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Original Research Article

A 5-years cross-sectional study of risk-factors fetomaternal outcomes in placenta accreta spectrum at single tertiary care centre in South India

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ABSTRACT

Background: PAS is an abnormal placental trophoblastic invasion into the myometrium, serosa and surrounding structures causing severe maternal morbidity and mortality due to massive obstetric hemorrhage (MOH). The incidence of PAS is on the rise due to increasing rate of Cesarean Section (CS) worldwide.

Aim: This study aimed to assess the risk factors associated with Placenta accreta spectrum (PAS) and to compare the fetomaternal outcomes in elective and emergency delivery in PAS.

Materials and Methods: This is a 5 years single centre cross-sectional study from 1st January 2018 to 31st December 2022. All diagnosed cases of PAS beyond 28 weeks of gestation were included. A total of 38 cases of PAS were studied. Chi-square test and T-test were used to compare the categorical variables with p value of <0.05 as statistically significant.

Results: The incidence of PAS was 1.85/1000 deliveries. Advanced maternal age, previous CS, placenta previa in current pregnancy were major risk factors. MOH was the commonest complication. The blood loss, increased operative time and need for blood transfusions was mainly dependent on the placental location. Prematurity and low birth weight were the most important perinatal outcomes.

Conclusion: Adequate blood and blood products prior to surgery is important as even in expert hands blood loss can be massive. Early referral and specialized regional team to manage PAS at tertiary care are needed. Future studies should emphasize on easy and early detection of PAS.

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1. Introduction

Placenta accreta spectrum (PAS) is an abnormally implanted placenta with trophoblastic invasion into the uterine myometrium, uterine serosa, urinary bladder and lateral pelvic wall. It is a consequence of abnormal endometrial-myometrial interface causing defective decidualization of the implanted placenta.^{1,2} The important risk-factors for occurrence of PAS are prior uterine surgeries like Cesarean section (CS), myomectomy, hysteroscopic adhesiolysis,

uterine curettage, submucous fibroids etc. There has been a dramatic increase in the incidence of PAS worldwide over the last 30 years which is consistent with the increase in CS rates all over the world. The chances of developing PAS in pregnancies following CS increases with the number CS the women undergoes, making CS the most important risk factor. PAS is associated with massive obstetric hemorrhage (MOH) especially in undiagnosed cases where forcible attempts are made for placental delivery. MOH is defined as excessive bleeding during pregnancy or postpartum of more than 1500 mL or fall in the hemoglobin of more than 4 g/dL or the need for more than four packed red blood cell

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transfusions in 24 hours in a pregnant woman.³

The management of a patient with PAS depends on the degree of placental invasion. Depending on the degree of trophoblastic invasion, International Federation of Gynecology and Obstetrics (FIGO) has proposed a new clinical classification as follows-

1. Grade 1 – Abnormally adherent placenta (PC) when the trophoblastic villi adhere to the myometrium without having a decidual interface.
2. Grade 2 – Abnormally invasive placentation (PI) when the trophoblastic villi invade into the myometrium.
3. Grade 3 – Abnormally invasive placentation (PP) when the trophoblastic villi invade full thickness of the uterine myometrium upto the serosa or beyond. This grade is further subdivided into: Grade 3a-limited to but including the uterine serosa; Grade 3b-when there is trophoblastic invasion into the urinary bladder; Grade 3c-when there is trophoblastic invasion into other pelvic tissues or organs.^{4,5}

The degree of PAS is found to be proportional to the number of previous scars on the uterus. Presence of placenta previa in such situation further increases the risk of developing PAS. The patients with PAS are usually managed with planned delivery by Caesarean section followed by peripartum hysterectomy. PAS increases the risk of fatal maternal hemorrhage, obstetric hysterectomy, multi-organ damage, disseminated intravascular coagulation and maternal mortality.^{6,7} It is important to have an antenatal diagnosis and multidisciplinary management for PAS for reducing the maternal morbidity and mortality. Owing to the rising incidence of PAS, there is a need for creation of regional specialized teams for dedicated care of patients with PAS. There is a lack of Indian data on the consensus in management of PAS disorders with regards to surgical approaches and experience, protocol-based care, multidisciplinary team composition, maternal co-morbidities and population demographics.^{8–10}

2. Objectives

2.1. Primary objective

The study was undertaken to study the risk factors associated with PAS.

2.2. Secondary objective

To compare elective and emergency delivery with respect to maternal and perinatal outcomes in pregnancies complicated by PAS.

3. Materials and Methods

This was a single centre observational study over 5 years conducted at KAHER's Dr. Prabhakar Kore hospital

which is a major referral centre in Karnataka and Maharashtra. The study period was from January 1st 2018 to December 31st 2022. Our hospital is a 2400 bedded tertiary care centre with 50 beds allotted to emergency obstetric unit. There are approximately 6000 deliveries annually. The facility is equipped with round the clock availability of obstetrician, anaesthetist, urologist, paediatrician, intensivist and interventional radiologist. All patients are managed as per the departmental evidence-based protocol.

The study was approved by institutional ethics committee. The source of data was from the hospital medical database and case-records section. Women who were admitted to our hospital with a diagnosis of PAS after 28 weeks of gestation on antenatal ultrasonography or who were referred after delivery with morbidly adherent placenta were included in the study. At our hospital, antenatal ultrasonography was done by trained experts to evaluate the presence of PAS using an ultrasound machine (Voluson S10, GE, Austria) with a curvilinear trans-abdominal probe (4–8 MHz) and a trans-vaginal probe (5–9 MHz). Placenta previa was said to be present when placenta was seen to be implanted within 2 cms from the cervical internal os either completely or partially. Gray-scale abnormalities associated with PAS were noted on ultrasound like multiple lacunae within the placenta (Moth-eaten appearance), non-visualisation of the normal sonolucent zone between the placenta and uterine musculature, decreased retro-placental muscle thickness (less than 1 mm), abnormalities of the uterine serosa-bladder interface, and extension of placental tissue into myometrium, serosa or bladder. The Colour Doppler findings supporting the diagnosis of PAS like turbulent blood flow within the placental lacunae, increased retro-placental vascularity, obvious gaps in the myometrial blood flow and bridging vessels between the placenta and uterine margin were noted.^{11,12}

3.1. Statistical analysis

The statistical analysis was done using IBM SPSS version 22. Categorical variables were analysed by mean and standard deviation for quantitative variables and compared using Chi square test /Fisher's Exact test and independent sample t-test. Median and interquartile range (IQR) were used for non-normally distributed quantitative variables. Shapiro-wilk test was conducted to assess normal distribution. The p-value < 0.05 was considered statistically significant.

4. Results

During the study period, 20,540 deliveries were registered. 38 cases of PAS were included in the study. Incidence of PAS in our hospital was 1.85 per 1000 deliveries. Table 1

demonstrates the patient demographic and baseline data, gestational age, obstetric history including the previous history of CS. The mean age of patients in the study was 30 ± 2.51 years. 63.16% patients were from rural areas. Majority of the patients belonged to Class 4 socio-economic status according to B.G Prasad classification for rural and class 3 according to Kuppaswamy classification for urban population. Most patients were second and third gravidas. 94.7% of women had history of previous CS. We had majority of the deliveries of patients with PAS in our hospital whereas only 2 cases were referred with morbidly adherent placenta after delivery. Majority of the cases were planned to be delivered electively. Classical section most commonly performed for managing cases of PAS in 50% of the cases. The mean pre-operative haemoglobin level was 8.3 ± 1.04 gms indicating that most patients had mild to moderate anemia before delivery.

Table 2 demonstrates increasing maternal age, history of previous CS and occurrence of placenta previa in the current pregnancy are the major risk factors for developing PAS. 37 of 38 (97.3%) cases of PAS were associated with placenta previa. All cases of placenta previa with accreta or percreta underwent CS followed by peripartum hysterectomy. Elective or emergency delivery was timed depending on the patient's condition at the time of presentation to our hospital. Antepartum haemorrhage, premature rupture of membranes and labour pains were the commonest indications for emergency delivery in our study. A team of experienced obstetricians, anaesthetist, urologist or surgeon, intensivist and paediatrician managed the cases of PAS. The interventional radiologist was called for if uterine artery embolization was planned. The decision to perform uterine artery embolization was dependent on the patient affordability and need for future fertility preservation.

Table 3 demonstrates maternal outcomes in elective and emergency deliveries in cases of PAS. Combined spinal and general anaesthesia was needed for most cases. The estimated intra-operative blood loss was similar in elective and emergency groups. The mean duration of surgery was 150-165 minutes. The additional procedures required to control bleeding like internal iliac artery ligation and uterine artery embolization were employed in 21 of 38 cases. The number of units of blood and component transfusions needed were also noted among the two groups. The need for inotropes was recorded in 13 cases due to hypotension following massive haemorrhage. The complications (intra-operative and post-operative) were recorded commonest being haemorrhage. The other complications were TRALI, Wound dehiscence, pulmonary oedema and vesico-vaginal fistula. 5 patients needed transfer to intensive care unit (ICU) post-operatively. The remaining patients were managed in the high dependency area of the labour room. The duration of

Table 1: Demographic characters and risk factors for PAS in study population (N=38)

Demographic characters and risk factors	Frequency	Percentage (%)
Age Group		
20-29	06	15.78
30-39	28	73.68
>39	04	10.52
Urban /Rural		
Rural	24	63.16
Urban	14	36.84
Socioeconomic Status		
Class I	03	7.89
Class II	10	26.32
Class III	06	15.79
Class IV	18	47.37
Class V	01	2.63
2	16	42.11
3	18	47.37
4	03	7.89
5	01	2.63
Parity		
0	02	5.26
1	13	34.21
2	18	47.37
3	04	10.53
4	01	2.63
Previous LSCS		
0	02	5.26
1	22	57.89
2	13	34.21
3	01	2.63
Place of Delivery		
In our hospital	36	94.74
Outside our hospital	02	5.26
Elective /Emergency		
Elective	28	77.78
Emergency	08	22.22
Type of Delivery		
Classical Section	19	50.00
LSCS	16	42.11
LSCS with Triple p procedure	01	2.63
Spontaneous Abortion	01	2.63
Vaginal Delivery with Retained Placenta	01	2.63
Peripartum Done /Not		
Yes	35	92.11
No	3	7.89

Table 2: Risk factors associated with PAS

Parameter	No.	Chi-square	p-value
Maternal age			
<30years	06	37.88	0.043
>30years	32		
Previous CS			
Yes	36	41.3	<0.001
No	02		
Previous uterine curettage			
Yes	08	5.569	0.048
No	30		
Placenta previa in current pregnancy			
Yes	37	46.6	<0.01
No	01		

hospital stay was recorded. The complication rates and length of hospital stay was also similar in both groups. 1 maternal death were noted in the emergency group due to disseminated intravascular coagulation secondary to massive haemorrhage. This patient had a delayed referral with antepartum haemorrhage. Following admission with haemorrhagic shock, the diagnosis of PAS was made at our centre before surgery.

In patients who underwent peripartum hysterectomy, the diagnosis of PAS was confirmed on histopathological examination. Peripartum hysterectomy was done in 35 (92.5%) patients. 3(7.8%) who did not undergo peripartum hysterectomy were managed with either conservative triple-P procedure or chemotherapy with methotrexate. MOH was the commonest complication in all cases undergoing caesarean hysterectomy irrespective of the timing of surgery. One patient was COVID-19 positive. One maternal death was reported emonstrates the perinatal outcome in the study. Adverse perinatal outcomes noted in our study were Preterm births (52.6%), NICU admission in 53.8%, and 6 stillbirths (15.4%). The preterm deliveries were associated with lower birth weight and need for NICU. Though these were not statistically significant among elective and emergency groups, there is need for NICU in the facility where patients with PAS are delivered as preterm and low birth weight babies tend to have higher neonatal complications. The blood loss and the operative time was mainly dependent on the placental location, grade of placental adherence and invasion into the surrounding structures.

5. Discussion

PAS is becoming an increasingly common obstetric complication with significant life-threatening risks to mother and the fetus. The incidence of PAS globally ranges from 0.04 to 0.9 per 1000 deliveries. In our study we had an incidence of 1.85 per 1000 deliveries which was higher than the global incidence. This could be due to our

centre being the major referral unit in our region. Advancing maternal age and higher parity were associated with increased CS rates due to high-risk factors complicating the pregnancy. History of prior CS and having placenta previa in current pregnancy were the major risk factors noted in our study. This was similar to most of the studies. The maternal outcomes in our study were MOH needing blood transfusion and peripartum hysterectomy. Elective delivery with Classical section followed by peripartum hysterectomy is the standard management presently for cases of PAS with placenta previa. This is noteworthy as in modern obstetrics, classical CS has very limited indications. Owing to the rise in the PAS, present day obstetricians need to be well-versed with the technique of classical CS and peripartum hysterectomy.¹² The patients managed with conservative techniques viz triple-P procedure were mainly for anterior placentation with focal adherence of the trophoblastic tissue. Resection of the adherent placenta along with the myometrium was done. Methotrexate was also used for focal adherent placenta. These cases had secondary hemorrhage needing peripartum hysterectomy eventually. Though studies show that elective delivery in PAS results in lesser hemorrhage, reduced operative time and lesser need for blood transfusions, there was no statistically significant difference between elective and emergency groups in our study.^{13,14} Our analysis showed that even after adjustment for variables like number of prior CS, grade of placental adherence, type of delivery, gestational age, occurrence of placenta previa in current pregnancy the difference is not significant. These could be due to pre-existing anaemia and performance of classical section which causes more blood loss.

We found that predictors of life-threatening hemorrhage in PAS are placenta previa with anterior placentation, lateral placentation and bladder invasion. These cases were more difficult to operate as compared to posterior placentae. The anticipated blood loss and the need for blood and blood product transfusion calls for pre-operative preparations for adequate blood and blood products. Experienced multi-disciplinary surgical team-based approach is needed to reduce maternal morbidity and mortality in PAS. However, even in expert hands, hemorrhage can still be catastrophic and difficult to manage. The outcomes in management of PAS depends not only on the experience and surgical skills of the attending surgical team but also on immediate access to blood transfusion and post-operative care in ICU or high dependency unit.^{15,16} Antepartum hemorrhage followed by labour pains and preterm premature rupture of membranes were common causes of admission and delivery before term. Preterm delivery and low birth weight were most significant neonatal outcomes which were seen.

Table 3: Comparison of maternal outcomes between elective and emergency deliveries in PAS

Parameter	Nature of delivery		Chi square	P value
	Elective (N=28)	Emergency (N=8)		
Anaesthesia used				
GA	12	4	0.64	0.72
SA	2	0		
SA & GA	14	4		
Estimated Blood Loss (ml)	2700 ± 558.79	2800 ±567	2.45	0.56
Duration of surgery (min)	150±25	165±25	1.33	0.43
Additional Procedures				
Internal Iliac Ligation	11	3	1.43	0.80
Uterine Artery Embolization	6	1		
Transfusion of Blood and Blood Products				
<10	13	5	14.50	0.15
10-20	15	3		
>20	0	1		
Use of Inotropes				
Yes	9	4	0.860	0.42
No	19	4		
ICU Admission				
No	25	6	1.062	0.30
Yes	3	2		
Duration of hospital stay (days)	12.74 ± 6.12	14± 6.12	4.550	0.35
Complications				
Massive haemorrhage	28	8	2.353	0.502
TRALI	4	1		
Pulmonary oedema	0	1		
Wound dehiscence	4	0	0.93	0.21
Vesicovaginal fistula	0	1		
Maternal death	0	1		

6. Conclusion

Advanced maternal age, previous CS and presence of placenta previa are the risk factors for developing PAS in current pregnancy. As the occurrence of PAS is rising, modern age obstetricians should be well-versed with the art of performing classical section and internal iliac artery ligation and peripartum hysterectomy. MOH is the commonest complication in both elective and emergency deliveries in PAS. Owing to this, prudent attempt to reduce the blood loss and availability of properly cross-matched blood should be ensured. Every case of PAS should be referred to tertiary care as it is associated with increased maternal and perinatal mortality and morbidity. Regional specialized teams are needed at every tertiary care to handle PAS. Future studies should focus on developing effective screening methods to detect PAS early and predict the risk of emergency delivery.

7. Source of Funding

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8. Conflict of Interest

There is no conflict of interest among the authors.

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