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CASE REPORT

Placenta increta and minimally invasive surgery: our experience and narrative review of the literature

Valentina **Ghirotto** [1], Guglielmo **Stabile** [2,*], Marco **Canestrelli** [1], Carla **Pisani** [1], Jeremy Oscar **Smith Pezua Sanjinez** [1], Stefania **Carlucci** [2], Davide **Dealberti** [1]

[1] Department of Obstetrics and Gynecology, "SS Antonio e Biagio Hospital", Alessandria, Italy.

[2] Department of Medical and Surgical Sciences, Institute of Obstetrics and Gynecology, University of Foggia, Foggia, Italy.

Corresponding author: Guglielmo **Stabile**, M.D., PhD. Department of Medical and Surgical Sciences, Institute of Obstetrics and Gynecology, University of Foggia, viale Luigi Pinto 11, 71100 Foggia, Italy.

Email: guglielmost@gmail.com.

ORCID: 0000-0001-9266-3896.

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ABSTRACT

Background. Placenta accreta spectrum disorder is a rare condition with a prevalence rate of 0.01-1.1%, increasing in incidence over the last years. It is a pathology that puts fetal life at risk, but above all maternal life. Accurate prenatal diagnosis, a multidisciplinary approach, the presence of skilled laparoscopic surgeons, appropriate equipment, resources and a tertiary hospital setting are key factors for successful management

Case presentation. We present the case of a 33-year-old woman with a complex medical history. She has undergone various surgical procedures, including a complicated myomectomy with haematoma and infection, cholecystectomy, appendectomy, and sleeve gastrectomy.

Following a spontaneous delivery, she developed primary and secondary postpartum haemorrhage. The patient required uterine tamponade at the delivery hospital and subsequent uterine artery embolization at another centre, followed by total hysterectomy with bilateral salpingectomy and abdominopelvic adhesiolysis at our institution. The surgical procedure revealed a residual placenta with pathological adhesion and myometrial invasion, confirming the diagnosis of placenta accreta spectrum disorder (PASD). She was discharged in good general condition.

A laparoscopic approach can be considered for delayed surgical management of this condition, even in patients with severe puerperal haemorrhage and hypovolemic shock. This strategy, with its

potential to reduce morbidity, represents a compromise between postpartum hysterectomy and conservative management

Conclusions. The use of mini-invasive laparoscopic techniques for the performance of total hysterectomy in PASD is possible, reduces the haemorrhagic risk during the intervention, improves the outcome and postoperative pain, with the final result of reducing the days of Hospitalization.

Key words

Placenta increta; previous myomectomy; haemorrhagic shock; mini-invasive laparoscopic technique; pregnancy; laparoscopy

Introduction

Placenta accreta spectrum disorder (PASD), also known as morbidly adherent placenta, describes a range of placental pathologies, including placenta accreta, placenta increta, and placenta percreta. The most accepted hypothesis for the cause triggering the placenta accreta spectrum disorder is a defect in the endometrial-myometrial interface, which would lead to abnormal decidualization in a uterine scar, deep placental anchoring villi and trophoblast infiltration [1]. The FIGO classification distinguishes 3 degrees of anomalies of the placental insertion based on the invasiveness in the myometrium: grade 1, 2 and 3. Grade 1 (placenta accreta) does not detach after active assistance maneuvers at the third stage of childbirth. The macroscopic evaluation shows distension of placental “bulge”, without invasion of the placental tissue through the surface of the uterus and no or minimal neovascularization. On microscopic examination, there are large areas of absence of deciduous between villi and myometrium. Grade 2 (placenta increta) presents macroscopic abnormalities such as bluish/purple coloration, distension or significant neovascularization. No placental tissue is observed to invade the surface of the uterus. The traction of the umbilical cord drags the uterus without separation of the placenta (dimple sign). Microscopic examinations show the villi to invade the muscle fibers and sometimes penetrate the lumen of the deep uterine vessels. Grade 3 (placenta percreta) is also divided into: 3A (invasion limited to the uterine serous, with a visible cleavage plane between bladder and rectum), 3B (bladder invasion) and 3C (invasion or not of the bladder, with another pelvic organ in addition) [2].

It is a rare condition with a prevalence rate of 0.01-1.1%, increasing in incidence over the last years [3]. Maybe for the increase rates of caesarean section, surgery of the uterus such as myomectomy that causing endometrial scarring [4]. This condition poses a significant risk for patient morbidity and mortality with complications such as massive haemorrhage, hysterectomy, infection, multisystem organ failure, intensive care admission and even death [5,6].

Accurate prenatal diagnosis is crucial to improve maternal outcomes, in particular in women with high-risk factors. Ultrasound, especially with the use of Color Doppler, is most effective in the prenatal diagnosis of PASD in high-risk pregnancies. Premature detection through ultrasound allows for better clinical management, reducing maternal morbidity by enabling planned interventions [7,8].

The ways to manage Placenta Accreta Spectrum disorder distinguish between conservative and

non-conservative uterus techniques. Conservative uterus-preserving methods, such as methotrexate administration and long-term antibiotics, were evaluated. Conservative management and approaches for fertility preservation are currently debated, as they still pose a substantial risk of complications during the postpartum period. This risk encompasses increased morbidity, mortality, infections, and the potential necessity of delayed hysterectomy [9-11].

A hysteroscopic resection was considered but was deemed to be a challenging approach due to the substantial exophytic mass obstructing the lower segment and possible complications [12]. An open caesarean hysterectomy remains the standard treatment for placenta accreta, considering its reproducibility, morbidity rate, and reduced complications compared to alternative options [5]. Although this seem to be the preferred management strategy, some studies indicate relatively high morbidity rates, including the need for transfusion, cystotomy, ureteral injuries, and infections [5,13]. Several case reports have demonstrated the laparoscopic method efficacy in managing placenta accreta, resulting in satisfactory outcomes with minimal bleeding and bladder injuries [14,15]. The key factors for successful management include a multidisciplinary approach, the presence of skilled laparoscopic surgeons, appropriate equipment and resources, and a tertiary hospital setting [14,15].

Case presentation

The patient was a nullipar 33-year-old woman with a complex medical history. Her surgical history included: laparotomy myomectomy a year earlier complicated by relaparotomy for haematoma with wall infection, cholecystectomy, appendectomy in paediatric age and sleeve gastrectomy. She reported a non-severe allergy to amoxicillin (weigth 75 Kg, BMI 28.6 Kg/m^2). She was allergic to amoxicillin and iodinated contrast media (weigth 75 Kg, BMI 28.6 Kg/m^2).

The woman gave birth spontaneously at another hospital a 2850 g female newborn complicated by primary major postpartum haemorrhage (3000 cc). She was subjected to manual secondment, RCU and Bakri balloon positioning, removed after 24 hours. In the days following delivery, a transfusion of 4 units of blood was performed and an infusion of ferric carboxymaltose was submitted, with restoration of haemoglobin values.

Almost a week later, the patient accessed an emergency to the hospital where she gave birth, reporting massive uterine bleeding. Consequently, she was given anti-haemorrhagic therapy with tranexamic acid and methylergomethrin maleate with the arrest of blood loss and maintenance of stable haemoglobin values.

On the same evening following discharge from home after a new haemorrhagic loss, the patient sought medical attention at another centre. An urgent abdominal CT scan was conducted with contrast medium after premedication with prednisone and an antihistamine, revealing irregular tissue margins approximately 80x50x50 mm APxLLXCC (antero-posterior x latero-lateral x cranio-caudal) with rich vascularisation. Two ampoules of fibrinogen intravenously and 1g of tranexamic acid were administered, followed by therapy with Clindamycin 600 mgx2/day intravenously.

On the same day, an embolization procedure was performed on the uterine arteries to reduce per-vascularised placental residue. The patient was discharged in good general clinical condition.

A month later, the patient experienced new massive uterine bleeding and sought medical attention at the hospital peripheric where she had given birth. She was admitted, transfused again, and transferred immediately to our hub centre.

A USG-TV scan was conducted: the uterine cavity was occupied by an inhomogeneous formation of 70x47mm, referable to the residual placental portion, which Doppler color score 2. The fundus uterine wall exhibited signs of accretism, with discontinuity in the area of the previous myomectomy (Figure 1 and 2).

Due to severe hypovolemia (80/60 mmHg) and pre-haemorrhagic shock (Hb 6.4 g/dL), surgical intervention in emergency was undertaken.

Perioperative transfusions (4 units of blood + 600 ml of concentrated fresh plasma) were administered. The patient was subjected to a total laparoscopic 3D hysterectomy with bilateral salpingectomy. The intervention lasted three hours and 5 minutes, there were no complications and the patient was haemodynamically stable, intraoperative blood loss was 150 ml and the salient steps were: Induction of pneumoperitoneum with subcostal access according to Palmer with Verres and the introduction of the optic was done through a supraumbilical access because the uterus appears like that of a 16-18 -week pregnancy, with regular surface preservation and a consistent diminution in size from the puerperal status. The Latzko space was prepared, and the uterine arteries were closed at their origin to reduce the significant vascularization of the organ. A tenacious and extensive adherential syndrome occurred between the omentum, anterior uterine wall and sigmoid and between the uterus and bladder, with a scarfold and partial uterine ventrification observed in previous surgical outcomes requiring massive adhesiolysis. The vesico-uterine fold is cautiously and progressively detached. The rest of the intervention did not present any particular critical issues. Histological examination confirmed placental increatism at the level of the uterine wall (Figure 3-6, Figure 1 supplementary). The postoperative course was uneventful. Bowel function resumed on postoperative day 3, hemoglobin levels remained stable (9.8 g/dL on day 1 and unchanged on day 3), and vital signs were within normal limits throughout hospitalization. The patient was discharged on postoperative day 3 in good general condition.

Discussion

The incidence of abnormal placentation is increasing in recent years. Among the main risk factors, surgical interventions are responsible for the creation of a scar at the level of the wall of the uterus, as in the case of myomectomy. A laparoscopic approach can be considered for delayed surgical management of this condition, even in patients with severe puerperal haemorrhage and hypovolemic shock. This strategy, with its potential to reduce morbidity, represents a compromise between postpartum hysterectomy and conservative management [16, 17, 18].

The decision between conservative management and total hysterectomy is contingent upon several factors, including the extent of placental invasion, the manifestation of infection symptoms, the woman's haemodynamic condition, the surgical proficiency of the practitioner, the availability of appropriate facilities, and the woman's aspiration to maintain fertility [16].

Uterine artery ligation, an alternative to uterine artery embolization, is used for both preventing and treating postpartum haemorrhage [19,20]. However, placenta previa and placenta accreta are risk factors for uterine artery ligation failure [19-21]. O'Leary suggested that these failures may be due to an extensive collateral circulation in the presence of abnormal placentation. A 2007 systematic review found no evidence supporting the superiority of any specific conservative treatment for postpartum haemorrhage management [22].

A retrospective study by Bretelle et al. [23] found that 19% of cases managed conservatively needed hysterectomy due to treatment failure, 15% developed fever, and 12% developed disseminated intravascular coagulopathy. Timmermans et al. [24] reviewed 60 cases of abnormal placentation managed conservatively and found failure rates of 15%, 23%, and 25%, respectively managed without any additional interventions, with use of methotrexate or with uterine arterial embolization. Endometritis was present in 18% of cases, and fever occurred in 35%.

Post-embolization syndrome is a prevalent complication of uterine artery embolization, characterised by pelvic pain, nausea, malaise, and low-grade fevers that persist for two to seven days. It distinguishes itself from endomyometritis, which is associated with elevated fever, escalating pain, and potentially purulent vaginal discharge occurring between one week and six months post-embolization. A compliant patient who comprehends the risks and benefits and adheres to regular follow-up can be managed conservatively. Although this approach mitigates severe morbidity, haemorrhage, infection, and disseminated intravascular coagulation remain potential risks. Delayed hysterectomy subjects patients to the usual risks of surgery and anaesthesia for a second time within weeks to months of delivery, irrespective of the surgical modality employed.

This is associated with higher peri-operative complication rates compared to non-obstetric hysterectomy. This is largely attributed to the often-emergent nature of the surgery, substantial surgical blood loss, size of the gravid uterus, risk of damage to nearby organs, and to have longer hospital days [16].

For women who do not desire to preserve fertility, delayed laparoscopic hysterectomy may serve as an alternative to minimise surgical morbidity. A minimally invasive approach employing conventional laparoscopic or robotic-assisted platforms may be envisaged when hysterectomy is deemed necessary following vaginal delivery in a haemodynamically stable patient.

Appropriate patient selection is paramount, whereas many of these procedures are performed on an urgent or emergent basis amidst potentially life-threatening haemorrhage. Specific challenges associated with performing robotic-assisted hysterectomy during the peripartum period include the additional setup time required for the minimally invasive approach in a patient with the potential to become unstable, as well as the challenges encountered with port placement in patients with large uterus. Timing is also significantly operator-dependent, and it is crucial to have a surgical team with extensive experience in robotic surgery.

It is widely acknowledged that hysterectomies performed through a minimally invasive approach confer numerous advantages, including reduced postoperative pain, smaller incisions, shorter hospital stays, and expedited recovery compared to open surgery. Although certain studies have indicated an association between increased body mass index (BMI) and heightened bleeding and extended operating times in laparoscopic surgery, there is evidence suggesting that in robotic-assisted laparoscopy, obese patients achieve comparable outcomes to non-obese patients [17]. Although robotics has proven to be a very effective technique, it has not demonstrated its superiority over laparoscopy in the treatment of gynecological pathologies [25, 26]. Furthermore, it

is a much more expensive technique and requires the availability of a robot that is not present in all facilities. Laparoscopic technique has demonstrated its effectiveness in the treatment of gynecological pathologies even in the case of a significantly increased uterus size and in the case of a high BMI of the patient [27].

While cases of peripartum hysterectomy are frequently emergencies and performed via laparotomy, a minimally invasive approach may be considered in patients requiring hysterectomy following vaginal delivery when an experienced team is available.

Numerous case reports have highlighted the laparoscopic method of managing placenta accreta, demonstrating favourable outcomes with minimal bleeding and minimal damage to the bladder [14,15,28] in addition to the shorter duration compared to robotic approach.

The use of mini-invasive endoscopic techniques in performing a total hysterectomy allows the surgeons to reduce the haemorrhagic risk during the intervention and improve the outcome and postoperative pain.

The timing of delayed laparoscopic hysterectomy is controversial. Ochalski et al. [15] performed laparoscopic hysterectomy at 12 weeks postpartum, whereas we planned to perform the procedure at six weeks postpartum due to severe hypovolemia and pre-haemorrhagic shock.

Optimising the timing of the procedure is paramount to minimise the risk of late complications such as haemorrhage and infections.

Conclusion

Placenta accreta condition poses a significant risk for patient morbidity and mortality with complications such as massive haemorrhage, hysterectomy, infection, multisystem organ failure, intensive care admission and even death. The laparoscopic approach appears to be safe and effective both immediately after delivery and at a later stage as in our case.

Key factors for the success of this approach include a multidisciplinary approach involving for instance preoperative anaesthetic consultation, the presence of skilled laparoscopic surgeons and advanced endoscopic equipment, and the availability of blood products in case of either bleeding complications or the conversion to an open approach.

COMPLIANCE WITH ETHICAL STANDARDS

Authors' contribution

Conceptualization, ; methodology, G.S.; validation G.R. and F.R.; formal analysis, G.S. and G.Z.; investigation, G.D.L., G.S. and F.P.M.; data curation, G.Z., F.R. and G.D.L.; writing—original draft preparation, G.S. and G.Z.; writing—review and editing, G.R., F.R., F.P.M. and G.A.T.; supervision, G.R.; project administration, G.S. All authors have read and agreed to the published version of the manuscript.

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Disclosure of interests

The authors declare no conflict of interest.

Informed consent

Informed consent was obtained from the patient involved in the study.

Data sharing

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

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Figure 1: Inhomogeneous area, referable to the residual placental portion.

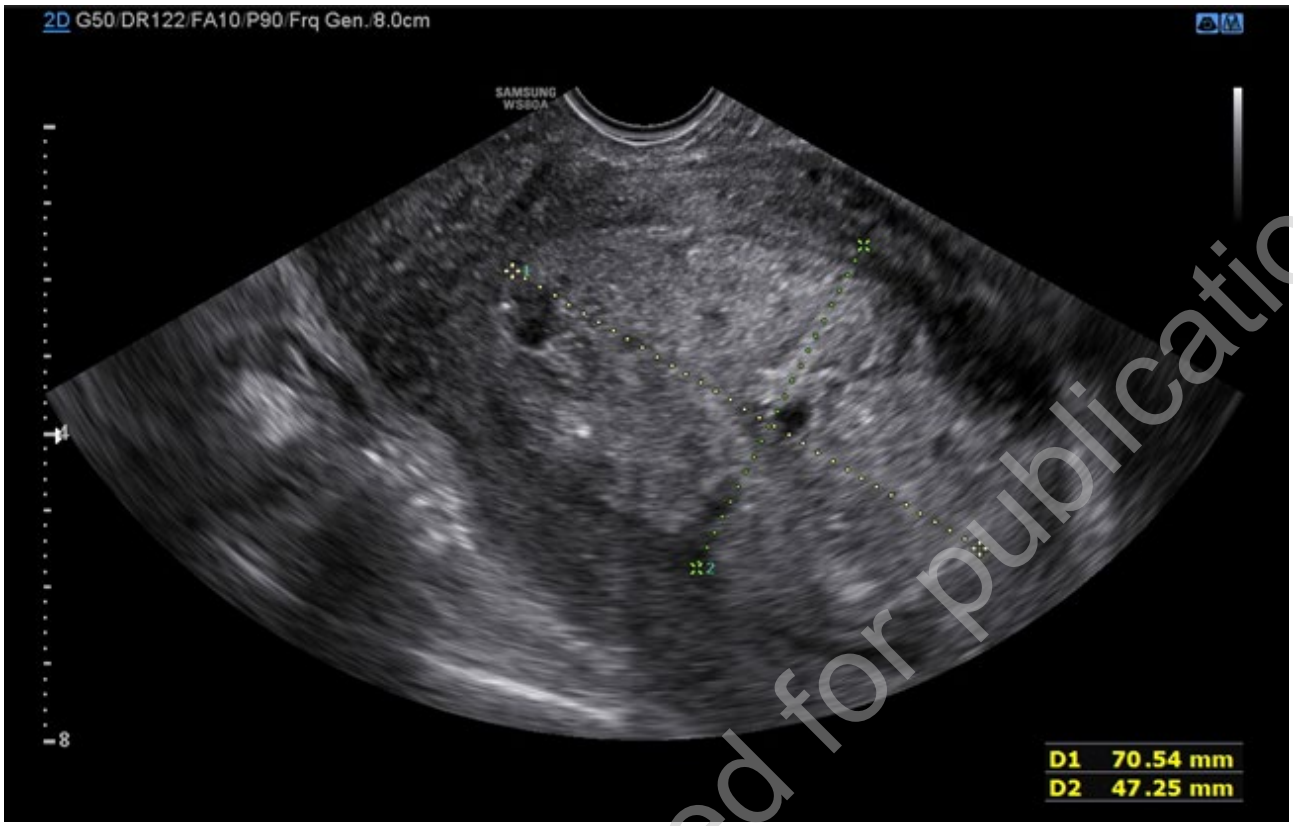

Figure 2: vascularization of the uterine wall and gradient margins of placental increatism at the livel of the uterine fundus with residual myometrium < 1mm.

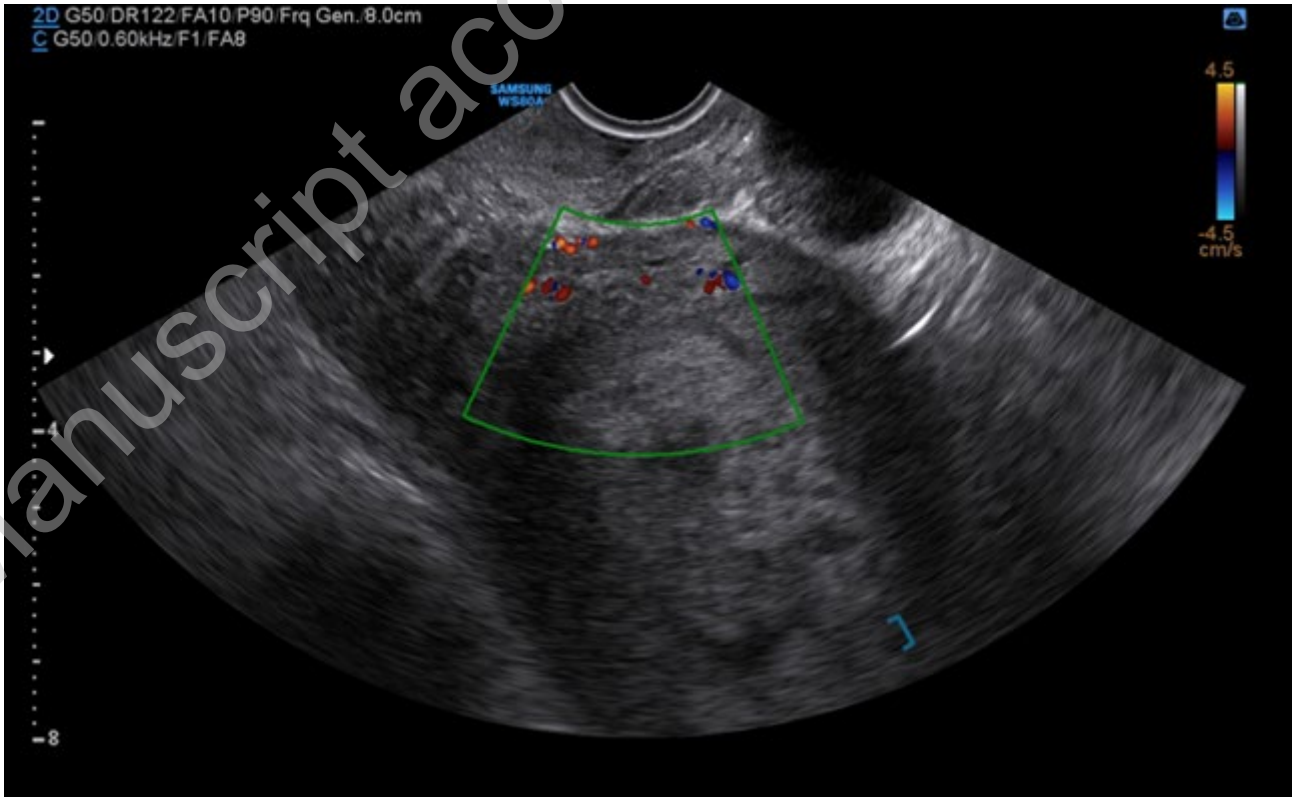

Figure 3-6: operative piece (uterus) with pathological myometrial invasion (incretism) of residual placenta.