

Placenta percreta presenting in the first trimester: Review of the literature

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Summary

Placenta percreta complicating pregnancy in the first trimester is extremely rare, and only a few cases have been reported in the literature. We recently reported on a patient with risk factors for placenta percreta that presented as first trimester fetal demise, unresponsive to medical management with prostaglandin. The patient required an emergency hysterectomy to control the bleeding after uterine curettage, and was complicated by severe consumption coagulopathy. This rare entity can lead to significant mortality and morbidity, particularly in the background of increased prevalence of the disease and its associated risk factors, and the large number of spontaneous and induced abortions performed worldwide. Therefore, we also reviewed all reported cases of first-trimester placenta percreta in the literature to increase the awareness of physicians and to highlight the clinical features and essentials of the management.

Key words: Placenta accreta; Percreta; First trimester; Early pregnancy.

Introduction

Although maternal mortality associated with placenta accreta has been greatly reduced with modern obstetric practice, obstetric haemorrhage still accounts for a significant proportion of maternal deaths [1]. It is therefore very important that regular reviews of the rarer causes of obstetric haemorrhage appear in the literature to emphasise their clinical features and aspects of management.

Placenta accreta is defined as abnormal adherence of the placenta to the myometrium, first characterised in modern times by Irving and Hertig in 1937 [2]. In general, placenta accreta is an abnormally firm attachment of placental villi to the uterine wall in the partial or complete absence of the normal intervening decidua basalis and fibrinoid layer of Nitabuch. Three variants of this complication can be histologically distinguished, according to the degree of invasion. In the most common form, placenta accreta, the placenta is attached directly to the underlying myometrium. Less commonly, chorionic villi may extend into the myometrium (placenta increta) or through the entire myometrial thickness to the serosa (placenta percreta). In placenta percreta, rupture into the peritoneal cavity and infiltration into the bladder and neighboring organs may occur.

The incidence has variously been reported between 1/540 to 1/93,000 pregnancies, with an average incidence of about 1:7,000. The highest incidence is reported from Thailand, which may reflect the increased prevalence of

trophoblastic disease in the Far East. It is estimated that approximately 15% of these cases are increta and 5-7% are percreta [1, 3, 4].

In a normal pregnancy, the placenta is formed at the implantation site by a combination of the chorion frondosum and the decidua basalis. When the decidua is partially or completely absent, abnormal placentation may occur, and an absent or poorly developed decidua is the constant pathologic feature in all reported cases of placenta accreta. The Nitabuch fibrinoid layer, on the other hand, may or may not be present [3]. Therefore, Fox hypothesized that any condition that adversely affects the endometrium and the decidua basalis may predispose to placenta accreta, resulting in an invasive placenta upon implantation at that site [4]. Predisposing risk factors include a uterine scar usually from a caesarean section or myomectomy, uterine curettage, history of manual removal of the placenta, endometritis, Asherman's syndrome, submucous fibroids, and adenomyosis, and all have been associated with endometrial injury [1, 4-7]. This theory can be further supported by another report from Bevan *et al.*, where dilatation and curettage in the first trimester failed to terminate a pregnancy that was later complicated by placenta percreta [8].

The development of placenta accreta is also strongly associated with advanced maternal age and high parity [1, 7, 9]. Increasing age alone may lead to progressive insufficiency of the decidua, accounting for an increased risk among these patients. Importantly, Miller *et al.* demonstrated that 89% of women with placenta accreta had coexisting placenta previa [7]. The risk for any type of placental disorder among women with placenta previa further increases linearly with the number of previous

Table 1. — Reported cases of confirmed placenta percreta/increta in the first trimester.

Author, year	Maternal age	Gravidity	Parity	Gestational age (weeks)	Placental abnormality	Clinical presentation	Risk factors	Management
Veridiano <i>et al.</i> , 1986	23	4	1	14	Percreta	Missed miscarriage, D&C followed by uterine perforation and vaginal haemorrhage	1 caesarean section	Hysterectomy
Woolcott <i>et al.</i> , 1987	34	3	2	10	Percreta	Incomplete miscarriage, D&C followed by vaginal haemorrhage	2 caesarean sections, second followed by PPH and postpartum curettage	Hysterectomy
Harden <i>et al.</i> , 1990	34	4	3	12	Increta	Incomplete miscarriage, D&C followed by vaginal haemorrhage	3 caesarean sections	Hysterectomy
Haider, 1990	35	6	5	12	Percreta	Missed miscarriage, D&C followed by vaginal haemorrhage	1 caesarean section	Hysterectomy
Ecker <i>et al.</i> , 1992	32	6	2	9	Increta	Missed miscarriage, D&C followed by vaginal haemorrhage	3 first trimester induced miscarriages, 1 vaginal delivery followed by PPH and postpartum curettage	Hysterectomy
Gist <i>et al.</i> , 1996	19	2	1	8	Increta	Blighted ovum, D&C followed by vaginal haemorrhage	1 caesarean section	Hysterectomy
Gherman <i>et al.</i> , 1999	27	4	2	5	Increta	Missed miscarriage, D&C followed by vaginal haemorrhage	1 caesarean section, 1 first trimester spontaneous miscarriage completed by D&C	Hysterectomy
Walter <i>et al.</i> , 1999	30	2	1	11	Increta	Delayed hemorrhage, occurring 17 weeks after uncomplicated D&C for an 11-week missed miscarriage	1 caesarean section	Hysterectomy (angiographic embolization was also offered)
Chanrachakul <i>et al.</i> , 2001	38	2	1	9	Increta	Missed miscarriage, D&C followed by vaginal haemorrhage	1 caesarean section	Hysterectomy
Carlton <i>et al.</i> , 2001	32	2	1	11	Percreta	Missed miscarriage, D&C followed by uterine perforation and vaginal and intraperitoneal haemorrhage	1 caesarean section	Hysterectomy
Hópker <i>et al.</i> , 2002		4	3	10	Percreta	Missed miscarriage, D&C followed by vaginal haemorrhage	1 caesarean section, 1 diagnostic D&C	Hysterectomy
Liu <i>et al.</i> , 2003	40	6	1	9	Increta	Induced surgical miscarriage, followed by vaginal haemorrhage	1 caesarean section	Bilateral uterine artery embolization
Esmans <i>et al.</i> , 2004	40	2	1	14	Percreta	Uterine perforation presenting as intraperitoneal haemorrhage	1 vaginal delivery, complicated by manual removal of the placenta and uterine curettage due to a placenta accreta	Hysterectomy
Balkanli-Kaplan <i>et al.</i> , 2006	33	2	1	7	Percreta	Delayed haemorrhage, occurring 8 months after uncomplicated D&C for a 7-week termination of pregnancy	1 caesarean section	Localised resection, Hysterectomy

caesarean sections, from 15-24% in woman with one previous caesarean section, to 48% with two previous sections, and to 67% with four or more previous sections [10]. The further increase in the incidence of placenta accreta, among women with placenta previa and a previous caesarean section, when the placenta was implanted over the scar, supports the theory that trophoblast adherence is enhanced when the scant decidualisation of the lower uterine segment is further impaired by previous myometrial disruption [7]. However, Fox reported that 7% of the patients with placenta accreta had no contributing factors identified [4].

Most cases of placenta accreta present during the delivery of a term or near-term fetus, when the placenta fails to separate spontaneously, and upon attempts of manual removal no plane of cleavage is recognised. Postpartum haemorrhage can be severe, and hysterectomy is usually necessary. Uncommonly, occasional cases have been reported, presenting in the second or third trimester as antepartum haemorrhage and/or uterine perforation or rupture leading to intraperitoneal or intravesical haemorrhage [11-14]. Many second-trimester cases occurred in the setting of severe postabortal haemorrhage [13, 14].

Materials and Methods

Reports of placenta accreta presenting in the first trimester are exceedingly rare. Using the key words “placenta accreta”, “placenta percreta”, “early gestation”, and “pregnancy” a, what appeared to be exhaustive, MEDLINE search from 1966 to 2007, revealed a total of only 14, histologically proven, first-trimester cases of placenta increta and percreta (Table 1) [15–28]. Placenta percreta was identified in seven cases, including our recent case. The most common clinical manifestation has been severe haemorrhage, precipitated by curettage for spontaneous or induced miscarriage. Two cases presented as delayed post abortion haemorrhage, 17 weeks and eight months following D&C [22, 28]. In three cases, spontaneous or iatrogenic uterine perforation occurred [15, 24, 27], complicated by intraperitoneal haemorrhage in two of them [24, 27]. In all cases, the definite management was total abdominal hysterectomy, except one that was managed with bilateral uterine artery embolisation [26]. Three additional cases of first-trimester placenta accreta have been reported in the first trimester in association with a cervical pregnancy [29–31]. Finally, Thorp *et al.* diagnosed one case of placenta percreta in the first trimester, which was confirmed histologically at 32 weeks of gestation [32].

Our case presented as a missed miscarriage, as most of the reported cases, and it can be postulated that retention of products of conception may be caused or enhanced by placenta percreta. Additionally, the patient failed to respond to prostaglandin treatment, which is an effective method of management of missed miscarriage. Olsen and Gonzalez-Ruiz reported a case of failed prostaglandin abortion in a second-trimester termination of pregnancy associated with placenta accreta, and they postulated that placenta accreta may have played a role in the failure of prostaglandin to induce abortion [33].

While most cases of placenta percreta are diagnosed at or near term, our case along with this review, highlight the fact that placenta percreta does not develop in later months as a result of the secondary disappearance or absorption of the decidua, but rather early during the process of implantation, enabling it to cause problems any time thereafter. It is important to recognise that placenta percreta can cause severe uterine bleeding at any gestational age, particularly when considering the large amount of dilatation and curettage performed for induced or spontaneous miscarriages. It can be assumed that there may be numerous undiagnosed cases of partial placenta accreta in patients with early incomplete miscarriages that do not become clinically apparent and can not be diagnosed histologically. Similarly, it is probable that a proportion of so-called difficult removal of placenta at term could have a component of partial placenta accreta.

The incidence of placenta accreta should increase steadily over the next decades, as the number of caesarean sections and maternal age at delivery increase. There is a need for reliable antenatal diagnosis, since placenta accreta encountered unexpectedly can lead to massive blood loss following its detachment, multiple complications and death. It has been suggested that the single most important factor affecting the outcome of placenta percreta, which still carries a maternal mortality rate from 2 to 7%, is the antepartum identification of abnormal placentation [34]. If these pregnancies can be identified, the blood loss can be minimised by the accurate planning of labour, the availability of blood products and earlier resort to hysterectomy [1]. Additionally, the patient and her family should be informed of her increased risk of placenta percreta and the resulting severe haemorrhage, for which hysterectomy might be required.

Anticipating this rare but potentially catastrophic complica-

tion of pregnancy at any gestational age is of primary importance. The first and most significant factor is the role of the obstetrician in identifying the patient at risk of abnormal placentation, and clinical history combined with a detailed imaging evaluation is often, though not always, useful in diagnosis. However, it should be kept in mind that placenta percreta can also develop in an unscarred uterus [12, 35].

Several diagnostic modalities have been used to detect placental abnormalities upon clinical suspicion, with varied success. The role of ultrasound (US) examination in the antenatal diagnosis of placenta accreta is unresolved. In one study by Gielchinsky *et al.* [36], US succeeded in diagnosing placenta percreta in only 45% of cases, in contrast to other studies by Levine *et al.*, and Finberg and Williams, where a sensitivity of 86–100% and a specificity of 92% were demonstrated [37, 38]. Sonographic findings include the absence or thinning of the usually dark line seen between the myometrium and the placenta that represents the decidua basalis, the presence of lacunar vascular spaces within the placental parenchyma (“swiss cheese” appearance), and thinning, irregularity, or focal disruption of the normally smooth hyperechoic interface between the bladder and myometrium [38, 39]. At present, color flow Doppler sonography has not been shown to have superior sensitivity over B-mode. However, Levine *et al.* found that power Doppler can increase the level of confidence in identifying the myometrial zone [37]. When prominent placental vessels can be identified extending from the placenta into the myometrium, then the diagnosis of placenta percreta should be suspected [39]. Finally, magnetic resonance imaging (MRI) can be useful as a complementary technique, particularly in assessing bladder involvement and in cases with a posteriorly implanted placenta [32, 37].

During the first trimester, US does not well define the decidual space in the lower uterine segment, and its value in early pregnancy is debatable. However, by nine to ten weeks the diffuse granular echotexture of the placenta is clearly apparent with US. Comstock *et al.* showed that in a patient with a previous caesarean delivery, a sac lying in the lower uterine segment on a scan at ten weeks or earlier suggests the possibility of placenta accreta [40]. Chen *et al.* diagnosed a case of placenta accreta at nine weeks’ gestation based on the absence of a retroplacental clear space, in association with hypervascularity of the lacunar spaces between the placenta and myometrium [41]. Our patient’s US revealed no placental abnormalities. As already mentioned, Thorp *et al.* managed to diagnose a case of placenta previa percreta with bladder involvement with the use of MRI at 9 weeks’ gestation [32].

An elevated maternal serum creatine kinase was reported to be a biochemical marker of placenta percreta in two cases [42]. Zelop *et al.* and Kupfermanc *et al.* found a significant association between an otherwise unexplained elevation of maternal serum alpha-fetoprotein and placenta percreta [43, 44]. If macroscopic haematuria is present or there is a sonographic suspicion, a preoperative cystoscopy could aid in making the diagnosis of bladder involvement and help the surgical team to prepare for a more extensive operation [39]. However, biopsy should be avoided because it may cause severe haemorrhage.

The treatment of choice is hysterectomy at all stages of gestation [1, 4]. This is based on the belief that conservative management gives a much higher mortality rate. This is supported by Fox in 1972, when he concluded that the conservatively treated patients had a four times higher mortality rate than those treated with immediate hysterectomy. In cases of suspected abnormal placentation, catheterisation and occlusion of both anterior divisions of the internal iliac arteries with balloon

catheters prior to planned surgery, can significantly decrease the uterine blood flow to reduce intraoperative blood loss and control postpartum haemorrhage. It also allows for eventual embolisation of the hypogastric arteries during surgery using absorbable gelatin particles [45, 46]. Conservative management of placenta percreta is also possible, and various methods have been employed with varying degrees of success [1, 5, 34, 47]. Conservative management is beneficial in preserving future fertility, and may reduce the need for transfusion [34]. It can be further categorised into conservative abdominal surgery and non-surgical conservative management. The former includes: bleeding control by bilateral uterine or internal iliac artery ligation, localised excision and uterine repair, and oversewing of the placental bed. Non-surgical measures include: systemic and intracervical injections of oxytocin, ergometrin, and prostaglandins, uterine curettage with vaginal or uterine packing, use of an intrauterine inflated Foley catheter, angiographic uterine artery embolisation, and leaving the placenta in situ with adjuvant chemotherapy. The choice between hysterectomy and conservative therapy depends on the severity of the placental percreta, the desire to preserve fertility, and the degree of haemorrhage or additional complications.

Experience in the management of first-trimester placenta percreta is limited because of its rare presentation in early gestation, and the difficulty in making such an early diagnosis. In 13 out of the 14 reported cases, as well as in our case, the definite treatment consisted of a hysterectomy, despite an initial effort to control the bleeding with local measures. In only one case [26] was placenta increta successfully managed by bilateral uterine artery embolisation (UAE). The authors also reported successful treatment in three additional cases of suspected placenta accreta with UAE, although they were not histologically confirmed. Therefore, they recommend UAE as conservative management in the first trimester when future fertility is desired, as soon as local measures fail to control the bleeding, or if the patient shows shock symptoms. On the contrary, other studies with longer gestation times showed that the success rate of UAE for postpartum bleeding is significantly lower in cases of abnormal placentation, due to a significant venous component of the bleeding, and suggest an alternative conservative treatment [48, 49].

Methotrexate has also been used in the management of invasive placenta, and in some cases it has been possible to avoid hysterectomy, providing that the patient is haemodynamically stable [47]. The earliest pregnancy described concerned a 15-week gestation, in which methotrexate treatment was unsuccessful [50].

No matter which initial management is used, if it is unsuccessful in controlling the bleeding rapidly, there should be early resort to hysterectomy. In our case, the diagnosis of placenta percreta was not considered in such an early gestation despite the presence of multiple risk factors. The delay in resorting to laparotomy led to the development of severe consumption coagulopathy, which was fortunately managed successfully with vigorous resuscitation.

Conclusion

Although rare, patients who have had previous uterine manipulation, including caesarean section, uterine curettage, manual removal of the placenta, uterine infection, and other pregnancy-associated complications are at risk for placentation abnormalities, as early as in the first trimester. Because of the difficulty in accurately diagnosing

these conditions preoperatively, particularly in early gestation, it is of paramount importance that the obstetrician is aware of the possibility of placental abnormalities, the possibility of severe haemorrhage, and the need for hysterectomy. This is imperative for proper preoperative and intraoperative planning, regarding especially the availability of blood products and the early resort to hysterectomy, as well as for the proper counseling of the patients. A high index of suspicion is still required for these patients, until hopefully in the future, improvements in imaging techniques enable a more accurate preoperative diagnosis.

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