Urological Involvement in the Multidisciplinary Management of Placenta Accreta Spectrum in a Centralised, High-Volume Centre: A Retrospective Analysis

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Abstract

Objectives Placenta accreta spectrum (PAS) significantly increases the complexity of childbirth and frequently involves urologic organs. Multidisciplinary team (MDT) care is paramount to ensure optimal outcomes. We aimed to evaluate urologic interventions in patients with PAS at a centralised, tertiary referral centre.

Methods An analysis of a prospectively collected data set, consisting of all women presenting with PAS at our institution between November 2013 and June 2019. Patients who required urological intervention were identified, and perioperative details were retrieved.

Results Forty-two cases of PAS were identified. The mean maternal age was 35 years, and mean gestational age at delivery was 34 weeks. Thirty-seven cases were managed electively, with 5 cases managed conservatively (no hysterectomy) and 5 requiring emergency management. Fifteen patients (36%) had suspected bladder invasion on MRI. A total of 36 patients (86%) had ureteric catheters inserted, 14 (33%) required bladder repair, and 2 had ureteric injuries (5%).

Conclusions PAS frequently requires urological intervention to prevent and repair injury to the urinary bladder and ureter. PAS is a rare condition that is best managed in an MDT setting in a centralised, tertiary, high-volume centre with access to a variety of medical and surgical sub-specialities.

Introduction

Placenta accreta spectrum (PAS) describes the range of pathologic adherence of the placenta: accreta, in which placental villi encroach on the decidual layer; increta, in which the myometrium is invaded; and percreta, in which the myometrium is fully penetrated by placental villi, breaching the serosa and invading adjacent organs including the bladder (most common), broad ligament, or sigmoid colon[1,2]. These disorders confer substantial risk for foetal and maternal death, with maternal mortality rates of up to 7%[3]. The overall incidence ranges from 1 in 435 to 1 in 5882 deliveries[4]. Placenta previa and increasing number of prior Caesarean section deliveries are independent risk factors for abnormally adherent placenta[5]. Other risk factors include advancing maternal age, in vitro fertilisation and other assisted reproductive technologies, previous operative uterine procedures, and previous PAS[4].

Key Words

Placenta accreta spectrum, placenta percreta, placenta accreta, placenta increta, multidisciplinary management

Competing Interests

None declared.

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Major maternal morbidity is due to the risk of massive maternal haemorrhage, subsequent major transfusions, and associated sequelae such as peripartum hysterectomy, ICU admission, cystotomy, infections, multi-organ failure, and even death[6,7]. Three main approaches to delivery have been described in women with PAS, all involving Caesarean section. These include Caesarean hysterectomy, the extirpative approach (in which the adherent placenta is removed post-delivery), and conservative management. Conservative management (when preservation of fertility is desired) involves delivery by Caesarean section without hysterectomy, with the placenta or part of it left in situ. Specific concerns with this approach include massive secondary postpartum haemorrhage and sepsis. The extirpative approach is widely criticised because of the significant rate of increased maternal morbidity and massive postpartum haemorrhage[6,8]. Scheduled Caesarean hysterectomy and avoidance of placental removal is associated with reduced maternal morbidity and is the preferred management[6]. Placenta percreta is the leading cause of peripartum hysterectomy in Western countries[2].

Urologist intervention is not uncommon in the management of PAS[9,10]. The rate of urinary tract injury during Caesarean hysterectomy for PAS is 29% compared with 4.8% in standard hysterectomy[11]. This risk plus the potential of bladder invasion requires antenatal diagnosis for prevention of injury (via ultrasound, magnetic resonance imaging and/or cystoscopy) and cohesive multidisciplinary team (MDT) involvement throughout the entire pregnancy[12,13]. In 2016, we published a retrospective analysis of women presenting with PAS to a major tertiary centre, showing the need for urological intervention in these patients[9]. We have prospectively maintained a database of cases to strengthen the case for multidisciplinary involvement. We aimed to evaluate urological interventions in patients with placenta accreta spectrum at a centralised, tertiary referral centre.

Materials and Methods

Forty-two women who presented to The Royal Women's Hospital (RWH) with PAS between November 2013 and June 2019 were identified. A retrospective analysis of the prospectively collected data was undertaken using perioperative details. Further data pertaining to imaging and pathology results were retrieved retrospectively from the medical records of patients. All data were collected with permission granted by The Human Research and Ethics Committees at The Royal Women's Hospital (Project AQA 20/18).

The management of PAS is centralised to The RWH in Melbourne, with smaller peripheral hospitals in the City of Melbourne and surrounding areas in the State of Victoria referring patients to this service. The MDT consists of obstetricians, specialised nursing staff, gynaecological surgical oncologists, urologists, general surgeons, paediatricians, diagnostic radiologists, and interventional radiologists. When a patient with suspected PAS is referred, Doppler-enhanced ultrasound is repeated in the RWH radiology department and, if necessary, an MRI of the pelvis is performed to further characterise the PAS. The case is then discussed at a PAS MDT and a date decided to perform surgery and a determination made whether hysterectomy or conservative management (no hysterectomy) will be attempted. All team members are also aware of the case in the event of emergency admission and subsequent emergency surgery.

Urological involvement primarily consisted of rigid cystoscopy for assessment of bladder involvement of the placenta and placement of ureteric catheters before Caesarean section. Experienced urologists scrubbed in with the gynaecologist during hysterectomy and performed cystotomy and repair when necessary. For more advanced cases, interventional radiologists inserted internal iliac artery occlusion balloons, and an intraoperative cell salvage machine was available in the event of catastrophic haemorrhage. All patients were managed in intensive care postoperatively.

Results

Between November 2013 and June 2019, a total of 42 patients presented with an antenatally suspected PAS. Patient characteristics are shown in **Table 1**. The mean maternal age was 35 (SD 4.9). Within this cohort, the mean number of prior Caesarean section deliveries was 2, and mean gestational age at delivery 34 weeks. For 39 patients, intended treatment was primarily planned admission for elective Caesarean hysterectomy; for 3 patients, it was planned conservative management (no hysterectomy). Elective operations eventuated in 37 patients, with 5 requiring emergency management.

Urologists performed cystoscopy and placement of bilateral ureteric catheters in 36 patients (86%); fluoroscopy was not used. Bladder wall involvement was suspected on preoperative imaging (placental MRI) in 15 cases (35%). However, only 7 patients were found to have bladder invasion intraoperatively. In another 7 cases, inadvertent iatrogenic cystotomies were performed with no imaging to suggest bladder involvement. Placental invasion of the bladder requiring cystotomy and repair by the urology team intraoperatively was found at Caesarean hysterectomy in 14 cases (33%). There were 2 cases of ureteric injury. One case had ureteric catheters in situ and the other was an emergency case where ureteric catheters were not placed. Both ureteric injuries

TABLE 1.

Patient characteristics and perioperative data

	Number of patients N = 42
Preoperative Characteristics	
Mean (SD) age, years	35 (4.9)
Mean (SD) previous Caesarean sections	2 (1.1)
Preoperative bladder involvement on imaging	15 (35%)
Mean gestational age (SD) at delivery, weeks	34 (3.4)
Planned Caesarean hysterectomy	39 (93%)
Planned conservative	3 (7%)
Perioperative Data	
Mean (SD) blood loss, mL	3025 (3147)
Ureteric catheter/stent placement	36 (86%)
Elective surgery	37 (88%)
Emergency surgery	5 (12%)
Bladder invasions with repair	14 (33%)
Ureteric injury with ureteric reimplantation	2 (5%)
Postoperative Diagnosis	
Percreta	29 (70%)
Increta	8 (19%)
Accreta	4 (9%)
Non-PAS	1* (2%)

** Antenatal suspected mild accreta on imaging, no evidence found intra operatively or on formal histology*

were recognised intraoperatively, and the ureters were re-implanted. Five emergency cases did not have ureteric catheters inserted in the interests of time and patient safety. There was 1 case of a small suspected placenta accreta in which ureteric catheters were not inserted as advised by the MDT.

Average blood loss across all cases was 3025 mL, ranging from 700 mL to 17 litres. On further analysis, those who underwent elective procedure had an average loss of 2541 mL whereas those requiring emergency management had and mean loss of 6600 mL. There were 8 cases of placenta percreta in which balloon catheters were inserted into the internal iliac arteries. There was no maternal mortality. One case of foetal death in utero occurred when the mother suffered major blood loss per vaginam requiring Caesarean hysterectomy at 19 weeks' gestation.

Discussion

Patients within our own institution are identified and their cases brought forward for discussion at our PAS MDT. Other institutions within the City of Melbourne or the State of Victoria also refer patients to our MDT for further management. The MDT meetings are arranged with an obstetrician, a radiologist, a urologist, and a gynaecologic surgical oncologist present. Other members of the extended MDT team include representatives from the haematology department to ensure plans are in place for catastrophic haemorrhage, as well as members of the general surgery, vascular surgery, and neonatology teams. An anaesthetic team with significant obstetric and complex surgical experience with massive haemorrhage is required. The appropriate surgical expertise is paramount for these complex cases[13].

Intraoperative cell salvage is not always required but is set up in the operating theatre for all cases. The first intraoperative role of the urology team is to assess the urothelium of the bladder and then the placement of ureteric catheters. The urology team will remain in theatre during the Caesarean section and hysterectomy to reduce the risk of bladder or ureteric injury and for reconstruction as required. The placement of ureteric catheters reduces the risk of ureteric injury but also allows for the earlier identification of injury[14,15]. Most patients in our series received preoperative ureteral catheterisation with resulting low risk of ureteric injury.

The accurate diagnosis of PAS is imperative for the management planning of these cases. All suspected cases in our institution have repeat imaging in our radiology department with Doppler-enhanced ultrasound and MRI. There is evidence to suggest that there is less severe haemorrhage when PAS is correctly identified antenatally rather than as an incidental finding at the time of elective or emergency delivery[6,16]. The reported sensitivity of MRI for the diagnosis of PAS is 80% to 85% and the specificity is 65% to 100%[17]. Interestingly, MRI does not necessarily improve upon the accuracy of ultrasound imaging[18]. In our series, the MRI had suggested 7 cases of bladder involvement but had not identified 7 others that were recognised intraoperatively. However, as these cases are managed in a high-volume unit, a urologist was present in the operating theatre for all cases, as per our MDT protocol.

One case in our series was identified as a placenta accreta on the basis of ultrasound imaging and MRI. At the time of surgery, it was found to not be a case of PAS, but this potential high-risk case was managed appropriately as per our MDT protocol.

We had 8 cases of placenta percreta in which interventional radiologists inserted balloon catheters into the internal iliac arteries. Upon delivery of the neonate, the balloons were inflated to reduce blood loss. Many high-volume centres also perform this procedure for selected placenta percreta cases, but it is not without risks. There is evidence that it can result in tissue infarction, infection, and elevated temperature postoperatively. A recent randomised controlled trial identified that balloon catheter occlusion of the internal iliac artery was not cost-effective, had significantly higher rates of postoperative fever, and made no significant difference in the rates of blood transfusion[19–21].

The neonatal paediatric team are also an integral part of the MDT. They are present in theatre at the time of delivery. Some series have advocated delivery at 34 to 35 weeks' gestation[12,22]. In our series the mean gestational age was 34 weeks. PAS may not have an adverse effect on neonatal outcomes, but given that the neonates are in general born pre-term, early involvement of the neonatal team will maintain high standards of care[23].

All patients in our series were admitted postoperatively to the ICU at The Royal Melbourne Hospital (RMH), an adjoining building. The RWH does not have an ICU, and the RMH has access to 24 hour on-call interventional radiology, general surgery, vascular surgery, and urology. If patients require embolization or a return to theatre, it is more practical for these patients to be managed at the RMH for the initial postoperative period. Liaising with the haematology department is also undertaken early; in our series, the mean blood loss was 3025 mL but the maximum blood loss recorded was 17 litres. The mean was higher for emergency cases at 6600 mL. Given the risk of having to instigate a massive transfusion protocol, it is imperative that the haematology department is fully aware in advance of the planned elective cases, and in the event of its proceeding as an emergency.

Other high-volume series have discussed the importance of multidisciplinary planning in all aspects of the journey from diagnosis of PAS, intraoperative management and postoperative care[12,13,24,25]. In our current series of 42 PAS cases there were 36 (86%) that required ureteric catheter insertion and 14 (33%) that required bladder repair, and there were 2 ureteric injuries (5%) managed with a tension-free refluxing ureteric reimplantation. The rate of bladder repair is similar to that in our series of 49 cases published in 2016, but there are fewer ureteric injuries in our current series.

Limitations of this work include the nature of a retrospective review of a prospectively maintained database. Despite this, meaningful conclusions may be drawn from the current data. While rare, PAS can have catastrophic outcomes for both the mother and the foetus. We highlight the acceptable outcomes of a centralised multidisciplinary service.

Conclusions

The evolution of the MDT management of these complex cases is paramount to maintain high standards and outcomes. These rare conditions are best managed in an MDT setting in a centralised, tertiary high-volume centre with access to a variety of medical subspecialities.

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