

# A Retrospective Evaluation of the Sociodemographic and Clinical Characteristics of Placenta Previa and Placenta Accreta Spectrum Cases Between 2021 and 2023

## 2021-2023 Yılları Arasındaki Plasenta Previa ve Plasenta Accreta Spectrum Olgularının Sosyodemografik ve Klinik Özelliklerinin Retrospektif Değerlendirilmesi

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### ÖZET

**Amaç:** Bu çalışmada kliniğimizde görülen plasenta previa ve PAS olgularının demografik özellikleri ile anne ve perinatal sonuçlarını üç dönem boyunca değerlendirmeyi amaçladık.

**Yöntemler:** Çalışmaya dahil edilen 94 katılımcının (kontrol = grup 1; n=30, plasenta previa = grup 2; n=44 ve PAS = grup 3; n=20) sosyodemografik özellikleri ile laboratuvar sonuçları veri tabanına kayıt edildi ve gruplar arasında karşılaştırıldı.

**Bulgular:** Gebelik, parite, önceki sezaryen doğum sayıları, başvurudaki semptomlar, ultrasonografide invazyon belirtileri, doğumdaki gebelik yaşı, doğum ağırlığı, yenidoğan yoğun bakım ünitesine kabul oranı, histerektomi oranı, hastanede kalış süresi, kan transfüzyonu ve atoni açısından gruplar arasında anlamlı farklılık saptandı ( $p<0.05$ ). Ameliyat sonrası Hb (grup 1 vs 2,  $10.96\pm 1.78$  vs  $9.66\pm 1.22$ ;  $p<0.001$  ve grup 1 vs 3,  $10.96\pm 1.78$  vs  $9.37\pm 1.20$ ;  $p<0.001$ ) ve Htc (grup 1 vs 2,  $32.23\pm 2.84$  vs  $28.83\pm 3.97$ ;  $p=0.001$  ve grup 1 vs 3,  $32.23\pm 2.84$  vs  $28.36\pm 3.49$ ;  $p<0.001$ ) düzeyleri arasında farklılık vardı.

**Sonuçlar:** Plasenta previa ve PAS olgularında ultrasonografi ile invazyon durumu ve doğum zamanlaması belirlenmelidir. Üçüncü basamak merkezlerdeki PAS'lı gebe kadınlara multidisipliner yaklaşım ve deneyimli bir ekibin katılımı, anne morbidite ve mortalite oranlarının azaltılmasında çok önemlidir.

**Anahtar Kelimeler:** Peripartum histerektomi, plasenta akreta spektrumu, plasenta previa, gebelik

### ABSTRACT

**Aim:** In this study, we aimed to evaluate the demographic characteristics and maternal and perinatal outcomes of placenta previa and PAS cases in our clinic over a three period.

**Methods:** The sociodemographic characteristics and laboratory results of 94 participants (control = group 1; n=30, placenta previa = group 2; n=44, and PAS = group 3; n=20) were documented and compared between the groups.

**Results:** Gravity, parity, previous cesarean sections, symptoms on admission, signs of invasion at ultrasonography, gestational age at delivery, birthweight, neonatal intensive care unit admission rate, hysterectomy rate, length of hospital stay, blood transfusion, and atony differed significantly between the groups ( $p<0.05$ ). Additionally, postoperative hemoglobin (groups 1 vs 2,  $10.96\pm 1.78$  vs  $9.66\pm 1.22$ ;  $p<0.001$  and groups 1 vs 3,  $10.96\pm 1.78$  vs  $9.37\pm 1.20$ ;  $p<0.001$ ) and Htc (groups 1 vs 2,  $32.23\pm 2.84$  vs  $28.83\pm 3.97$ ;  $p=0.001$  and groups 1 vs 3,  $32.23\pm 2.84$  vs  $28.36\pm 3.49$ ;  $p<0.001$ ) levels differed between them.

**Conclusions:** Invasion status and timing of delivery should be determined by means of ultrasonography in cases of placenta previa and PAS. A multidisciplinary approach to pregnant women with PAS in tertiary centers and involving an experienced team is very important in reducing maternal morbidity and mortality rates.

**Key words:** Peripartum hysterectomy, placenta accreta spectrum, placenta previa, pregnancy

## INTRODUCTION

Postpartum hemorrhage (PPH) is still one of the most important causes of maternal mortality despite advances in technology, improvements in medical care, the use of effective and powerful uterotonic agents, improved blood transfusion facilities, modernization of intensive care units, enhanced radiological intervention techniques, and surgical procedure innovations (1). It is very difficult to protect pregnant women with PPH from peripartum cesarean (C/S) hysterectomy, especially at young ages (2). Although the role of the uterus in sexual life is not fully understood, it is thought to be possibly involved in the control and regulation of sexual functions and the maintenance of youth and attraction (3).

The most important risk factor for PPH is a previous history of uterine surgery, and the most common cause is C/S deliveries (4). The risk of placenta previa and placenta accreta spectrum (PAS) increases with each C/S delivery, and the risk of peripartum C/S hysterectomy therefore also rises. There is no doubt that when truly indicated, C/S protects the life of both the baby and the mother, and also reduces pelvic organ prolapse and lower urinary tract symptoms (5).

Placenta previa is defined as the the placenta lying on or within 2 cm of the internal cervical os. Placenta accreta is defined as superficial invasion of placental villi into the myometrium without invading the myometrium, placenta incretata as penetration of placental villi into the myometrium, and placenta percreta as penetration of placental villi up to the uterine serosa. The most important theory in the physiopathology of PAS involves the absence of normal decidualization due to the defect at the endometrial junction resulting from uterine scarring (6, 7).

The frequency of PAS and placenta previa has increased in recent years. Although the prevalence of placenta previa varies worldwide, it is generally 4 per 1000 births, while the frequency of PAS is 0.17% (8). While the presence of placenta previa alone in the first pregnancy constitutes a 3% risk for PAS, the risk rises to 11% in the presence of one previous C/S, 40% in the presence of two, 61% in the presence of three, and 67% in the presence of four C/S (9). Identified risk factors for placenta previa include advanced maternal age, increased parity and C/S numbers, multiple pregnancies, history of placenta previa in a previous pregnancy, previous curettage, smoking, cocaine use, having a male fetus, and infertility treatment. Similarly, advanced maternal age, increased number of gravida and parity, history of previous C/S, and curettage have been identified as risk factors for PAS (5,7). The most commonly employed diagnostic method in the antenatal treatment of PAS is ultrasound (USG), and normal placental findings do not exclude PAS. The hypochoic zone, observed between the myometrium and placental tissue in normal placental location at USG, disappears in cases of PAS.

The presence of placental tissues and lacunae extending to the bladder in the anterior placental location and the presence of turbulent lacunar flow at Doppler USG are strong findings in favor of diagnosis of PAS (10).

While the management of placenta previa and PAS depends on the diagnosis of the case (whether adjacent organ invasion, such as accreta, increta, or percreta is present or not), the experience of the surgery and anesthesia team, the facilities available in the hospital (blood transfusion facility, the possibility of interventional procedures, etc.), and the individual's desire for fertility, PAS has been identified as an important risk factor that may require emergency peripartum hysterectomy (11).

Focal resection and leaving the placenta in the uterus are alternative approaches for PAS, which is usually managed by means of peripartum cesarean hysterectomy, and management of PAS with a multidisciplinary team in tertiary centers can reduce morbidity and mortality (1,11). The purpose of the present study was to evaluate the demographic characteristics and maternal and perinatal outcomes of case of placenta previa and PAS in our clinic over a three-year period.

## MATERIALS AND METHODS

Following receipt of approval from the ethical board (2023-161), 10.542 patients who had given live or still births via C/S at 20 weeks of gestation and/or with birth weights 500 g or higher between January 1st, 2021 and December 31st, 2023 in our clinic were included in the study after retrospective investigation of the digital record system and delivery records from the hospital archives. The study was conducted in accordance with the ethical guidelines set out in the 1964 Declaration of Helsinki. The inclusion criterion for the study were 18-42 years, body mass index (BMI) 18-35 kg/m<sup>2</sup>, singleton pregnancy, diagnosis with placenta previa, and PAS by preoperative USG and/or magnetic resonance imaging (MRI). Exclusion criteria were BMI >35 kg/m<sup>2</sup>, a history of hysterectomy for non-PAS indications, and missing file information. The absence of the hypochoic zone in the examination with USG, the presence of enlarged lacunae in the placenta, and the presence of turbulent lacunar flow at Doppler USG were evaluated in favor of PAS. MRI examination was not performed in patients diagnosed with PAS. Data from 64 C/S cases due to placenta previa and PAS, including maternal age, BMI, gravity and parity numbers, miscarriage, previous C/S, symptoms on admission, gestational age at delivery, birth weight, NICU admission rate, blood transfusion requirement, peripartum hysterectomy, and peri- and postoperative complications were recorded annually and compared. International Federation of Gynecology and Obstetrics (FIGO) surgical classification which stratifies the severity of the invasion also has been performed (6).

**Table 1.** PAS subcategories in the FIGO system are based on the degree of invasion and local tissue damage.

Stage of Disorder	Findings
1 Noninvasive	Grossly adherent placenta identified through manual examination. Homogeneous myometrial thickness without thinning in myometrial cross-sections
2 Superficial invasion	Cross-sections reveal an irregular placenta without involvement of the outer myometrium (More than 25% of the myometrial thickness is preserved)
3 Deep invasion	Cross-sections show irregular placenta involving the outer myometrium (Less than 25% of myometrial thickness is preserved). Serosa is intact
4 Deep invasion with serosal disruption	Placenta deeply invades with disruption of the uterine serosal surface
5 Deep invasion with adherence to extrauterine structures	Placental invasion into adjacent organs (usually the bladder) or extrauterine fibroadipose tissue, confirmed by microscopy

### Statistical analysis

Statistical Package for Social Sciences (SPSS) (version 15.0, SPSS, Inc, Chicago, IL, USA) software was used for the statistical analysis. Shapiro-Wilk analysis was performed to evaluate the normality of distribution of continuous variables. The paired t-test and One-Way ANOVA were applied for the analysis of data exhibiting normal distribution. The Kruskal-Wallis test was applied to non-normally distributed data. The

chi-square and the Fisher exact tests were used to compare categorical parameters. Continuous variables were expressed as mean + standard deviation (SD) and categorical variables as numbers of cases and percentage values. A p-value of <0.05 was regarded as statistically significant.

### RESULTS

Of 102 participants initially included, 8 (7.84%) dropped

**Table 2.** Sociodemographic characteristics of the participants.

	Control (Group 1) (n=30)	Placenta previa (Group 2) (n=44)	Placenta accreta spectrum (Group 3) (n=20)	1 vs 2	1 vs 3	2 vs 3
Age (years)	30.83±3.63	33.25±5.80	33.25±5.16		0.189	
BMI (kg/m <sup>2</sup> )	28.82±4.22	30.58±4.31	30.46±5.48		0.289	
Gravity	4.50±1.51	3.48±2.23	5.55±2.72	0.001*	<0.001	0.006*
Parity	0 (0-1.0)	2.0 (1.0-2.0)	4.0 (2.0-5.0)	0.001*	<0.001*	0.005*
Miscarriage	0 (0-0)	0 (0-1.0)	0 (0-0)		0.660	
Number of previous cesarean sections	0 (0-1.0)	1.0 (0-2.0)	2.0 (2.0-4.0)	0.010*	0.001*	0.010*
<b>Educational level n (%)</b>						
Illiterate	1 (20.0%)	7 (15.9%)	5 (25.0%)			
Elementary	15 (50.0%)	19 (43.2%)	12 (60.0%)		0.449	
High school	6 (20.0%)	15 (34.1%)	2 (10.0%)			
University	3 (10.0%)	3 (6.6%)	1 (5.0%)			
<b>Economic status n (%)</b>						
Low level	21 (70.0%)	29 (65.9%)	15 (75.0%)			
Intermediate level	9 (30.0%)	15 (34.1%)	5 (25.0%)		0.757	
High level	-	-	-			
<b>Place of residence n (%)</b>						
Village	8 (26.7%)	9 (20.5%)	4 (20.0%)			
Town	15 (50.0%)	27 (61.4%)	8 (40.0%)		0.391	
City	7 (23.3%)	8 (18.1%)	8 (40.0%)			
<b>Complaint at admission</b>						
Pain	6 (20.0%)	6 (13.6%)	2 (10.0%)			
Fetal Distress	12 (40.0%)	0 (0)	2 (10.0%)			
Bleeding	2 (6.7%)	22 (50.0%)	8 (40.0%)	<0.001*	0.012	0.484
Pain + Bleeding	1 (3.3%)	12 (27.3%)	2 (10.0%)			
Elective	9 (30.0%)	4 (9.1%)	6 (30.0%)			

Flowchart of the study

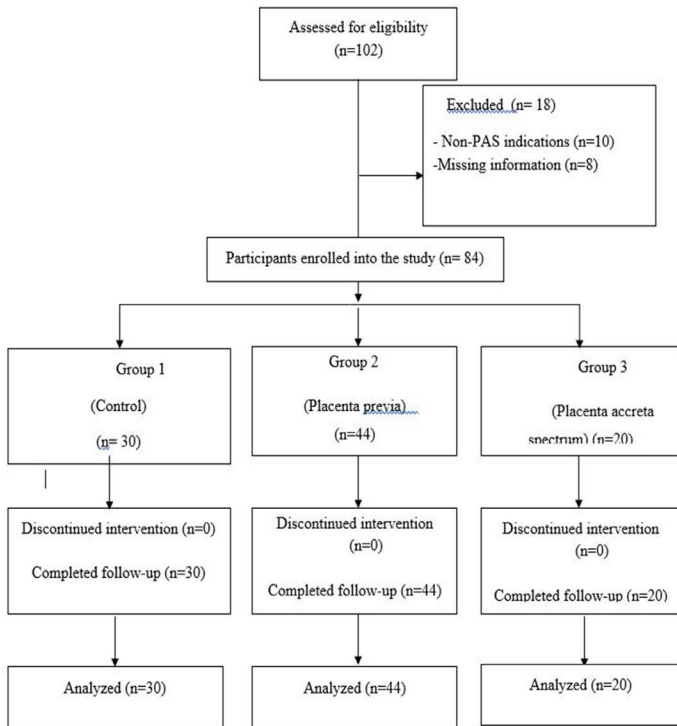


Figure 1. Enrollment and follow-up of the study subjects

out; thus, 94 participants were included in the study: 30 with control (Group 1), 44 with placenta previa (Group 2) and 20 PAS (Group 3) (Fig 1).

Tables 2 and 3 show the participants' sociodemographic characteristics and clinical features. No difference was determined between the groups in terms of age, BMI, numbers of miscarriages, education levels, economic status, area of residence, re-laparotomy, and thromboembolism rates ( $p>0.05$ ). However, gravity and parity numbers, previous C/S, symptoms on admission, signs of invasion at ultrasonography, gestational age at delivery, birthweight, first and fifth Apgar scores, NICU admission rates, hysterectomy rates, hospital stays, blood transfusion, and atony differed between the groups ( $p<0.05$ ).

The participants' laboratory outcomes are summarized in Table 4. Although the levels of preoperative Hb, Htc, and leukocyte count, and postoperative leukocyte count were comparable between the groups ( $p>0.05$ ), postoperative hemoglobin (groups 1 vs 2,  $10.96\pm 1.78$  vs  $9.66\pm 1.22$ ;  $p<0.001$  and groups 1 vs 3,  $10.96\pm 1.78$  vs  $9.37\pm 1.20$ ;  $p<0.001$ ) and Htc (groups 1 vs 2,  $32.23\pm 2.84$  vs  $28.83\pm 3.97$ ;  $p=0.001$  and groups 1 vs 3,  $32.23\pm 2.84$  vs  $28.36\pm 3.49$ ;  $p<0.001$ ) levels differed between them.

Table 3. Clinical features of the participants.

	Control (Group 1) (n=30)	Placenta previa (Group 2) (n=44)	Placenta accreta spectrum (Group 3) (n=20)	1 vs 2	1 vs 3	2 vs 3
Sign of invasion at ultrasonography	0 (0)	0 (0)	10 (50.0%)	-	<0.001*	<0.001*
FIGO						
Surgical						
Classification	3	0 (0)	6 (30.0%)			
	4	0 (0)	6 (30.0%)		<0.001*	
	5	0 (0)	8 (40.0%)			
Gestational age at delivery (weeks)	38.1±0.6	36.6±0.5	36.4±1.5	<0.001*	<0.001*	0.283
Birthweight (g)	3232.05±267.56	2752.39±665.5	2724.50±510.42	0.001*	0.004*	0.780
Apgar	1st Min	6.5±0.7	6.65±0.74	<0.001*	<0.001*	0.861
	5th Min	9.1±0.5	7.95±0.60	<0.001*	<0.001*	0.576
NICU admission rate n (%)	0 (0%)	10 (22.7%)	11 (55.01)	0.004*	<0.001*	0.020*
Hysterectomy n (%)	0 (0)	1 (2.3%)	12 (60.0%)	0.916	<0.001*	<0.001*
Re-laparotomy	0 (0)	1 (2.3%)	1.0 (5.0%)		0.531	
Hospital stay (days)	1.4±0.7	2.7±1.2	4.1±2.3	0.001*	<0.001*	0.002*
Blood transfusion	0	4.9±2.1	9.8±3.2	<0.001*	<0.001*	<0.001*
Thromboembolism n (%)	0 (0)	0 (0)	1 (5.0%)		0.209	
Infection n (%)	0 (0)	4 (9.1%)	4 (20.0%)	0.038*	0.005*	0.104
Atony n (%)	0 (0)	1 (2.3%)	6 (30.0%)	0.916	<0.001*	0.005*

BMI: body mass index, FIGO: International Federation of Gynecology and Obstetrics, NICU: neonatal intensive care unit

\*Statistically significant

**Table 4.** Laboratory outcomes of the participants.

	<b>Control (Group 1) (n=30)</b>	<b>Placenta previa (Group 2) (n=44)</b>	<b>Placenta accreta spectrum (Group 3) (n=20)</b>	<b>1 vs 2</b>	<b>1 vs 3</b>	<b>2 vs 3</b>
Preoperative Hb level (g/dl)	11.23±1.47	10.50±2.18	10.33±1.94		0.133	
Postoperative Hb level (g/dl)	10.96±1.78	9.66±1.22	9.37±1.20	<0.001*	<0.001*	0.543
P	0.076	0.010*	0.034*			
Preoperative Htc level (%)	33.01±4.57	31.39±5.75	31.57±6.10		0.560	
Postoperative Htc level (%)	32.23±2.84	28.84±3.97	28.36±3.49	<0.001*	<0.001*	0.476
P	0.071	0.006*	0.028*			
Preoperative leukocyte count (103) (mcl)	11.11±2.54	12.11±5.01	12.62±4.61		0.451	
Postoperative leukocyte count (103) (mcl)	12.15±2.33	13.34±4.30	13.54±3.96		0.263	
P	<0.001*	<0.001*	<0.001*			

Hb: hemoglobin, Htc: hemotocrit, ALT: alanine aminotransferase, AST: aspartate aminotransferase

\*Statistically significant

## DISCUSSION

In this study, intended to evaluate the sociodemographic characteristics and maternal and perinatal outcomes of placenta previa and PAS cases in our clinic over a three-year period, the number of previous cesareans was higher, the week of delivery was lower, and hysterectomy and blood transfusion rates were higher in the group with PAS.

The first step to be taken in PPH is to increase the dose and rate of IV oxytocin infusion. If the bleeding persists, IM methyl ergonovine administration, tranexamic acid, medical use of recombinant F-7 alpha, and massive blood transfusion protocols are applied. If the bleeding still continues despite these medical procedures, invasive radiological interventions, uterine balloon tamponade, uterine compression sutures, and vascular ligation can be performed. However, despite all these uterus-preserving treatments and interventions, peripartum C/S hysterectomy unfortunately still maintains its importance as a life-saving technique (12).

Placental anomalies (placenta previa and PAS) and bleeding due to placental retention account for 36% of deaths due to PPH (13). Placenta previa is the most common cause of bleeding in the second and third trimesters of pregnancy, and the incidence of placenta previa has been reported as 1 in 200 births worldwide (14). Previous studies have reported a prevalence of placenta previa of approximately 0.40% and a prevalence of PAS of approximately 0.17%. The equivalent figures in the present study were 0.42% for placenta previa 0.28% for PAS, slightly higher than in the previous literature. This may be due to primary C/S rates in Turkey being much higher than those regarded as normal by the World Health Organization (4).

As postpartum hemorrhage is closely associated with PAS, clinical prenatal diagnosis and a multidisciplinary approach are essential in order to optimize maternal and infant care

and management at birth (15). Unfortunately, a meta-analysis reported that only 56% of cases of posterior PAS can be diagnosed by means of USG and 74% by means of MRI (16). MRI can be diagnostic for PAS, especially in the presence of suspicious USG findings (10). Nonetheless, primary MRI should not represent the first choice for the diagnosis of PAS (17). It should also be noted that findings observed in anterior PAS at USG may not be observed in posterior PAS (18). MRI is not routinely used to evaluate placental invasion anomaly in our clinic, and none of the cases were evaluated using MRI in the present study.

Therapeutic options in PAS include termination of pregnancy before expected date of delivery, leaving the placenta for reabsorption without delivery or delaying hysterectomy, manual removal of the placenta after normal delivery or C/S, focal excision of the affected uterine region, and peripartum hysterectomy (19). PAS is the most common cause of peripartum C/S hysterectomy and is considered an important cause of maternal mortality (14,17,20,21). Peripartum C/S hysterectomy was applied to 60% of the pregnant women with PAS during the period of the study.

Following delivery via fundal uterine incision, the umbilical cord can be tied and the placenta can be left in the uterus, either allowing spontaneous reabsorption or enabling delayed hysterectomy to be performed. A double J catheter can be inserted into the bilateral ureters before the operation. If no cervical invasion is determined, supracervical hysterectomy should be performed, but total hysterectomy should be performed in the presence of cervical invasion (22). Following delivery of the fetus after transverse uterine incision, the uterus can be closed primarily after local excision of the part exhibiting abnormal placental invasion. If the myometrium tissue in the area with abnormal placental invasion is sufficiently thick (2 mm), the placenta can be



manually extirpated after delivery via the vaginal route or C/S, and a conservative approach can be adopted for bleeding in the placental bed (19).

Due to the increase in C/S rates in the last 10 years, a significant increase has also occurred in the number of pregnant women with placenta previa and PAS, and this also unfortunately increases C/S hysterectomy rates. High cesarean hysterectomy rates are associated with a history of previous C/S, placental invasion anomaly, placenta previa, and previous uterine scarring (23).

We observed varying degrees of placental adhesion anomalies in 20 patients in the study group. Twelve patients were evaluated as placenta percreata and all of them underwent a cesarean hysterectomy. This was an appropriate approach according to the ACOG 2018 guideline (24). All of the patients who underwent hysterectomy also had placenta previa totalis. The pregnancy history of these patients included at least one cesarean delivery, or uterine instrumentation such as curettage due to abortion, operative hysteroscopy or myomectomy. It is known that patients with placenta percreata have less blood loss and different morbidities with cesarean hysterectomy compared to the organ-preserving approach (25). Patients with placenta previa as well as any previous uterine surgery were considered to be risky in terms of placenta attachment anomaly (26). Patients were informed about the need for hysterectomy, blood transfusion, and damage to surrounding organs such as the bladder and ureter. Accordingly, their consent was obtained. The preoperative bilateral ureteral catheter was placed in all patients with suspected invasion by the urology department. We believe that there is a decrease in urological complications and operation time when a hysterectomy is performed with manual palpation of the ureters (27). In all patients with placenta previa totalis and for whom we predicted that there would be placental adhesion anomaly, babies were delivered by making a vertical midline skin incision and a fundal uterine incision at least 2 cm away from the placenta (28).

PAS is an important clinical entity in terms of antenatal complications, as it can increase morbidity and mortality in newborns due to preterm birth. Placental localization and morphology should be routinely evaluated during fetal anatomical screening in all pregnancies. Pregnant women with suspected placenta previa or PAS should be referred to a tertiary center with experienced specialists for follow-up and treatment. It should be remembered that the most important factor affecting prognosis in placental invasion anomalies is diagnosis in the antepartum period (29).

Placenta previa and PAS, the most important causes of postpartum hemorrhages and maternal morbidity and mortality, should be diagnosed without delay. All cases diagnosed with or suspected to be PAS should be referred to

a tertiary center with an experienced surgical and anesthesia team, and the requisite intervention should be performed at the most appropriate time. This is highly important in terms of reducing both maternal and fetal mortality and morbidity.

The strength of this review lies in its prototypical sample from central Turkey, the results being capable of generalization to most of the country's population. However, the study is limited by being conducted in a single tertiary care institution and its retrospective design.

## CONCLUSION

Advances in technology and improved ultrasound quality have made the diagnosis of placenta previa and PAS easier and more reliable. Examination of invasion status using USG is very important in determining the mode and timing of delivery in these cases. In particular, childbirth among women with PAS should be well planned with a multidisciplinary approach by an experienced team in tertiary centers.

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