

## Placenta Accreta Spectrum: A 2-year Retrospective Observational Study

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### Abstract

#### **Aims**

To assess the management and outcomes of Placenta Accreta Spectrum disorders and highlight the important management recommendations from international guidelines.

#### **Methods**

A retrospective audit of women diagnosed with Placenta Accreta Spectrum disorder from January 2018 to December 2019.

#### **Results**

Nine cases (0.16%) of placenta accreta from 5695 births were identified. All women received caesarean section under general anaesthesia. Caesarean hysterectomy occurred in seven cases (78%). Mean ( $\pm$ SD) age of women was ( $34.4 \pm 3.9$  years) and mean parity score was ( $3.2 \pm 1.2$ ). Mean gestational age at birth was  $35.1 \pm 0.8$  weeks. Bilateral iliac artery balloon occlusion occurred in eight (89%) cases. Median estimated blood loss [range] was 1700 mL [1000-7000] with only 11% of patients (1/9) experiencing more than 3L of blood loss. Intraoperative red blood cell transfusion occurred in six cases (67%). Median number of units of red cell transfusion [range] was four units [0-10]. Mean hospital length of stay was ( $6.7 \pm 1.1$  days) and there were no maternal deaths. Multidisciplinary team involvement of senior anaesthetists and obstetricians was noted in all cases.

#### **Discussion**

Placenta accreta spectrum is increasing in incidence in obstetric practice and is associated with significant maternal morbidity and mortality. Implementing national guidelines can improve patient outcomes.

## **Introduction**

Placenta Accreta was first defined in 1937 as “abnormal adherence of the afterbirth in whole or in parts to the underlying uterine wall in the partial or complete absence of decidua”<sup>1</sup> Placenta accreta spectrum describes a range of abnormal pathologic adherence of the placenta into the uterus including placenta accreta, increta and percreta.

The prevalence of PAS is between 1 in 300 and 1 in 2,000 births<sup>2</sup>. The incidence of PAS has increased significantly over the past decades with one cohort study showing an increase in incidence from 0.12% to 0.31% of births over a 40-year period from 1970<sup>3</sup>. This is likely due to rising rates of caesarean section, use of assisted reproduction technology and increased maternal age, which are all known risk factors<sup>2,3</sup>.

PAS can result in significant maternal and neonatal morbidity and mortality with life-threatening complications such as significant obstetric haemorrhage, which, require massive blood; transfusion, sepsis, and surgical complications<sup>1</sup>.

A standardised multidisciplinary approach in the management of PAS has been shown to result in less blood transfusion and intensive care unit admission compared with standard obstetric care without a specific protocol<sup>4</sup>.

This retrospective study assessed the management and outcome of PAS at University Hospital Galway (UHG) from 2018-2019 and highlights the important management recommendations from international guidelines.

## **Methods**

A two-year retrospective observational study was carried out on women identified as having placenta accreta spectrum (PAS) at Galway University Hospital from January 2018 to December 2019. Cases were identified by chart reviews of all caesarean sections, cross-referencing the data against all diagnoses of placenta accreta documented on medical records.

Anaesthetic, intraoperative and nursing notes were reviewed, and in the cases where critical care admission was required, the critical care electronic record system (Metavision) was accessed, and the relevant information retrieved.

## **Results**

Nine cases of placenta accreta spectrum from 5695 births (0.16% of all births) were identified. 7 out of 9 (77%) women received an antenatal diagnosis of PAS. For two patients (22%), there was a suspicion of diagnosis antenatally which was confirmed at caesarean section. All women received antenatal ultrasound scans. Seven out of nine (Seventy seven percent) of women had their antenatal diagnosis supported with MRI. Two patients had a strongly convincing diagnosis by ultrasound and as such did not require additional imaging.

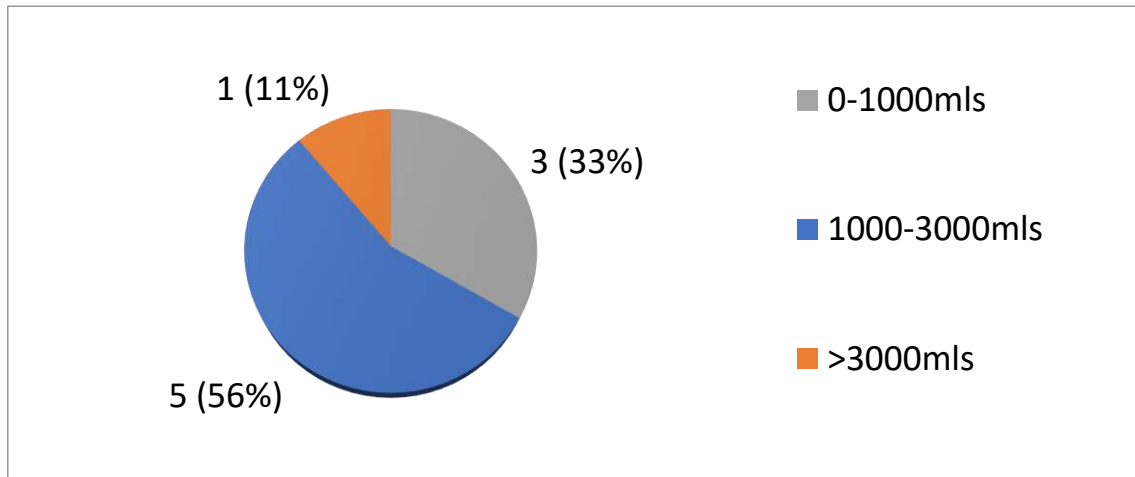
MDT discussion regarding optimal delivery time, interventional radiology involvement, and pre-operative planning were made in all 9 cases. All women received caesarean section under general anaesthesia. In nine cases (100%) the obstetric consultant was present and carried out the caesarean sections. In eight out of nine cases (88%) the anaesthetic consultant was also present. Caesarean hysterectomy occurred in seven cases (78%). Mean ( $\pm$ SD) age of women was ( $34.4 \pm 3.9$  years) and mean parity score was ( $3.2 \pm 1.2$ ). Mean ( $\pm$ SD) number of previous caesarean sections was ( $1.89 \pm 1.09$ ) (Table 1).

A planned caesarean section occurred in 78% of cases (7/9). Mean gestational age at birth was  $35.1 \pm 0.8$  weeks. Bilateral iliac artery balloon occlusion occurred in eight (89%) cases. Median estimated blood loss [range] was 1700 mL [1000-7000] with only 11% of patients (1/9) experiencing more than 3L of blood loss. (Figure 1). Intraoperative red blood cell transfusion occurred in six cases (67%). Mean number of units of red cell transfusion [range] was 3.1 units [0-10] (Figure 2). Mean ( $\pm$ SD) duration of surgery was 2.44 hours ( $\pm 0.49$ ).

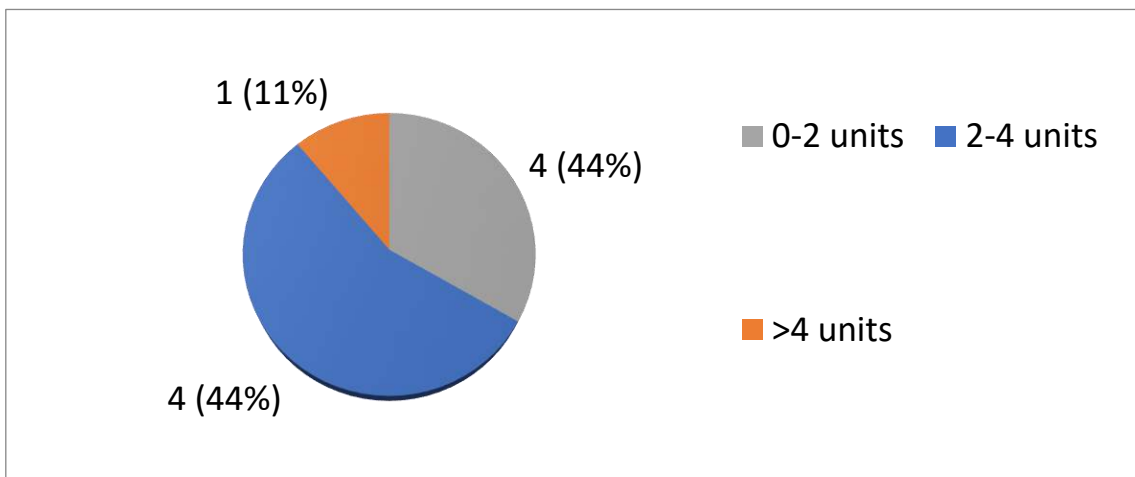
Six patients (67%) were transferred to the labour ward high dependency care room post-operatively and three patients (33%) required admission to critical care following surgery. Reasons for critical care admission were as follows: major blood loss with transfusion requirement, emergency caesarean section and consultant request. Mean hospital length of stay was 6.7 days ( $\pm 1.1$  days). There was no maternal or neonatal deaths perioperatively.

<b>Risk Factors</b>	<b>Number of women (%)</b>
Age (years)	
18-25	0 (0%)
26-30	1 (11%)
31-35	3 (33%)
36-40	5 (56%)
Parity	
P 0-1	1 (11%)
P 2-3	4 (44%)
P 4-5	4 (44%)
Number of previous caesarean sections	
0	1 (11%)
1-2	6 (67%)
3-4	2 (22%)

**Table 1: Risk factors for Placenta Accreta Spectrum (PAS)**



**Figure 1:** Overall summary of the perioperative estimated blood loss in patients with PAS. Data label format is [number (percentage)].



**Figure 2:** Overall summary of the number of units of red blood cells transfused perioperatively in patients with PAS. Data label format is [number (percentage)].

## Discussion

Placenta accreta spectrum is becoming increasingly more common in obstetric practice and is associated with significant maternal morbidity and mortality. Major blood loss is the most frequent complication which can lead to significant morbidity resulting in mechanical ventilation, infection, and prolonged hospital admission <sup>5</sup>. The International Federation of Gynaecology and Obstetrics (FIGO) state that maternal mortality ranges from 1-7% from placenta accreta spectrum disorders <sup>6</sup>.

PAS is a serious pregnancy complication that results in likely caesarean hysterectomy <sup>7</sup> and delivery should take place in a specialist centre with immediate access to blood products, maternal and neonatal intensive care by a multidisciplinary team with expertise in pelvic surgery <sup>8</sup>.

In 2018 the UK Royal College of Obstetricians and Gynaecologists (RCOG) produced guidelines<sup>2</sup> for the management of placenta accreta spectrum to help instruct the appropriate healthcare workers on the management of this complex obstetric complication that is increasing in incidence across the globe.

The placenta accreta spectrum disorder rate at our institute was 0.16% (1 in every 632 births) and was similar compared to internationally published rates<sup>2</sup>. Known risk factors for PAS such as age, parity and previous caesarean section were shown in our study to be associated with the disorder. Over half the patients (56%) were over 36 years of age, 89% (8/9) had previous caesarean section and a parity score greater than two. The increased rate of PAS following previous caesarean section has been well described in the literature. A large study<sup>9</sup> of over a twenty-year period of over 64,000 births demonstrated that patients who had undergone two or more previous caesarean sections were at a statistically significant increased risk of developing placenta accreta spectrum with an odds ratio [OR] of 8.6, (95% CI 3.536-21.078,  $P < .0001$ ). Another retrospective study<sup>10</sup> showed that patients with three or more previous caesarean sections were associated with a 56-fold increased risk of developing placenta accreta spectrum [OR 55.9] (95% CI 25.0–110.3). It has been recommended that women should be informed of the increased risk of PAS when undergoing elective caesarean sections for non-medical indications<sup>2</sup>.

Previous placenta praevia is another important risk factor for developing placenta accreta spectrum. A UK obstetric surveillance study showed that discovered that the incidence of placenta accreta spectrum increases from 1.7 per 10 000 women overall to 577 per 10 000 in women with both a previous caesarean section and placenta praevia<sup>11</sup>

Developing placenta accreta spectrum is not solely the potential consequence of previous caesarean section surgery. Previous surgical trauma to the uterine endometrium or superficial myometrium such as uterine curettage, manual removal of the placenta, postpartum endometritis or myomectomy are also associated with increased risk of developing placenta accreta spectrum in future pregnancies<sup>2</sup>. The overall risk of developing placenta accreta spectrum following previous uterine surgery is thought to be [OR]3.40 (95% CI 1.30–8.91)<sup>11</sup>.

The diagnosis of placenta accreta spectrum can be made by ultrasound imaging. A systematic review<sup>12</sup> of ultrasound studies including 3707 pregnancies found that the overall performance of ultrasound when performed by skilled operators was very good with a sensitivity of 90.72% and specificity of 96.94%. Women that are high risk of developing placenta accreta spectrum such as women with placenta praevia and previous caesarean sections should be specifically screened for placenta accreta spectrum during the routine foetal anomaly scan<sup>2</sup>. A systematic review and meta-analysis<sup>13</sup> have shown that in women presenting with placenta praevia and history of prior caesarean section, the use ultrasound for the antenatal detection of placenta accreta spectrum is even higher with a sensitivity of 97.0%. MRI can also be used to complement ultrasound imaging for the diagnosis of placenta accreta spectrum<sup>2</sup>. MRI has been found to have high predictive accuracy in assessing the depth and topography of placental invasion<sup>2,14</sup>.

When planning the birth of known or suspected PAS, a careful balance between foetal maturity and the risk of unscheduled birth must be met. The RCOG guidelines <sup>2</sup> recommends the planned birth would occur between 35+0 and 36+6 week of gestation, although there is no strong evidence to help guide timing of birth. Careful planning and management are required, and blood loss has been shown to be greater in emergent births <sup>15</sup>. In our study, one case of unplanned category one emergency caesarean section occurred at 35+5 weeks. This preceded the scheduled date of elective caesarean section of 36+4 weeks. As there was no time for iliac artery balloon insertion, there was a noted high volume of blood loss, and the patient went to a critical care bed post-operatively for monitoring.

The main risk involved in cases of PAS is massive obstetric haemorrhage which can lead to secondary complications of coagulopathy, multisystem organ failure and death <sup>6</sup>. The median estimated blood loss of 1.7L compares very favourably to cohort studies which showed median blood loss of greater than 3L <sup>16,17</sup>. Many women with PAS require massive blood transfusion with eight units or more <sup>2</sup> and our results that showed the median number of blood cells required for transfusion of four units indicates a positive outcome. In our practice the epidural catheter was placed prior to transfer to interventional radiology for insertion of internal iliac balloon catheters, in case of the need for emergency caesarean section following the radiological intervention. The patient was subsequently transferred to theatre for insertion of an arterial line for invasive blood pressure monitoring and large bore intravenous access pre-operatively in anticipation of major intraoperative blood loss.

The use of internal iliac prophylactic balloon catheters is controversial due to the reported risks associated including arterial rupture and thrombosis <sup>18</sup>, while some studies have reported reduced blood loss and transfusion requirements <sup>19</sup>. The main aim of this procedure is to reduce intraoperative blood loss during caesarean section, in patients with an antenatal diagnosis of placenta accreta <sup>2</sup>. There were no reported complications from the use of internal iliac artery balloon catheterization in our study. Other interventional radiological procedures have been described in the management of placenta accreta spectrum such as intraoperative internal iliac artery, postoperative uterine artery embolization, and aortic artery balloon occlusion <sup>2</sup>. However, strong evidence on their use is lacking and larger studies are required to assess the safety and efficacy in their use.

The care of PAS disorders is highly challenging and requires a multidisciplinary integrated approach to planning and management. This would entail universal access to a multidisciplinary team, radiologic expertise for diagnosis and intervention, neonatal and adult intensive care units, and massive transfusion capacity. Caesarean section surgical expertise in complex pelvic surgery is highly recommended in the management of PAS disorders <sup>2,6</sup>. Surgical complications such as injury to bladder, ureters and bowel can occur, however studies have shown outcomes can improve in the presence of a surgical team experienced in complex pelvic surgeries <sup>20,21</sup>.

A standard consistent care plan should be established in institutions that may provide care for PAS disorders<sup>2,6</sup>. Women with PAS disorders cared for by a multidisciplinary team with a standardised care plan are less likely to require large blood transfusion and bleeding complications compared to women cared for by a non-multidisciplinary obstetric care without a specific protocol<sup>2,8</sup>. A multicentre retrospective cohort study<sup>4</sup> showed that patients with placenta accreta spectrum disorder that were cared for using a standardised approach by a specific multidisciplinary team experienced less estimated blood loss ( $P = .025$ ) and trend towards less blood transfusion ( $P=0.06$ ), this was despite the patients in the MDT group having a more cases of placenta percreta which is the most invasive form in the placenta accreta spectrum and is associated with increased risk of blood transfusion, urological injury and intensive care admission<sup>22</sup>. A 14-year study in Ireland showed the introduction of a multi-disciplinary care service was associated with an increase in antenatal diagnosis from 56.3 to 92.9% ( $P < 0.0001$ ), a significant reduction in estimated blood loss and blood transfusion ( $P < 0.0001$ )<sup>23</sup>.

There is currently no national guidelines or database on the incidence and management of PAS disorders that is rising in incidence globally. Currently the avenue to report all cases of PAS is via the Confidential Audit of Severe Maternal Morbidity, which is under the direction of the National Perinatal Epidemiology Centre. The latest annual report identified an increased rate of peripartum hysterectomies from 2011 to 2020. This found the leading cause to be PAS<sup>24</sup>. Raising awareness on the clinical risk factors of PAS disorders and key management principles including the existence of international guidelines<sup>2,6</sup> can enhance training for staff and result in the implementation of local policies, care bundles and guidelines that have been shown to improve patient care.

#### **Declaration of Conflicts of Interest:**

The authors confirm no conflicts of interest.

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