ZKTB

ORIGINAL RESEARCH

Determination of Placenta-Myometrium Relationship in Caesarian Sections

Sezaryenlerde Plasentanın Myometrium ile İlişkisinin Değerlendirilmesi

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Placental attachment abnormalities is an important obstetric problem. Previous Caesarean scars are important risk factors for this pathology. We want to investigate PAA abnormalities preoperatively using gray scale and Doppler ultrasonography

ABSTRACT

Objective: *The relative prevalence of placental attachment abnormalities (PAA) has been increased lately. They may cause severe complications in respect to their types, and determining presence and the type of the invasion before delivery is important for the obstetrician. The objective of this prospective, cross – sectional and descriptive study was to investigate PAA preoperatively using gray scale and Doppler ultrasonography (USG) in patients who had a Caesarian section (C/S) at least once before and scheduled for C/S again, and to compare the results with histopathological diagnosis.*

Material and Methods: *A total of 104 pregnant women who admitted to Yıldırım Beyazıt University Medical Faculty, Atatürk Education and Research Hospital Obstetrics and Gynecology Department between January and July 2013, and scheduled for C/S were included in the study. All of the included patients had had C/S before, at least once. Gray scale and Doppler USG was performed in all patients to determine PAA, and the findings were compared with the histopathologic results of placental bed biopsy obtained during C/S.*

Results: *The indications for C/S were previous C/S once in 74%, previous C/S twice in 25.5%, and previous C/S more than twice in 1% of the patients. None of the patients had any suspicion for PAA intraoperatively, postoperative complications, or PAA in the histopathological diagnosis. There were no findings on Doppler USG in 77.9% of the patients, 20.2% of them had increased vascularity alone, 1.0% had increased vascularity and lacunar flow, and 1.0% had lacunar flow alone in the subplasental region. There were no findings on gray scale USG in 90.4% of the patients. There were placental lacunae and obliteration of the retroplacental clear zone in 2.0% of the patients, and the thinnest myometrial wall was <1 mm in the placental region in 7.6% of them.*

Conclusion: *Absence of PAA in our series may be due to factors such as our surgical technique, and individual wound healing processes. The mechanisms causing abnormal placentation are not still clear.*

Keywords: *pregnancy; ceaserian; placental attachment abnormalities; prenatal diagnosis*

ÖZET

Amaç: *Günümüzde görülme sıklığı rölatif olarak artmış olan plasental yapışma anomalileri (PYA) tiplerine göre ciddi komplikasyonlara yol açmakta, doğum öncesi invazyon varlığının belirlenmesi ve tipinin açıklanması doğumu gerçekleştirecek hekim açısından büyük önem taşımaktadır. Bu prospektif, kesitsel ve tanımlayıcı çalışmanın amacı, en az bir kez sezaryen (C/S) olmuş ve tekrar C/S planlanan hastalarda preoperatif gri skala ve doppler USG ile PYA açısından değerlendirip histopatolojik tanı ile karşılaştırmaktır.*

Gereç ve Yöntemler: *Bu amaçla Ocak 2013-Temmuz 2013 tarihleri arasında, Yıldırım Beyazıt Üniversitesi Tıp Fakültesi Ankara Atatürk Eğitim Araştırma Hastanesi Kadın Hastalıkları ve Doğum bölümüne başvuran, daha öncesinde en az bir kez C/S olan ve bu gebeliğinde de C/S planlanan toplam 104 olgu çalışma kapsamına alınmıştır. Bu gebelere preoperatif PYA'nın belirlenmesi amacıyla gri skala ve doppler USG yapılıp, intraoperatif plasental yatak biyopsisi alınarak histopatolojik inceleme ile karşılaştırılmıştır.*

Bulgular: *C/S endikasyonlarının %74'ü bir kez C/S, %25,5'i iki kez C/S ve %1'i ikiden fazla C/S'dir. Hastaların hiçbirinde intraoperatif PYA şüphesi, postoperatif komplikasyon ve patoloji sonucunda da PYA rastlanmamıştır. %77,9 hastada doppler USG normal çıkmıştır. %20,2'sinde yalnızca subplasental alanda vaskülarite artışı, %1,0'inde subplasental alanda vaskülarite artışı ve laküner akım varlığı, %1,0'inde yalnızca laküner akım varlığı görülmüştür. Gri skala USG'de %90,4 hastada herhangi bir bulguya rastlanmamıştır. %2,0'sinde plasental lakün ve retroplasental berrak alan obliterasyonu, %7,6'sında plasental alandaki en ince miyometriyal kalınlığın <1 mm olduğu görülmüştür..*

Sonuç: *Bizim çalışmamızda PYA görülmemesinin nedeni yapılan cerrahi tekniğe, bireysel yara iyileşmesi gibi faktörlere bağlanabilir. Anormal plasentasyona neden olan mekanizmalar hâlâ net değildir.*

Anahtar Kelimeler: *sezaryen, plasental yapışma anomalileri*

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INTRODUCTION

PAA is an important obstetric problem that can be life-threatening for both mother and fetus. Previous Caesarean scars are important risk factors for this pathology.

Abnormal placental implantation is classified as accreta, increta and percreta. Placenta accreta is the mildest of three decidual penetration forms of the chorionic villi. Placenta increta is invasion of myometrium by chorionic villi. Placenta percreta is the most severe implantation abnormality in which myometrium, uterine serosa, and frequently neighboring organs are invaded (1).

The incidence of placental invasion is between 1/500 and 1/2500, and was increased in last few decades due to increased prevalence of C/S (2). Despite well known risk factors, its etiology is not yet clear (3).

Peripartum complications increase in patients with abnormal placental adhesion to myometrium. Life threatening hemorrhage can be seen in these patients. Blood transfusions and hysterectomy may be needed. In addition, if other visceral structures of the pelvis are involved, a more complex surgical approach may be required. Early diagnosis of PAA helps surgeon for preoperative planning and consultations (4).

Although USG is the main diagnostic tool in the diagnosis of PAA, use of magnetic resonance imaging (MRI) has increased lately. MRI is usually ordered in patients with a high clinical suspicion of PAA, when USG is not sufficient for the diagnosis. Although histopathological diagnosis has been regarded as the gold standard in most of the studies, in clinical point of view, it is known that placenta accreta - increta and percreta can stand altogether in one patient, and this may cause discrepancies between clinical / surgical picture and histopathological diagnosis (for example when biopsy is performed in the region of superficial invasion) (5).

In this study, we investigated the localization of placenta and its relation with myometrium with Doppler – gray scale TA USG, and compared USG findings with the histopathological diagnoses.

MATERIAL AND METHOD

A total of 104 pregnant women who admitted to Yıldırım Beyazıt University Medical Faculty, Atatürk Education and Research Hospital Obstetrics and Gynecology Department between January and July 2013, and scheduled for C/S were included in the study. All of the included patients had had C/S before, at least once. Radiology Department performed preoperative gray scale and Doppler USG in all patients for presence of PAA, and intraoperative placental bed biopsies were performed to compare USG findings and histopathological diagnoses. This study is planned as a prospective, cross – sectional and descriptive study. Obtaining and evaluation of placental bed biopsies: After removal of the placenta and membranes during Caesarian section, a 1-1.5 cm3 biopsy material was obtained with scissors or scalpel under direct vision or by palpation from the area where the placenta and the membranes were detached the very last. No complications developed during these procedures. Placental bed biopsies were fixed in 10% formalin for 24 hours, and then embedded in paraffin. The 5-micron-thick sections obtained from paraffin blocks were stained with hematoxylin and eosin, and examined under the light microscope for placental attachment abnormalities.

The name, protocol number, age, gestational week, height (cm), weight (kg), body mass index (BMI), the number of pregnancies, parity, the number of living children, smoking status, previous surgery except for C/S and curettage, intrauterine deaths, abortus, ectopic pregnancy, history of curettage or molar pregnancy, antenatal follow up, early membrane rupture (EMR), modes of previous deliveries and indications for C/S, localization of placenta, presence of intraoperative PAA, postoperative complications, gray scale and Doppler USG findings, and the histopathological results of all included patients were noted.

Gray scale and color / power Doppler imaging was performed with Aplio 500 USG device, using a 3.5 MHz convex probe. First, placental localization was examined with gray scale examination, and the thinnest myometrial wall was measured at the placental region. Later, color Doppler imaging was used to search for lacunae, increased retroplacental vascularity, and presence of PAA. USG findings were compared with histopathological diagnoses. Statistical analysis: The data were analyzed with SPSS 15.0 statistical package program. Descriptive statistics were given as frequency, mean, median, and percent distribution, and the means were presented as mean ± standard deviation (SD).

RESULTS

The ages of the patients included in study ranged between 20 and 39 years, with a mean of 29.1 ± 4.4 years. Their mean gestational age was 37.8 ± 0.8 weeks (range 35.1-39.6 weeks), and mean BMI was 29.9 ± 4.2. The mean number of pregnancies was 2.8 ± 1.1 with a median of 3, the mean number of living children was 1.3 ± 0.6 with a median of 1, and the mean parity was 1.4 ± 0.6 with a median of 1. Among the patients included in the study, 14.4% smoked, 1% had history of dilatation and curettage (D/C) and uterine myomectomy (except C/S). Their history revealed intrauterine death in 4.8%, abortus in 23.1%, ectopic pregnancy in 1.0%, curettage once in 6.7%, curettage twice in 1.0%,and molar pregnancy in 1.9%. On antenatal follow up, diabetes mellitus (DM) was determined in 6.7%, and hypertension (HT) in 1.0% of the patients. Early membrane rupture (EMR) was seen in only 1.9% of the patients.

The delivery characteristics and placental localizations of the patients are given in Table 1.

Table 1: The delivery characteristics of the patients included in the study.

	Number (n)	Percent (%)
Indication for delivery	Total: 104	
C/S once	77	74.0
C/S twice	26	25.0
C/S three times	1	1.0
Placental localization	Total: 104	
Anterior	36	34.6
Posterior	23	22.1
Right side	13	12.5
Left side	10	9.6
Fundus	22	21.2

C/S: Caesarian section.

Table 2: The intraoperative and postoperative follow up data, USG findings and histopathological diagnoses of the patients.

	Number (n)	Percent (%)
Intraoperative PAA		
Absent	104	100
Present	-	-
Postoperative complications		
Absent	104	100
Present	-	-
Doppler USG		
No findings	81	77.9
Increased vascularity in subplacental zone	21	20.2
Increased vascularity in subplacental zone, and presence of lacunar flow	1	1.0
Presence of lacunar flow	1	1.0
Gray scale USG		
No findings	94	90.4
Placental lacunae and obliteration of the retroplacental clear zone	2	2.0
The thinnest myometrial wall as < 1 mm in the placental region	8	7.6
Histopathological diagnosis		
No PAA	104	100
PAA positive	-	-

PAA: Placental attachment abnormality, **USG**: Ultrasonography.

The mode of first delivery was C/S in 90.4%of the patients. The indications for C/S were previous C/S once in 74%, previous C/S twice in 25.5%, and previous C/S more than twice in 1% of the patients. Analysis of the placental localizations showed that 34.6% were localized at anterior, 22.1% were localized at posterior, 12.5% were localized at the right side, 9.6% were localized at the left side, and 21.2%were localized at the fundus of the uterus.

The intraoperative and postoperative follow up data, USG findings and histopathological diagnoses of the patients are shown in Table 2.

None of the patients showed intraoperative or postoperative histopathological PAA. The patients included in this study were analyzed for following 6 parameters by Doppler USG:

1. Increased vascularity in subplacental zone,

2. Presence of lacunar flow,

3. Bridging vessels from placenta to uterus, including serosa,

4. Hypervascularity at bladder - uterus serosal surface,

5. Vessels emanating from placenta towards bladder,

6. Crossing vessels at the surface of placental tissue.

There were no findings on Doppler USG in 77.9% of the patients, 20.2% of them had increased vascularity alone, 1.0% had increased vascularity and lacunar flow, and 1.0% had lacunar flow alone in the subplasental zone.

The patients included in this study were analyzed for following 6 parameters by gray scale USG:

1. Placental lacunae,

2. Obliteration of the retroplacental clear zone,

3. Disturbance of the relation between uterus surface and bladder's posterior wall,

4. Determination of the thinnest myometrial wall as < 1 mm beneath the placenta,

5. Echogenic focal exophytic masses in the placenta along uterine serosa,

6. Disturbances on the placental surface (irregularities and myometrial invasion).

There were no findings on gray scale USG in 90.4% of the patients. There were placental lacunae and obliteration of the retroplacental clear zone in 2.0%, and the thinnest myometrial wall was < 1 mm in the placental region in 7.6% of the patients.

Other investigated parameters were not seen in any of the patients.

Since PAA was not found in any of the patients included in the study, its relation with other parameters could not be analyzed statistically [age, gestational week, height (cm), weight (kg), BMI, the number of pregnancies, parity, the number of living children, smoking status, previous surgery except for C/S and curettage, intrauterine deaths, abortus, ectopic pregnancy, history of curettage or molar pregnancy, antenatal follow up, EMR, modes of previous deliveries and indications for C/S, localization of placenta, presence of intraoperative PAA, postoperative complications, gray scale and Doppler USG findings].

DISCUSSION

PAA is a current histopathological diagnosis, and it was first described in the 20th century. Many pathological lesions we know today were not known by pathologists and anatomists in the 18th and 19th centuries. The reports indicate that PAA was not seen or rarely seen until 1930s (6). When we consider from this point of view, and take the complications it causes during delivery, it is not probable that PAA was recognized that late. Therefore it is supposed that there were no diagnostic problems in the past, but the factors causing PAA were scarce. The data about the natural evolution process of these data are insufficient (6).

One of the largest studies performed on PAA was done by Gielchinskyet al. This study was performed on 310 patients between 1990 and 2000, and history of C/S, placenta praevia, advanced maternal age, increased number of gravida and parity, curettage, and multiple abortuses were determined as the risk factor for PAA (7). Since PAA was not found in any of the patients included in the study, its relation with other parameters could not be analyzed statistically [age, gestational week, height (cm), weight (kg), BMI, the number of pregnancies, parity, the number of living children, smoking status, previous surgery except for C/S and curettage, intrauterine deaths, abortus, ectopic pregnancy, history of curettage or molar pregnancy, antenatal follow up, EMR, modes of previous deliveries and indications for C/S, localization of placenta, presence of intraoperative PAA, postoperative complications, gray scale and Doppler USG findings].

Previous C/S and intrauterine surgical procedures are the most important two risk factors for PAA (8-12). The largest series in the United States reported its prevalence as 1:540-1:2500 (10). Such a large range may be related to different clinicopathological definitions and differences in regional C/S rates. Histopathological diagnosis is the gold standard in PAA, but since postpartum bleeding can be controlled without postpartum hysterectomy, and there are no biopsy materials available for a histopathological diagnosis, PAA cannot be determined as the cause of the bleeding.

PAA accompanies 5% of the pregnancies with placenta praevia (8-10). Endometritis, manual placenta removal, myomectomy, histeroscopic surgery, IVF procedures, endometrial resection, uterine artery embolization, chemotherapy, radiation, bicornuate uterus, adenomyosis, submucous fibroids, and myotonic dystrophy were also reported as risk factors for PAA (8, 13, 14).

With the rapid increase in C/S incidence, the contributions of other risk factors for PAA development have decreased. Only one of the patients included in our study had the history of myomectomy. Since there was no PAA in this patient, and myomectomy history was present in only one patient, we could not analyze the relation between history of myomectomy and PAA. Gynecologic conditions such as adenomyozsis can rarely be recognized before pregnancy and cause misunderstanding, a number of clinicians suggest that PAA can develop in a uterus with a normal structure. A maternal age > 35 years increases the risk of placenta accreta 3.2-fold. This increased risk is probably related to multiparity and previous uterine surgery.

Surgical abortion, intrauterive device placement, and uterine curettage are the most widely performed procedures, and are related to PAA (8-10). Although 4.8% of the patients included in our study had the history of intrauterine death , 23.1% had abortus, 1.0% had ectopic pregnancy, 6.7% had curettage once, 1.0% had curettage twice, and 1.9% had molar pregnancy, none of them developed PAA. Myometrial fragments can be seen in approximately 1/3 of the surgical pregnancy terminations and curettage performed for abortus (14). In fact, the direct relations of these conditions with PAA are not clear. Larger and deeper myometrial injuries are associated with worse re-epithelization of the scar tissue. The relation of PAA with the surgical technique used in C/S (monolayer/ multilayer suturing or the type of the suture material used) is not clear.

Smoking can be a risk factor for PAA due to its close relationship with placenta praevia. The prevalence of placenta praevia is 250-fold increased in smoking mothers. An analysis on 371 placenta praevia cases reported that prenatal smoking could be an important predictor (15). In our study, 14.4% of the patients were smoking, but a statistical analysis could not be done since we did not determine PAA in any of our patients.

Although aforementioned risk factors have been reported to increase the risk of PAA, the effect of primary C/S indication on abnormal placentation has not been proven yet. It is not yet clear whether PAA increases after primary elective C/S where myometrium is thicker, or after primary or emergent C/S during labor where myometrium is thinner. The risk of PAA was found lower in C/S done during labor with an indication, when compared to the primary C/S performed without any indication (16). This suggests that PAA risk increases when a thick myometrium is cut. Placentation changes are possible in the subsequent pregnancies due to the immunological - biochemical changes occurring in the myometrium during labor (17, 18). However, vaginal deliveries before C/S are not related with this risk (16).

Some factors have been proposed to explain abnormal placentation in PAA. The oldest opinion is excessive invasion of primary defect by trophoblastic function in uterine myometrium (19). Another hypothesis claims that the secondary basalis defect in uterus scar region developed due to decidualization fault may cause abnormally deep trophoblastic invasion (20). The last hypothesis claims that abnormal vascularization and secondary localized ischemia in postoperative scarring process cause both faulty decidualization and excessive trophoblastic invasion (21).

USG is the primary screening tool in women with PAA risk. The gray scale USG findings suggestive of PAA are obliteration of myometrial space or retroplacental clear zone, reduced myometrial thickness, chaotic intraplacental blood flow, and intraplacental lacunae.

In our study, a total of 104 women were examined both by gray scale and Doppler USG preoperatively. There were no findings on gray scale USG in 90.4% of the patients. There were placental lacunae and obliteration of the retroplacental clear zone in 2.0 % of the patients, and the thinnest myometrium in the placental region was < 1 mm in 7.6% of the patients. However other findings were not seen in any of them. On Doppler USG, there were no findings in 77.9% of the patients, 20.2% of them had increased vascularity alone, 1.0% had increased vascularity and lacunar flow, and 1.0% had lacunar flow alone in the subplasental zone. However other findings were not seen in any of them. Since none of the patients included in the study had placental attachment abnormalities, the specificity and sensitivity of the gray scale and Doppler USG findings could not be analyzed.

In conclusion, surgery and PAA are interrelated. PAA develops secondary to a surgically induced uterine abnormality. From a point of view, PAA can be suggested as the iatrogenic uterine disease of 20th century. The absence of PAA in our study patients may be related to previous surgical technique, and wound healing factors of the individuals. Despite the risk factors for PAA have been put forth, the mechanisms causing abnormal placentation are not clear. The limitations of our study are the small number of patients in our series, and a different team performing previous C/S procedures. Studies performed on a larger series in which the operations performed by the same team are needed to further clarify our results.

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