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Maternal outcomes after placenta previa and its spectrum at a single Saudi academic tertiary care center: 21-year experience

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ABSTRACT

Background: Placenta previa with and without accreta spectrum are among the most serious obstetric conditions that needs a multidisciplinary team-work to achieve best maternal outcome. We reviewed our experience over 21 years at an academic tertiary hospital before and after establishment of placenta previa team

Objective: To study the experience of a single academic center managing patients with placenta previa and placenta accreta spectrum over two decades.

Design: Retrospective chart review

Patients and Methods: This study included all cases with a confirmed diagnosis of placenta previa and/or placenta accreta spectrum that were managed at Jeddah after King abdulaziz university Hospital from 2001 to 2021. Paper and electronic chart reviews and a search of the birth registry book were performed for all cases.

Main Outcome Measures: Maternal morbidity and mortality due to abnormal placentation

Sample Size: 521 patients

Results: The establishment of a placenta previa team led to an increased prevalence of placenta previa, from 4 to 13.32 in 1000 deliveries, without increased maternal morbidity or mortality. Furthermore, it enhanced patient experience and resulted in satisfactory maternal outcomes.

Conclusion: Management of placenta previa and placenta accreta spectrum by a well-coordinated team was cost-effective and markedly reduced maternal morbidity and morbidity. The involvement of this team also improved patient experience, especially in cases in which high-risk interventions were required.

Limitations: Retrospective, single-center study; lack of statistical analysis; lack of a validated tool to differentiate treatment strategies

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INTRODUCTION

Placenta previa (PP) is an extremely serious obstetric condition. It is characterized by the presence of the placenta in the lower uterine segment and necessitates delivery by cesarean section (CS). Its prevalence is approximately 4 per 1000 live births.[1] but might be higher according to predisposing risk factors. In addition to the risk of operative morbidity, PP increases the risk of placenta acrreta spectrum (PAS)[2] Many risk factors contribute to the development of PP and/or PAS, with uterine surgeries, mainly CS delivery, being the leading cause. PP is usually diagnosed and confirmed by a detailed ultrasound (US) examination after mid-pregnancy, while PAS can be diagnosed by both US and magnetic resonance imaging with high sensitivity.[3]

Once PP is diagnosed, a birth plan involving planned CS with a protocol to prevent or minimize associated morbidity is prepared. The prevalence of PP and PAS has increased with an increase in the rate of CS and assisted reproductive techniques.[4-6] Cases of PP and PAS are usually referred to tertiary care centers to ensure the best possible care simultaneously for the mother and her fetus because these centers typically have the necessary facilities and the multidisciplinary team required to appropriately manage these cases and any complication that might be encountered.[7] An initial review of PP cases at King Abdulaziz University Hospital (KAUH) in 2013 showed that the institute was well equipped to manage cases of PP and can provide care for such cases in the province in which it is located.[5] In 2016, a PP team was established and approved by the institute's medical board, which is the highest executive board for the hospital. Herein, the author describes the experience of PP and PAS management from 2001 to 2021

KEYWORDS:
Management, maternal morbidity, and mortality Placenta previa, placenta acrreta spectrum, prevalence.

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at the institute from the viewpoint of maternal outcomes and insights obtained from the established PP team. The PP team formulated an evidence-based medicine policy and procedure including a clinical pathway to a standardized care plan to improve treatment quality and patient safety.

PATIENTS AND METHODS

Ethical approval for the study was obtained from KAUH's research ethics committee. The study was based on data collected from all cases with a diagnosis of PP or PAS and managed at KAUH,Jeddah the largest tertiary academic medical center in the western region of Saudi Arabia. Data were collected for all pregnancies complicated by PP and/or PAS over a period of 21 years (from January 2001 to December 2021). The necessary information was obtained by a manual paper search (old records) and using electronic (new) medical records as well as the birth registry book based on the International Classification of Diseases-10 coding system.

The data collected included the annual rate of CS and PP among these cases, management plan, maternal outcome, admission to the intensive care unit (ICU), operative and postoperative morbidities, and rate of maternal mortality. Descriptive analysis of the data was performed in addition to a review of the management plans for PP and/or PAS before and after the establishment of the PP team.

RESULTS

From January 2001 to December 2021, 82,283 births and 521 cases of PP and/or PAS were recorded at KAUH. The numbers of cases before and after the establishment of the PP team were 260 (49.9.%) and 261 (50.1%), respectively. This finding indicated that the presence of the team increased the number of PP and/or PAS cases referred to the institute (from 4 in 1000 to 13.32 in 1000 births) as the team gained publicity in the region.

The 260 cases referred to KAUH before the establishment of the PP team were diagnosed based on a high index of suspension due to abnormal antepartum hemorrhage, which is painless most of the time unless it is associated with labor pain. The diagnosis was confirmed by US examination performed by either a maternal-fetal medicine unit or radiology department according to feasibility and the urgency of the case. The cases were managed by a primary consultant in case of a planned procedure and by an on-call consultant in case of an emergency. Consultants from other concerned specialties were involved according to the need. The cases were managed according to individual plans made by the surgeon, and no standardized protocol or pathway was followed.

The cases managed were reviewed after two deaths that occurred postpartum 4 months due to hemorrhagic complications. Elective CS had been performed in both cases; however, the management was clearly suboptimal. Hysterectomy was performed in the two cases during the second operation, and both patients developed end-organ damage. A history of CS was the most common contributing factor to PP development in the 260 cases reviewed, and the maximum number of prior CS was 5.

After the establishment of the PP team, PP and/or PAS was diagnosed in 261 cases by US examination by the maternal-fetal medicine unit and/or magnetic resonance imaging for further evaluation of placental invasion. Standardized protocols were employed to report placental site and invasion for both modalities (Table 1). Once a case of PP and/or PAS was diagnosed, the PP team followed the standardized PP policy and procedure (Table 2).

The PP team at KAUH was established in 2016 and includes all concerned specialties without underestimating the role of every healthcare practitioner in direct or indirect contact with such patients (e.g., admission officers, social workers, nursing staff, and others). Increased parity and a history of repeated CS up to eight such instances were the most common risk factors for PP and/or PAS. In all but five cases, CS was performed under general anesthesia; in the five cases in question, general anesthesia was used in combination with epidural. Delivery before 36 weeks occurred in 43.3% with the involvement of the PP team compared to 50% before the team was constituted. Furthermore, after the PP team was established, the rate of emergency delivery decreased to 28%, compared to 55.3% before the team was formed.

The main and only operative injuries were urological (one was a ureteric injury and the remaining were bladder injuries). All injuries were recognized intraoperatively and were successfully repaired. (Table 3)

Table 1: PP team at KAUH and its role

Member	*Role*
Obstetrician (team leader)	Be responsible for patient management including and not limited to the birth plan, counseling of the patient and her husband about family planning, performing cesarean section, and consulting with required specialties
Maternal-fetal medicine	Perform detailed ultrasound and confirm the placental site and invasion if relevant
Neonatologist	Manage the baby after birth as all cesarean sections were planned by the completion of week 36 of gestation unless indicated otherwise
Radiologist	Perform magnetic resonance imaging and identify discrepancies if present by using maternal-fetal medicine ultrasound and arterial embolization for select cases
Anesthetist	An obstetric anesthetist shall be readily available for the delivery
Intensivists	Shall be notified for all preoperative care interventions
Hematologist	Ensure optimum and safe transfusion therapy
Blood bank	To keep blood readily available
Urologist	To be consulted whenever required
Vascular surgeon	To be consulted whenever required

Table 2: Clinical pathway followed by the PP team (summary)

Summary
Counseling and education by the main physician responsible
Provision of patient education material prepared by the team
Obtaining informed consent for high-risk interventions
Consultation for anesthesia and in the critical care unit
Planning for birth by the completion of week 36 of gestation unless indicated earlier
Keeping 4–6 units of packed red blood cells readily available in the operating room on the day of surgery
Notifying the team members about cases
Post-partum follow-up in 4–6 weeks and 12 weeks according to patients' needs.
Pathological examination of the placenta and uterus if hysterectomy is performed.
Subtotal hysterectomy shall be considered if total hysterectomy is not feasible
Surgical approach (skin and uterine incisions) was applied according to surgeons' preferences
Interventional radiology consultation (whenever possible)

Table 3: Maternal management

	2001-2015	*2016-2021*
Total deliveries	62,701	19,582
Total number of cesarean sections	13,404(21.3%)	6,057 (30.9%)
Number of PP or PAS cases	260 (0.41%)	261 (1.33%)
Nationality of patients with PP	142 non-Saudi 118 Saudi	57 non-Saudi 204 Saudi
Age range of patients with PP	18–45 years	19-49 years
PP in primigravida	37 (14.23%)	29 (11.11%)
PP with no prior CS	125 (48.07%)	102 (39.08%)
Gestational age of <36 weeks	130 (50%)	113
Emergency CS	116 (44.61%)	73
Elective CS	144 (55.39%)	188
CS under regional anesthesia	84 (32.30%)	12
Arterial embolization	2 (0.77%)	5 (1.91%)
Cesarean hysterectomy	24 (9.23%)	16 (6.13%)
Massive transfusion	32 (12.31%)	16 (6.3%)
Admission to the ICU	33 12.69%)	16 (6.3%)
Deaths	2	0

Preoperative cross-matching of packed red blood cells and booking of a bed in the ICU were performed for all cases. However, only 6% of the patients had a massive transfusion and were admitted to the ICU. Hysterectomy was a planned procedure in more than 70% of the cases, and subtotal hysterectomy was reported in only one case. Only one patient had acute kidney injury and required dialysis during ICU admission. The patient's renal function recovered well but she developed Sheehan's syndrome. Furthermore, with the establishment of the PP team, there were no cases of venous thrombosis, no maternal mortalities, and no reported sentinel event or patient complaint received from Press Ganey or the patient experience office. Methotrexate was not used and nor was planned delayed hysterectomy performed in any case before and after the PP team was established.

DISCUSSION

This study showed that the prevalence of PP including PAS (6.3 per 1000 in 21 years) was higher than that reported internationally [1]. This finding is explained by the type of patients (high number of repeated CS) managed at KAUH and the presence of an in vitro feralization unit where assisted reproduction is provided in addition to the establishment of the PP team.[4,5] Most of the cases were multigravida and with prior CS, similar to those reported in the literature. The proportion of cases with prior CS but not a history of *in vitro* fertilization (IVF) was remarkable.[8]

Diagnosis of PP was almost 100% accurate by US examination performed by the MFM unit at the mean gestational age of 33 weeks. However, an accurate PAS diagnosis needed further evaluation and was correlated with MRI and pathological examination. The increased detection of PAS was related to the application of the standardized protocol for diagnosis and contributed to improved maternal outcomes.

Before the PP team was established at KAUH, there was no consensus on the protocol for managing patients. However, after the establishment of the PP team, the initial step was patient education and detailed counseling once the diagnosis was made. This step markedly affected the treatment plan, because it promoted the cooperation and understanding of

both the patient and her family. The relevant data were also analyzed by the office of patient experience, through which the PP team had never received a complaint, and the quality department, which monitors patients' experience by a third party; Press Ganey which gives insight on quality and safety of care with national and international benchmarking[10,11].

In our center, the placenta was not left in place after the delivery of the fetus in any case. Furthermore, no patient received methotrexate nor underwent a planned delayed hysterectomy [12]. The center has a high CS rate (>30%) and is considered a referral center for women with high-risk pregnancies. The availability of an IVF unit in our center has contributed to an increased rate of CS as well as multiple gestations, both of which were positively correlated with an increasing rate of PP.[13]

Both US and MRI are highly sensitive for the diagnosis of PP and PAS and using US with standardized criteria as implemented by the maternal-fetal medicine unit at our center is considered quite sufficient. Planned delivery by the completion of week 36 of gestation did not increase neonate morbidity or mortality, and all neonates were evaluated in collaboration with the neonatology team in another study.[9,14] Fertility preservation and or uterus-saving strategies are part of patients' well-being, especially in a culture like the Saudi culture in which big families are a common goal and the uterus is part of women's self-identity. However, there were no instances of segmental uterine excision or the Triple-P procedure in our center. Most uterine preservation procedures were performed by vascular or placental/uterine wall suture ligatures and uterine packing provided maternal hemodynamic stability was maintained.[15,16]

No sentinel events were reported after the establishment of the PP team, and this enforce the compliance with the policy and the applied management by multidisciplinary team. The digital vascular imaging (DVI) has been used successfully but in a very limited number of cases. Its use is encouraged to minimize blood loss and the need for transfusion medicine.

Management of PP with or without PAS by a multidisciplinary team is a key strategy for improving maternal outcome through the implementation of an evidence-based protocol from diagnosis to delivery. Wherever resources are available for a PP team or board, such a team should be established to provide the necessary care and improve maternal outcomes including uterine saving procedures.

The study is limited by its retrospective single-center nature. No statistical analysis was performed by considering risk factors or maternal outcomes. Furthermore, no validated tool was available to differentiate treatment strategies.

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Availability of Data and Material: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest: The author declares that she has no conflict of interest.

Ethical Approval: This monocentric retrospective cohort analysis involving medical records of human participants was conducted in accordance with the ethical standards of the research ethics committee at KAU.

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