ORIGINAL ARTICLE

Role of Sonography in Prenatal Evaluation of Placenta Accreta

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ABSTRACT:
Objective: To evaluate the diagnostic accuracy of gray scale and doppler examination in antenatal diagnosis of placenta accreta.
Materials and Methods: This is a prospective study done in a tertiary care center having large number of obstetrical cases,Ziauddin University hospital during a period of ten months from 12th August 2014 to 11th June 2015.Thirty seven pregnant high risk cases all with clinical suspicion of placenta accreta were subjected to sonographic evaluation using gray scale and color doppler imaging by senior radiologists. Presence of vascular lacunae with turbulent flow, loss of retro-placental clear space, vessels traversing the uterine serosa, thin out myometrium and interrupted retro-placental flow was evaluated sonographically. Maternal delivery records were reviewed for delivery outcomes and sonographic findings were confirmed at delivery on surgical and clinical findings.
Results: The diagnostic sensitivity of ultrasound for placenta accreta was 93.3% and specificity was 85.7%. Positive predictive value was 96.5% whereas negative predictive value of 75%.
Conclusion: Gray scale and color Doppler sonography has fairly good sensitivity for prenatal diagnosis of placenta accreta
Keywords: Placenta accreta, Sonography, Color Doppler, Sensitivity, Specificity

INTRODUCTION:

Placenta accreta is an important cause of maternal morbidity and mortality and is becoming the major reason for emergent postpartum hysterectomy. Two recent studies conducted in the United States propose a prevalence of one in 2500 deliveries, with both studies using both clinical and pathologic diagnoses.[1,2,3]The incidence of placenta accreta has increased with the growing number of cesarean deliveries. Recent estimate signifies a 25% to 50% incidence of placenta accreta in patients with placenta previa and prior cesarean delivery.[1]Morbidly adherent placenta implies an abnormal implantation of placenta into the uterine wall which could be placenta accrete vera, increta or percreta. In Placenta accrete vera placental villi adhere directly to the myometrium. In placenta increta placental villi invade into the myometrium and in placenta percreta placental villi invade through the myometrium and into the serosa. Placenta previa and previous cesarean section are the most important known risk factors for Placenta accreta. The clinical outcome of Placenta accreta is massive hemorrhage during placental separation. Hysterectomy is frequently required, serving to serious co-morbidities such as cystotomy (15.4% of cases), ureteral injury (2.1%), and pulmonary embolus (2.1%), with 26.6% of patients admitted to the intensive care unit.[4] Placenta percreta can also lead to the damage of adjacent organs, mostly leads to bladder injury. The exact pathogenesis of placenta accreta is not obvious, however, there have been several theories proposed. It is documented that abnormal vascularization due to scarring process after surgery with secondary localized hypoxia can lead to both faulty decidualization and disproportionate trophoblastic invasion.[5,6,7] Prenatal diagnosis of placenta accreta can help reducing the complication rate by enabling a surgeon to plan for the type of resources required at the time of delivery. Cesarean section is generally planned at 36 weeks gestation to minimize the risk of spontaneous labor. Surgical preparation regarding matters such as site of incision and need for uterine artery balloon occlusion can be individualized. The accuracy of sonography using gray scale and Color Doppler techniques for prenatal diagnosis of placenta accreta varies broadly in different studies. Its sensitivity has been described in range of 33% and 100%, and the specificity also varies broadly.[8,9,10,11,12,13] The aim of present study was to evaluate the accuracy of sonography in prenatal diagnosis

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of placenta accreta.

MATERIALS AND METHODS:

It is a prospective study done in Ziauddin University Hospital during a period of ten months between 12th August 2014 to 11th June 2015. It is a tertiary care institute with large number of obstetric patients. Our study population included 37 pregnant females. All cases having clinical suspicion of placenta accreta were sonographically evaluated using Gray scale and Color Doppler imaging by senior radiologists. Presence of vascular lacunae with turbulent flow, loss of retroplacental clear space, vessels traversing the uterine serosa, thin out myometrium and interrupted retroplacental flow was evaluated sonographically. Maternal delivery records were reviewed for delivery outcomes.

The placenta was considered normal if it was easily delivered during cesarean delivery without any bleeding complications. Ideally, the standard of reference for the diagnosis of abnormal adherent placenta is histological evaluation after hysterectomy has been performed. However, hysterectomy is not always clinically indicated and management should be conservative (decision to leave the placenta to involute in situ if bleeding is controlled, or pre-surgical uterine artery balloon embolization). Therefore, in these cases pathologic evaluation was unavailable therefore the diagnosis was based on clinical information provided at the time of delivery and surgery. The placenta was considered as accreta by clinical criteria including hemorrhage and adherent placenta during cesarean section or when it was evident that the placenta had reached the uterine serosa or the adjacent organs.The sensitivity, specificity, positive predictive value (PPV), and negative predictive value(NPV) were calculated for sonographic diagnosis of placenta accreta. All calculations were done using SPSS version 19.

RESULTS:

37 patients underwent sonographic evaluation for prenatal diagnosis of placenta accreta.29 patients were given the diagnosis of placenta accreta on the basis of ultrasound findings and 28 out of 29 patients were found to have placenta accreta on final diagnosis. Out of 37 patients 8 patients were given no sonographic evidence of placenta accreta. Out of these 8 patients 6 patients were clinically positive for absence of placenta accreta.The diagnostic sensitivity of ultrasound for placenta accreta was establish as 93.3% and specificity as 85.7% with positive predictive value of 96.5% and negative predictive value of 75%.Placental lacunae showing turbulent flow on color doppler were found to be the most sensitive imaging feature to predict the sonographic evidence of placenta accreta with sensitivity of 92% and specificity of 82%.Vessel traversing the uterine serosa was established as the most specific feature to diagnose placenta accrete sonographically with specificity of 95%.Presence of placenta previa and prior history of cesarean section are strongly associated with increased risk of placenta accreta. We have found that the risk of accreta increases with increased number of previous cesarean sections. Out of 37 patients all had history of previous cesarean scar and out of them only 5 (n=13) had history of single cesarean section. 86% (n = 32) of patient had low lying placenta, among these 32 patients 15 patients had grade 3 placenta previa, 5 had grade 4 placenta previa, 8 presented with grade 2 and 4 patients had grade 1 placenta previa. Increased maternal age was also found to be associated with increased risk of placenta accreta, mean age of the patients diagnosed with placenta accrete was calculated as 27 years.Most of the cases were diagnosed between 32 to 36 weeks of gestation.Out of 37 cases about half of them were confirmed of having placenta accreta on clinical and surgical criteria.

Table: 1

Sensitivity	93.3%
Specificity	85.7%
Positive predictive value	96.5%
Negative predictive value	75%

DISCUSSION:

Placenta accreta is a considerable source of maternal morbidity and mortality and is now the most common cause of peripartal hemorrhage resulting in emergent postpartum hysterectomy. Our study evaluated that ultrasound using color doppler imaging can correctly diagnose placenta accrete antenatally for proper surgical planning in order to reduce the risk of life threatening peripartal hemorrhage. The incidence of placenta previa and placenta accreta was amplified as regards to increased rate of cesarean sections, frequency of placenta accreta in the existence of placenta previa rising from 24% after one cesarean section to about 67% after four or more cesarean sections.[14]These results agree with our study which signifies the history of previous cesarean section in all patients with placenta accreta and only five had previous single cesarean scar, so we establish that the risk of placenta accreta increases with the increase in number of previous cesarean section.The study done by Dwyer[15]in 32 patients established the sensitivity of sonography for diagnosis of placenta accreta as 93% and specificity as 71%. They have mentioned in their study limitations that their study might have underestimated the sensitivity and specificity of sonography. This justifies our study results that have estimated the sensitivity of sonography for evaluation of placenta accreta as 93.3% and specificity of 85.7%. Esakoff[16]in 108 patients, have documented sensitivity of 89.5%, specificity 91%, positive predictive value(PPV) of 68%, and negative predictive value (NPV) of 98%. Shih[17]evaluated 170 patients and found sensitivity of 97%, specificity of 92%, PPV of 77% and NPV 99%.Warshak[18]in 453 patients have documented sensitivity of 77%, specificity of 96%, PPV of 65% and NPV of 98%.Wong [19]in 66 patients found sensitivity of 89%, specificity of 98%, PPV of 89% and NPV of 98%. In our study 37patients were evaluated and we found sensitivity of 93.3%, specificity of 85.7%, PPV of 96.5% and NPV of 75%. Our results are coinciding with all

these studies. Thus Sonographic imaging is the cheapest and prompt imaging technique to use for the evaluation of placenta accreta with high sensitivity and specificity.Ultrasound examination with color Doppler imaging and MRI have all been used in the diagnosis of placenta accreta with varying specificity and sensitivity. Ultrasound and color Doppler examination are the first step for the diagnosis of placenta accreta.[20,21,22,23,24]MRI should be used as a complementary tool when ultrasound evaluation is equivocal or when the placenta is hardly visualized on ultrasound examination.[25]

The limitation of our study was that not all the cases went through pathological evaluation as about half of cases were confirmed on clinical and surgical findings.

CONCLUSION:

Both gray scale ultrasound and color Doppler examination are highly accurate in predicting the radiological patterns of placenta accreta. It can save not only the time and money but life of high risk and clinically diagnosed cases of placenta accreta.

REFERENCES:

1. Miller DA, Chollet JA, Goodwin TM. Clinical risk factors for placenta previa-placenta accreta. Am JObstetGynecol 1997;177:210-14
2. ACOG Committee on Obstetric Practice. ACOGCommittee opinion no. 266, January 2002: placenta accreta. ObstetGynecol 2002;99:169-70
3. Silver RM, Landon MB, Rouse DJ. Maternal morbidity associated with multiple repeat cesarean deliveries. ObstetGynecol 2006;107:1226-32
4. Usta IM, Hobeika EM, Musa AA, Gabriel GE, Nassar AH. Placenta previa-accreta: risk factors and complications. Am J Obstet Gynecol 2005;193:1045-9
5. Wehrum MJ, Buhimschi IA, Salafia C. Accreta complicating complete placenta previa is characterized by reduced systemic levels of vascular endothelial growth factor and by epithelial-to-mesenchymal transition of the invasive trophoblast. Am J ObstetGynecol2011; 204:411.e1-411.e11
6. Tantbirojn P, Crum CP, Parast MM. Pathophysiology of placenta accreta: the role of deciduas and extravilloustrophoblast. Placenta 2008;29:639-45
7. Strickland S, Richards WG. Invasion of the trophoblast. Cell 1992;71:355-7
8. Lam G, Kuller J, McMahon M. Use of magnetic resonance imaging and ultrasound in the antenatal diagnosis of placenta accreta. J SocGynecolInvestig 2002;9:37-40
9. Finberg HJ, Williams JW. Placenta accreta: prospective diagnosis in patients with placenta previa and prior cesarean section. J Ultrasound Med 1992;11:333-43
10. Levine D, Hulka CA, Ludmir J, Li W, Edelman RR. Placenta accreta: evaluation with color Doppler US, power Doppler US, and MR imaging. Radiology 1997; 205:773-6
11. Chou MM, Tseng JJ, Ho ESC. Prenatal diagnosis of placenta previaaccreta by transabdominal color Doppler ultrasound. Ultrasound Obstet Gynecol 2000;15:28-35
12. Comstock CH, Love JJ Jr, Bronsteen RA. Sonographic detection of placenta accreta in the second and third trimesters of pregnancy. Am J Obstet Gynecol 2004;190: 1135-40
13. Wong HS, Zucollo J, Parker S, Burns K, Tait J, Pringle KC. Antenatal diagnosis of non-previa placenta increta with histological confirmation. Ultrasound Obstet Gynecol 2006;27:467-9
14. Japaraj RP, Mimin TS, Makudan K. Antenatal diagnosis of placenta previaaccreta in patients with previous cesarean scar. J Obstet Gynecol 2007;33(4):431-7
15. Dwyer BK, Belogolovkin V, Tran L. Prenatal diagnosis of placenta accreta: sonography or magnetic resonance imaging? J Ultrasound Med 2008; 27:1275-81
16. Esakoff TF, Sparks TN, Kaimal AJ. Diagnosis and morbidity of placenta accreta. Ultrasound ObstetGynecol2011; 37:324-7
17. Shih JC, Palacios Jaraquemada JM, Su YN. Role of three-dimensional power Doppler in the antenatal diagnosis of placenta accreta: comparison with gray-scale and color Doppler techniques. Ultrasound Obstet Gynecol2009; 33:193-203
18. Warshak CR, Eskander R, Hull AD. Accuracy of ultrasonography and magnetic resonance imaging in the diagnosis of placenta accreta.Obstet Gynecol 2006; 108:573-81
19. Wong HS, Cheung YK, Zuccollo J, Tait J, Pringle JC. Evaluation of sonographic diagnostic criteria for placenta accreta. J Clin Ultrasound 2008; 36:551-9
20. Chou MM, Ho ES, Lee YH. Prenatal diagnosis of placenta previa accreta by transabdominal color Doppler ultrasound. Ultrasound ObstetGynecol2000; 15:28-35
21. Lau WC, Fung HY, Rogers MS. Ten year experienceof caesarean and postpartum hysterectomy in a teaching hospital in Hong Kong. Eur J Obstet Gynecol Reprod Biol 1997;74:133-7
22. Grobman WA, Gersnoviez R, Landon MB.Pregnancy outcomes for women with placenta previain relation to the number of prior cesarean deliveries Obstet Gynecol 2007;110:1249-55
23. Levine D, Hulka CA, Ludmir J, Li W, Edelman RR.Placenta accreta: evaluation with color Doppler US,power Doppler US, and MR imaging. Radiology 1997;205:773-6
24. Japaraj RP, Mimin TS, Mukudan K. Antenatal diagnosis of placenta previa accreta in patients with previous cesarean scar. J Obstet Gynaecol Res 2007; 33:431-7
25. Comstock CH. Antenatal diagnosis of placenta accreta: a review. Ultrasound Obstet Gynecol 2005;26:89-96