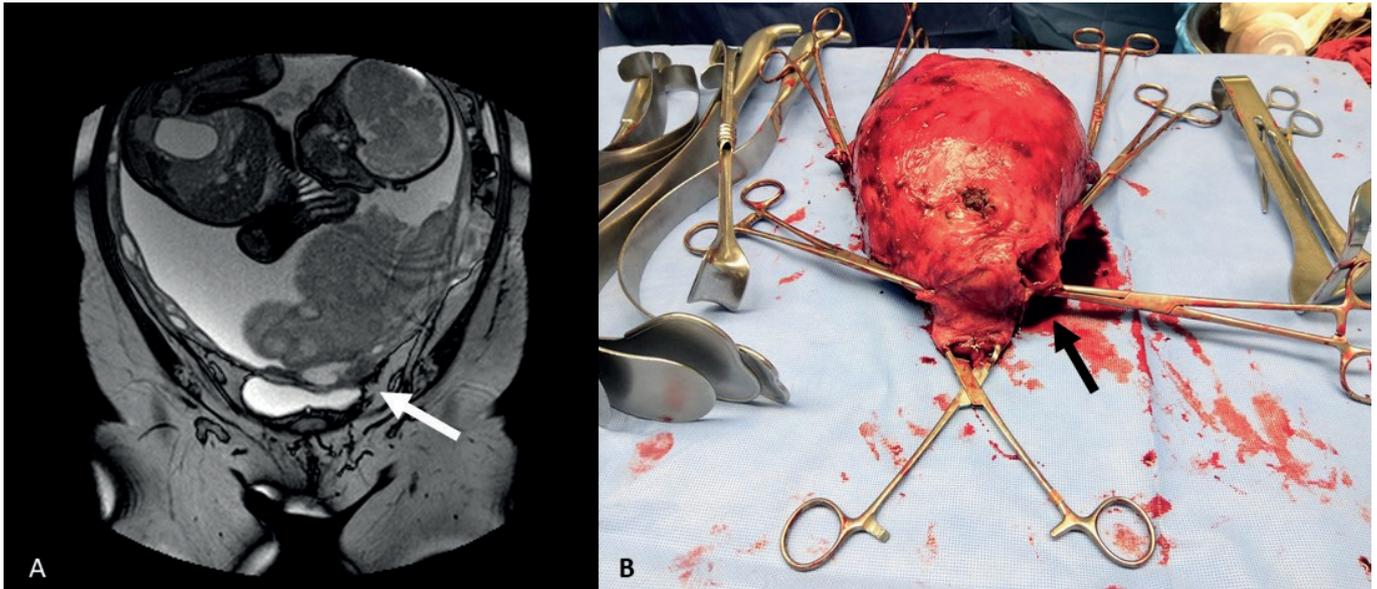
## MATERIALS AND METHODS

For the narrative review, a systematic search of PubMed, MEDLINE, and Scopus databases was conducted to identify English-language guidelines and

recommendations, randomized controlled trials, systematic reviews and meta-analyses, open-label studies and case series published between 2010 and 2021. For the search strategy specific keywords to each database were used: “placenta percreta”, “management of “placenta percreta”, “diagnosis of placenta percreta”, “placenta percreta and bladder injury”, “morbidly adherent placenta,” or “abnormally invasive placenta.” The latter keywords were used in various combinations. For the provided case report, clinical and demographical characteristics were recorded before and after the surgery explained below.

## CASE PRESENTATION

A 40-year-old woman was admitted to our hospital at 30 weeks of gestation due to intermittent and scarce metrorrhagia and haematuria. She had an history of two caesarean sections. Placenta previa was diagnosed on ultrasonography. The ultrasound examination raised the doubt of placenta percreta as placental vessels seemed to invade the bladder. Magnetic resonance imaging was performed. The bladder appeared fused and infiltrated (**Figure 1A** - white arrow), findings consistent with the latter diagnosis. The metrorrhagia and haematuria resolved short after admission. Given that, after a multidisciplinary case discussion with obstetrics, neonatologists, anaesthesiologists, urologists and radiologists, we planned to perform a caesarean delivery at 34 weeks. The patient underwent caesarean section with an antero-fundal uterine incision. A female neonate was delivered with APGAR scores of 9 and 9. The umbilical cord was clamped, and the placenta left *in situ*. The uterine breach was closed with an interrupted suture. To identify the bladder separation site with the anterior uterine wall, the bladder was filled. The anterior uterine wall was recognized to be affixed to the bladder. Cystotomy was performed to identify percreta villous tissue whereas the urologist carried out a partial cystectomy to remove the involved bladder area. The procedure was complicated by bleeding, hence prophylactic balloons were inflated in order to occlude hypogastric arteries. A planned hysterectomy was performed. Total blood loss was 3,000 mL and five red blood cell-packed units were transfused. **Figure 1B** (black arrow) shows the breach in perimetrium caused by infiltrating chorionic villi, a hallmark of placenta percreta. The patient was discharged after six days with a Foley catheter in place which was removed 30 days postoperatively.



**Figure 1.** (A) MRI slice showing the invasion of placenta outside the uterus, in the bladder (white arrow). (B) Macroscopic breach in perimetrium caused by infiltrating chorionic villi (black arrow).

## DISCUSSION

Antenatal diagnosis of placenta percreta is essential for planning its management in order to reduce maternal morbidity and mortality [13]. When performed by experts, ultrasound imaging is highly accurate in detecting placenta accreta spectrum [14]. A systematic review showed that ultrasound, in women with placenta previa and previous caesarean section, had sensitivity of 97%, specificity of 97% and diagnostic OR of 228.5 for the antenatal diagnosis of PAS [15]. The ultrasound features of PAS were standardized by The European Working Group on Abnormally Invasive Placenta in 2016 [16]. In placenta percreta villous invasion makes myometrium undetectable. This results in loss of the clear zone and loss of different echogenicity between placental tissue and myometrium [1]. A cohort study reported that bladder wall interruption, bladder bulge and exophytic mass occurred in 33% of cases of invasive placentation [17]. Placental lacunae are often described by authors, independently of the invasion's depth [1]. Neovascularization between the anterior wall of the uterus and posterior wall of the bladder is a prominent feature in cases of abnormally invasive placenta [18].

According to Thiravit *et al.*, the sensitivity, specificity and accuracy of MRI in detecting placenta percreta were 91.7, 44 and 71.4% respectively. The invasion of placenta outside the uterus and moderate-marked degree of heterogeneous placental

signal intensity (Figure 1A) were the most significant MRI image in diagnosis of placenta percreta. In addition radiologists considered: no evaluable myometrial layer associated with large dark intra-placental bands on T2-weighted imaging and presence of abnormal bizarre disorganized intra-placental vessels [13].

The management of placenta percreta is a controversial topic. Placenta abnormalities that cause a pathological pregnancy and previous caesarean scar are one of the main indications for women over 40 years of age to undergo caesarean section [19].

As for the Royal College guidelines [12] four surgical approaches are viable:

- Primary hysterectomy following delivery of the foetus, without attempting placental separation.
- Delivery of the foetus avoiding the placenta, repairing of the incision leaving the placenta *in situ*.
- Delivery of the foetus without disturbing the placenta, followed by partial excision of the uterine wall (placental implantation site) and repair of the uterus.
- Delivery of the foetus without disturbing the placenta, leaving it *in situ*, followed by elective secondary hysterectomy at day 3-7.

There are no well-controlled observational studies, and therefore, no firm recommendations can be made. Further evidence retrieved by literature shows that the most common treatment for placenta percreta is a scheduled caesarean delivery followed by hysterectomy, managed by multidisciplinary team

[15]. Leaving the placenta *in situ* is a conservative management which can be tried in women wishing to preserve their fertility. Possible complications of the latter approach are chronic bleeding, sepsis, septic shock, peritonitis, uterine necrosis, fistula, injury to adjacent organs, acute pulmonary oedema, acute renal failure, deep venous thrombosis or pulmonary embolism [20]. Prophylactic antibiotics may be helpful in immediate postpartum period to reduce the risk of infective complications [21]. Considering PAS in general, a retrospective multicentre study examined 167 women treated conservatively for placenta accreta. Conservative expectant management with part of the placenta left *in situ* was successful in 131 out of 167 cases (78.4%; 95%CI 71.4-84.4) [16]. This is not true for placenta percreta. The systematic review of Matsuzaki *et al.* [12] revealed that high maternal morbidity is observed during conservative management of placenta percreta. They included 72 patients with conservatively managed placenta percreta that had been reported in 44 studies published between 1990 and 2016. The success rate of conservative management of placenta percreta was lower than that reported for other types of PAS disorder. Severe maternal complications were observed. The similarly low success rate for placenta percreta observed in the latter systematic review could reflect the severity of placental invasion.

In case of placenta percreta, the prevalence of urological complications is also increased, including cystotomy and ureteric injury. In case of bladder invasion, several authors recommend to fill the bladder in order to detect the separation site with the uterine wall, and consequently open the former to remove percreta villous tissue [14]. Matsubara states that the first merit of filling the bladder is reducing bleeding, making this surgery easier and limiting bladder injury [22].

Analysing the outcome of different surgical procedures, Clausen *et al.* [23] reported that the immediate postoperative complications appeared similar. With placenta left *in situ*, they observed a higher prevalence of long-term complications (61%), especially infections (25%), haemorrhage (44%) and secondary hysterectomy (58%). Postoperative complications did not exceed 12% when initial surgical procedures were hysterectomy or local resection; the authors also compared different endovascular interventions, such as balloon occlusion and/or embolization to reduce the loss of blood. Patients managed with embolization, balloon occlusion of internal iliac arteries or with a combination of two

strategies had an estimated blood loss of 2,350-3,550 ml. When balloon occlusion was placed in the common iliac arteries or in the aorta the estimated average blood loss was 1,650 ml. When adjuvant endovascular interventions were not used, women needed more blood transfusions [23].

A study of Rosner-Tenerowicz *et al.* [24] analysed 21 pregnant women with placenta percreta. In 13 women a temporary balloon occlusion of the internal iliac arteries during caesarean section hysterectomy was used. Remaining patients underwent standard caesarean hysterectomy without prophylactic balloon occlusion. The latter had a greater blood loss and higher rate of complications (haemorrhagic shock, disseminated intravascular coagulation, bladder injury).

When fluid resuscitation is needed, we must consider that women in the immediate postpartum period have increased blood volume and systemic vasodilatation while colloid oncotic pressure is lower. This can lead to third space expansion, pulmonary oedema, and left ventricular diastolic dysfunction, which is why after initial fluids administration, further eventual fluid therapy should be guided by dynamic measures of preload [25, 26].

The ideal timing of delivery for these patients has yet to be determined. Evidence in literature suggest a scheduled delivery at 34-36 weeks [27]. Robinson *et al.* [28] support the increasing likelihood of emergency delivery when pregnancy goes beyond 34 weeks of gestation. O' Connor *et al.* reported a case of a 37-year-old woman with an obstetric history of classical caesarean and prenatal diagnosis of suspected placenta percreta. Because of the placental protrusion through the previous classical caesarean incision site, they delivered the neonate, at 33 weeks, through a lower segment incision below the level of placental invasion. Then they performed hysterectomy [20]. A recent retrospective cohort study compared the management of placenta previa percreta with a control group of non-accreta placenta previa. The 19 pregnancies with placenta percreta carried out a planned caesarean delivery between 35 and 38 weeks. Two patients had primary caesarean hysterectomy, fifteen patients were managed with a secondary hysterectomy and in the remaining two patients the myometrium with placental tissue was excised. Seventeen women were treated with a post-caesarean delivery embolization of the uterine and internal iliac arteries. In this study the different surgical techniques used for

hysterectomy closure at prior caesarean section didn't influence the presence of placenta percreta in the future [7]. Instead, other authors found that the use of monofilament suture and interrupted sutures for uterine closure in previous caesarean delivery reduced prevalence of PAS disorders in subsequent pregnancies [18, 24].

## CONCLUSIONS

Placenta percreta is a life-threatening condition, hence antenatal diagnosis is crucial for proper surgical management. It should be considered in any pregnant patient with a previous history of caesarean section even if without clinical manifestations. Evidence from literature indicates that the ideal timing of delivery for these patients, if asymptomatic, may be between 34 and 36 weeks of gestation. The different treatment options and relative risks should be discussed with patient and each case should be managed by a multidisciplinary team to warrant the best possible approach.

## COMPLIANCE WITH ETHICAL STANDARDS

### *Authors contribution*

G.P., E.C.: Surgery. M.G.: Data research. G.T.: Imaging and revision. M.S.: Writing – review & editing. D.D.G.: Literature search. G.R.D.: Writing – original draft.

### *Funding*

None.

### *Study registration*

N/A.

### *Disclosure of interests*

The authors declare that they have no conflict of interests.

### *Ethical approval*

N/A.

## *Informed consent*

Obtained.

## *Data sharing*

N/A.

## REFERENCES

1. Jauniaux E, Collins S, Burton GJ. Placenta accreta spectrum: pathophysiology and evidence-based anatomy for prenatal ultrasound imaging. *Am J Obstet Gynecol*. 2018;218(1):75-87. doi: 10.1016/j.ajog.2017.05.067.
2. Trojano G, Damiani GR, Olivieri C, Villa M, Malvasi A, Alfonso R, et al. VBAC: antenatal predictors of success. *Acta Biomed*. 2019;90(3):300-9. doi: 10.23750/abm.v90i3.7623.
3. Damiani GR, Xuamin H, Vimercati A, Di Gennaro D, Loizzi V, Gaetani M, et al. Management of a rare case of placenta trophotropism. *Minerva Obstet Gynecol*. 2022;74(5):462-5. doi: 10.23736/S2724-606X.22.05015-1.
4. Loverro MT, Damiani GR, Di Naro E, Schonauer LM, Laforgia N, Loverro M, et al. Analysis of relation between placental lesions and perinatal outcome according to Amsterdam criteria: a comparative study. *Acta Biomed*. 2020;91(3):e2020061.
5. Trojano G, Colafoglio G, Saliani N, Lanzillotti G, Cicinelli E. Successful management of a cervical twin pregnancy: neoadjuvant systemic methotrexate and prophylactic high cervical cerclage before curettage. *Fertil Steril*. 2009;91(3):935. doi: 10.1016/j.fertnstert.2008.11.009.
6. Jauniaux E, Chantraine F, Silver RM, Langhoff-Roos J; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO consensus guidelines on placenta accreta spectrum disorders: Epidemiology. *Int J Gynaecol Obstet*. 2018;140(3):265-73. doi: 10.1002/ijgo.12407.
7. Jansen CHJR, Kastelein AW, Kleinrouweler CE, Van Leeuwen E, De Jong KH, Pajkrt E, et al. Development of placental abnormalities in location and anatomy. *Acta Obstet Gynecol Scand*. 2020;99(8):983-93. doi: 10.1111/aogs.13834.
8. Hubinont C, Mhallem M, Baldin P, Debieve F, Bernard P, Jauniaux E. A clinico-pathologic study of placenta percreta. *Int J Gynaecol Obstet*. 2018;140(3):365-9. doi: 10.1002/ijgo.12412.

9. Jauniaux E, Ayres-de-Campos D, Langhoff-Roos J, Fox KA, Collins S; FIGO Placenta Accreta Diagnosis and Management Expert Consensus Panel. FIGO classification for the clinical diagnosis of placenta accreta spectrum disorders. *Int J Gynaecol Obstet.* 2019;146(1):20-4. doi: 10.1002/ijgo.12761.
10. Smith ZL, Sehgal SS, Van Arsdalen KN, Goldstein IS. Placenta Percreta With Invasion into the Urinary Bladder. *Urol Case Rep.* 2014;2(1):31-2. doi: 10.1016/j.eucr.2013.11.010.
11. Chantraine F, Langhoff-Roos J. Abnormally invasive placenta--AIP. Awareness and pro-active management is necessary. *Acta Obstet Gynecol Scand.* 2013;92(4):369-71. doi: 10.1111/aogs.12130.
12. Matsuzaki S, Yoshino K, Endo M, Kakigano A, Takiuchi T, Kimura T. Conservative management of placenta percreta. *Int J Gynaecol Obstet.* 2018;140(3):299-306. doi: 10.1002/ijgo.12411.
13. Thiravit S, Lapatikarn S, Muangsomboon K, Suvannarerg V, Thiravit P, Korpraphong P. MRI of Placenta percreta: differentiation from other entities of placental adhesive disorder. *Radiol Med.* 2017;122(1):61-8. doi: 10.1007/s11547-016-0689-3.
14. Jauniaux E, Alfirevic Z, Bhide AG, Belfort MA, Burton GJ, Collins SL, et al. Placenta Praevia and Placenta Accreta: Diagnosis and Management: Green-top Guideline No. 27a. *BJOG.* 2019;126(1):e1-e48. doi: 10.1111/1471-0528.15306.
15. Jauniaux E, Bhide A. Prenatal ultrasound diagnosis and outcome of placenta previa accreta after cesarean delivery: a systematic review and meta-analysis. *Am J Obstet Gynecol.* 2017;217(1):27-36. doi: 10.1016/j.ajog.2017.02.050.
16. Collins SL, Ashcroft A, Braun T, Calda P, Langhoff-Roos J, Morel O, et al. Proposal for standardized ultrasound descriptors of abnormally invasive placenta (AIP). *Ultrasound Obstet Gynecol.* 2016;47(3):271-5. doi: 10.1002/uog.14952.
17. Jauniaux E, Collins SL, Jurkovic D, Burton GJ. Accreta placentation: a systematic review of prenatal ultrasound imaging and grading of villous invasiveness. *Am J Obstet Gynecol.* 2016;215(6):712-21. doi: 10.1016/j.ajog.2016.07.044.
18. Sumigama S, Sugiyama C, Kotani T, Hayakawa H, Inoue A, Mano Y, et al. Uterine sutures at prior caesarean section and placenta accreta in subsequent pregnancy: a case-control study. *BJOG.* 2014;121(7):866-74; discussion 875. doi: 10.1111/1471-0528.12717.
19. Puglia M, Dubini V, Andersson L, Voller F. Incidence and risks of caesarean section in women aged  $\geq 40$  years. *Ital J Gynaecol Obstet* 2021;33(1):45-51. doi: 10.36129/jog.33.01.05.
20. Sentilhes L, Ambroselli C, Kayem G, et al. Maternal outcome after conservative treatment of placenta accreta. *Obstet Gynecol.* 2010;115(3):526-34. doi: 10.1097/AOG.0b013e3181d066d4.
21. Fox KA, Shamshirsaz AA, Carusi D, Secord AA, Lee P, Turan OM, et al. Conservative management of morbidly adherent placenta: expert review. *Am J Obstet Gynecol.* 2015;213(6):755-60. doi: 10.1016/j.ajog.2015.04.034.
22. Matsubara S. "Filling the bladder" at Cesarean Hysterectomy for Placenta Percreta. *Geburtshilfe Frauenheilkd.* 2018;78(7):715-6. doi: 10.1055/a-0592-5032.
23. Clausen C, Lönn L, Langhoff-Roos J. Management of placenta percreta: a review of published cases. *Acta Obstet Gynecol Scand.* 2014;93(2):138-43. doi: 10.1111/aogs.12295.
24. Rosner-Tenerowicz A, Pomorski M, Fuchs T, Śliwa J, Pilecka K, Zimmer A, et al. Management of placenta percreta with temporary balloon occlusion of the internal iliac arteries. *Eur J Obstet Gynecol Reprod Biol.* 2018;226:71-2. doi: 10.1016/j.ejogrb.2018.05.014.
25. Simonetto C, Garzon S, Laganà AS, Raffaelli R, Cromi A, Uccella S, et al. Maternal sepsis: A comprehensive review from definition to treatment. *Ital J Gynaecol Obstet.* 2020;32(3):166-81. doi: 10.36129/jog.32.03.03.
26. Marinelli E, Negro F, Varone MC, Trojano G, Del Rio A, Zaami S. Perinatal and post-partum infections in times of Coronavirus: are compliance with cautionary measures and safety protocols key factors in staving off litigation? *Ital J Gynaecol Obstet.* 2020;32(3):189-99. doi: 10.36129/jog.32.03.05.
27. O'Connor D, Berndt A. Placenta percreta. *CMAJ.* 2018;190(6):E168. doi: 10.1503/cmaj.171411.
28. Robinson BK, Grobman WA. Effectiveness of timing strategies for delivery of individuals with placenta previa and accreta. *Obstet Gynecol.* 2010;116(4):835-42. doi: 10.1097/AOG.0b013e3181f3588d.