

Diagnosis of placenta accreta by ultrasonography: a "gold standard"?

Diagnóstico de placenta accreta por ecografia: "gold standard"?

Carla Nunes*, Rui M. Carvalho**, Cláudia Araújo**, Susana Santo**, Antonieta Melo***, Luís M. Graça****

Departamento/Clínica Universitária de Obstetrícia e Ginecologia, CHLN – Hospital Universitário de Santa Maria

Faculdade de Medicina da Universidade de Lisboa, CAM – Centro Académico de Medicina de Lisboa

Abstract

Introduction: Placenta accreta occurs when part of the placenta or the entire placenta invades and is inseparable from the uterine wall. The diagnosis of placenta accreta before delivery allows multidisciplinary planning in an attempt to minimize potential maternal or neonatal morbidity and mortality. The diagnosis is usually established by ultrasonography and occasionally supplemented by magnetic resonance imaging. Our aim is to make a retrospective analysis of ultrasound findings of placenta accreta in women followed at our Department.

Material and Methods: Retrospective analysis of the ultrasound findings of placenta accreta in women followed between March 2009 and May 2013. The degree of placental invasion and its specific topography were established in the operating room according to clinical and anatomical criteria.

Results: Seven patients were included in this study. Multiple ultrasound findings of placenta accreta were found simultaneously. Surgical results were closely related to the degree and level of invasion evidenced through imagiological assessment.

Discussion and Conclusion: Our data is in accordance with the published consideration that ultrasonography is sensitive and specific enough for the diagnosis of placenta accreta.

Keywords: Placenta accreta; Ultrasonography; Diagnosis.

INTRODUCTION

Placenta accreta occurs when part of the placenta or the entire placenta invades and is inseparable from the uterine wall. Three grades of abnormal placental attachment are defined according to the depth of invasion: *accreta* (chorionic villi attach to the myometrium), *increta* (chorionic villi invade into the myometrium), *percreta* (chorionic villi invade through the myometrium and serosa, and occasionally into adjacent organs, such as the bladder)¹. In this paper, the general term "placenta accreta" will refer to all 3 grades of abnormal placental attachment unless otherwise specified.

The incidence of placenta accreta has increased and seems to be parallel to the increasing cesarean delivery rate²⁻⁴. Prior uterine surgery, myomectomy and curettage, in addition to cesarean section, have all been

associated with abnormal placentation, but more ominously, placenta previa has been associated with a high risk of placenta accreta²⁻⁴. Placenta accreta occurred in 9.3% of women with placenta previa and in 0.004% of women without placenta previa⁵.

Unexpected situations of placenta accreta can lead to catastrophic blood loss, multiple complications such as adult respiratory distress syndrome, Sheehan's syndrome, renal failure, and even death⁵. The value of making the diagnosis of placenta accreta before delivery is that it allows for multidisciplinary planning in an attempt to minimize potential maternal or neonatal morbidity and mortality^{6,7}.

The diagnosis is usually established by ultrasonography and the features suggestive of placenta accreta include vascular spaces within the placenta, thinning of the myometrium overlying the placenta, loss of the retroplacental "clear space", protrusion of the placenta into the bladder, increased vascularity of the uterine serosa and turbulent blood flow through the lacunae on Doppler ultrasonography^{5,8}.

Ultrasound is the first-line method to diagnose pla-

*Interna Complementar de Obstetrícia e Ginecologia

**Assistente Hospitalar de Obstetrícia e Ginecologia

***Chefe de Serviço de Obstetrícia e Ginecologia

****Director do Departamento e Professor Catedrático

cental invasion⁹; nevertheless, when it is necessary to characterize the lesion topography in relation to soft pelvic tissues, when there are ambiguous ultrasound findings or a suspicion of a posterior placenta accreta, with or without placenta previa, ultrasonography may be insufficient and placental magnetic resonance imaging (MRI) is required^{6,10}.

This aim of this study is to perform a retrospective analysis of the ultrasound findings of placenta accreta in the women surveilled at our Department.

MATERIAL AND METHODS

Retrospective analysis of the ultrasound findings of placenta accreta in the women surveilled at our Department, between March 2009 and May 2013.

The diagnosis of placenta accreta was made at our Ultrasound Unit, during the second or third trimesters of pregnancy.

Scans were performed by 5 registered sonographers, who are specialized in fetal imaging.

Ultrasound scanners with linear and sectorial 3.5 and 5MHz transducers and also 5 and 7MHz transvaginal transducers were employed, by GE Voluson 730 Expert and Voluson E8.

The ultrasound findings considered as criteria of placenta accreta were vascular lacunae, myometrial thinning, loss of the retroplacental “clear space” and interruption of bladder line.

Ultrasound results were retrospectively analyzed and compared with surgical findings.

The degree of placental penetration and its specific topography were established in the operating room according to clinical and anatomical criteria.

Data collected from our databases included demo-

graphic data, obstetric history, specific ultrasound diagnosis, gestational age at diagnosis, surgical findings and general outcome of the mother and the fetus.

RESULTS

Seven cases of pregnant women with ultrasound signs of placenta accreta were surveilled at our Department.

Mother’s age ranged between 28 and 41 years and all of them had previous cesarean sections (Table I).

Multiple ultrasound findings of placenta accreta were found simultaneously (Table II; Figures 1-3). The ultrasound evaluation showed that in all cases the placenta was previa and in the majority was percreta (n= 6).

Only 1 of our 7 cases of placenta accreta was not identified in the second trimester (case 7). That woman was admitted for the first time at our hospital at 28 weeks, after a third trimester obstetric hemorrhage.

The majority of these women were admitted in our Department some weeks before the scheduled cesarean section for surgical planning with a multidisciplinary care team. Delivery planning involved obstetricians, surgeon-gynecologists, neonatologists, anaesthesiologists and urologists, to optimize the patient’s outcome. Cesarean hysterectomy was scheduled for 35-37 weeks of gestation, after preoperative ureteric stent placement. Support performed by the intensive care unit was also set.

Total hysterectomy was carried in 6 patients and uterine conservation was possible in 1 case (case 6).

Surgical results were closely related to the degree and level of invasion diagnosed by ultrasound (Table III; Figures 3 and 4).

Maternal outcomes were favorable, despite the ex-

TABLE I. DEMOGRAPHIC DATA OF PREGNANT WOMEN WITH PLACENTA ACCRETA

Patient	Age (years)	Previous C-section (n)	Previous Vaginal delivery (n)	Previous Curettage (n)
1	34	2	0	0
2	41	3	0	0
3	36	2	1	1
4	40	2	0	0
5	28	1	2	1
6	34	1	0	0
7	39	2	0	0

TABLE II. ULTRASOUND FINDINGS IN PATIENTS WITH PLACENTA ACCRETA

Patient	Week of the diagnosis	Established diagnosis	Vascular lacunae	Myometrial thinning	Retroplacental "clear space" loss	Interruption of bladder line
1	20	Previa Percreta	+	+	+	+
2	23	Previa Percreta	+	+	+	+
3	22	Previa Increta	+	+	+	-
4	22	Previa Percreta	+	+	+	+
5	21	Previa Percreta	+	+	+	-
6	24	Previa Percreta	+	+	+	-
7	28	Previa Percreta	+	+	+	Suspicion

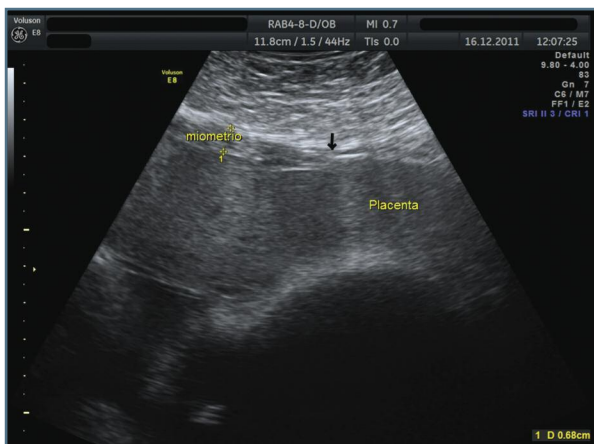


FIGURE 1. Thinning of the myometrium overlying the placenta (arrow) (case 3)

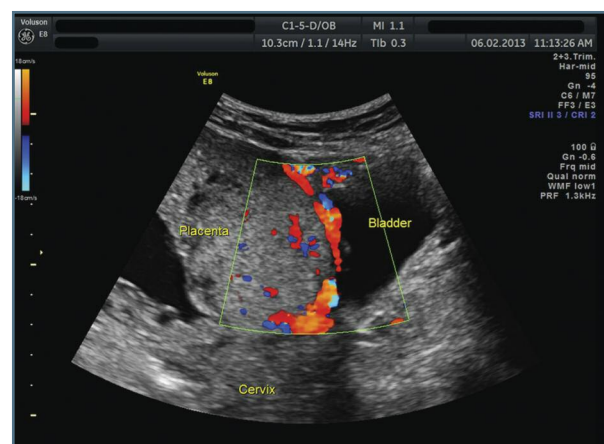


FIGURE 2. Vascular spaces, turbulent blood flow through the lacunae and increased vascularity of the serosa (case 4)

pected blood transfusions in all cases and the expected hysterectomy in 6 cases. It was also performed a partial cystectomy and bladder reconstruction in cases 2, 4 and 7.

Fetal outcomes were also favorable in the majority of the cases, with the exceptions of cases number 4 and 5. In the case number 4, it was performed an urgent cesarean section at 28 weeks of pregnancy because of severe bleeding and the newborn was admitted in neonatal intensive care with the diagnosis of respiratory distress syndrome of prematurity and hypoxic-ischemic encephalopathy. In the case number 5 it was diagnosed

a fetal anencephaly and it was planned a medical termination of pregnancy, which involved a hysterectomy, before 24 weeks of pregnancy.

DISCUSSION AND CONCLUSION

Grayscale ultrasonography is sensitive and specific enough for the diagnosis of placenta accreta⁶. However, reports of discrepancies between ultrasound diagnosis and surgical complexity are usual, which make therapeutic planning difficult. Color Doppler and

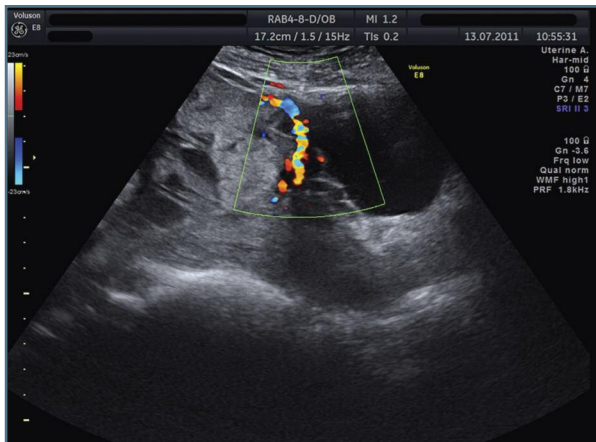


FIGURE 3. Increased vascularity of the uterine serosa (the same case of Figure 4)

power Doppler were used in order to reduce the diagnostic error of conventional ultrasound¹¹⁻¹², nevertheless, when it was necessary to characterize the lesion topography, in relation to soft pelvic tissues, MRI was required¹⁰.

The use of gadolinium contrast enables MRI to more clearly delineate the outer placental surface relative to the myometrium and differentiate between the heterogeneous vascular signals within the placenta from those caused by maternal blood vessels⁶. However, intravenous gadolinium should be avoided during pregnancy and should be used only if absolutely essential, because the risk of possible fetal effects¹³.

Diagnosis of placenta accreta before delivery allows multidisciplinary planning in an attempt to minimize potential maternal or neonatal morbidity and mortality^{6,7}.

If there is a strong suggestion of the presence of

abnormal placental invasion, health care providers practicing at small hospitals with insufficient blood bank supply or inadequate availability of subspecialty and support personnel, should consider patient transfer to a tertiary perinatal care center⁶, as is the case of our hospital. Improved outcomes have been demonstrated when these patients give birth in specialized tertiary care centers¹⁴.

It is believed that an accurate presurgery diagnosis would make it possible to minimize risks and plan a safer surgery¹⁵.

Prior uterine cesarean section and curettage have been strongly associated with abnormal placentation²⁻⁴. In our series, 5 women had more than one cesarean section and the other 2 had only one. Two of them also had a previous curettage. Placenta previa has been associated with a high risk of placenta accreta²⁻⁴. In this group all the placentas were previas.

All the pregnant women of our group had vascular spaces within the placenta and thinning of the myometrium overlying the placenta.

Multiple venous structures occurring throughout the myometrium and placenta in placenta accreta were first described by Kerr de Mendonça in 1988¹⁶. The presence and increasing number of lacunae within the placenta at the second trimester of gestation have been shown to be the most predictive ultrasonographic sign of placenta accreta, with a sensitivity of 79% and a positive predictive value of 92%¹⁷. The presence of lacunae was also found to be significantly associated with risks of disseminated intravascular coagulopathy, massive transfusions, and intensive care need¹⁸, as occurred in our series, despite the favorable global outcomes.

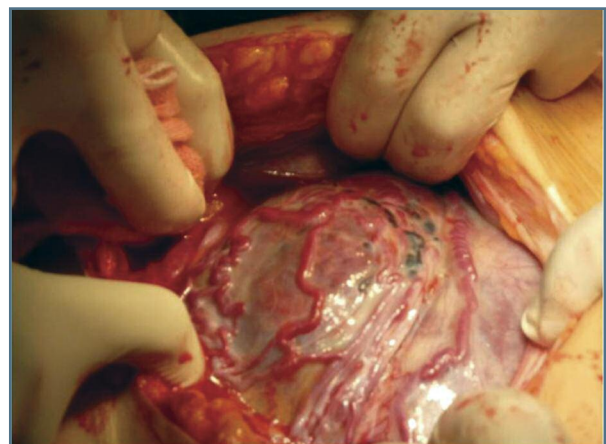


FIGURE 4. Thin and vascularised uterine lower segment at the time of c-section (case 2)

TABLE III. BLADDER INVASION IN PATIENTS WITH PLACENTA ACCRETA

Patient	Ultrasound	Surgical findings
1	Yes	Yes
2	Yes	Yes
3	No	No
4	Yes	Yes
5	No	No
6	No	No
7	Suspicion	No

Progressive thinning of the retroplacental myometrium indicates the proximity of placental tissue to the peritoneal serosa or surrounding viscera, particularly the bladder¹⁹.

An abnormal clear space in the lower uterine segment was also a frequent finding, as we also observed in our series, but its usefulness appears to be as support for other findings and, if isolated, is usually a false-positive diagnosis¹⁷.

Finberg and Williams added "uterine serosa-bladder line" interruption as additional criteria for placenta accreta, when they looked prospectively at third trimester patients who had both a previous cesarean delivery and placenta previa²⁰. Lack of myometrial tissue could result in thinning or disruption of the vesicouterine interphase, which has been found to be associated with greater compromise. Distinguishing between irregularities of the bladder wall and placenta accreta may be difficult^{17,20}. We have 3 cases of interruption of bladder line and protrusion of the placenta into the bladder, diagnosed by ultrasonography and confirmed in the operating room. In case number 7 there was a suspicion of protrusion of the placenta into the bladder that was not confirmed surgically.

There is insufficient evidence to support routine MRI scanning of patients with sonographically suspected placenta accreta to improve management and outcome¹⁹. MRI is often recommended when ultrasound findings are inconclusive, but is considered an adjunctive modality, that adds little to the diagnostic accuracy of ultrasonography⁶. MRI findings suggestive of placenta accreta include uterine bulging, heterogeneous signal intensity within the placenta, dark intraplacental bands on T2-weighted images, tenting of the bladder, and direct visualization of placental invasion into pelvic structures²¹.

Summarizing, surgical results were closely related to the degree and level of invasion evidenced through ultrasound assessment.

In conclusion, placenta accreta represents a clinical and diagnostic challenge that is being encountered with increasing frequency. Clinicians should be aware of the clinical issues, risk factors, and imagiological findings to facilitate optimal case management.

Related to the diagnostic and imagiological findings, despite the limited number of cases, our data support the idea that has been established in the literature, that ultrasonography is sensitive and specific enough for the diagnosis of placenta accreta and MRI may be helpful only in ambiguous cases.

ACKNOWLEDGMENT

Prof. Dr. Carlos Calhaz-Jorge and Dr. Nuno Clode

REFERENCES

1. Barnhart KT. Clinical practice. Ectopic pregnancy. *N Engl J Med* 2009; 361:379–387.
2. Shaw JL, Dey SK, Critchley HO, Horne AW. Current knowledge of the aetiology of human tubal ectopic pregnancy. *Hum Reprod Update* 2010; 16:432–444.
3. Farquhar CM. Ectopic pregnancy. *Lancet* 2005; 366:583–591.
4. Yao M, Tulandi T. Current status of surgical and nonsurgical management of ectopic pregnancy. *Fertil Steril* 1997; 67:421.
5. Murray H, Baakdah H, Bardell T, Tulandi T. Diagnosis and treatment of ectopic pregnancy. *CMAJ* 2005; 173:905.
6. Creanga AA, Shapiro-Mendoza CK, Bish CL, et al. Trends in ectopic pregnancy mortality in the United States: 1980–2007. *Obstet Gynecol* 2011; 117:837.
7. Nwanodi O, Berry R Jr. Spontaneous triplet, tubal ectopic gestation. *J Natl Med Assoc.* 2006 Jun; 98(6):963–4.
8. Singhal Am, Chin VP. Unilateral triplet ectopic pregnancy. A case report. *J Reprod Med.* 1992;57:187–188.
9. Schmitt R, Heinen K. Unilateral ectopic pregnancy of triplets. *Geburtshilfe und Frauenheilkunde.* 1972;32:136–137.
10. Dart RG, Kaplan B, Varaklis K. Predictive value of history and physical examination in patients with suspected ectopic pregnancy. *Ann Emerg Med* 1999; 33:283.
11. Ankum WM, Mol BW, Van Der Veen F, et al. Risk factors for ectopic pregnancy: a meta-analysis. *Fertil Steril.* 1996;65:1093–1099.
12. Murray H, Baakdah H, Bardell T, Tulandi T. Diagnosis and treatment of ectopic pregnancy. *CMAJ.* 2005;173:905–912.
13. Bouyer J, Coste J, Shojaei T, et al. Risk factors for ectopic pregnancy: a comprehensive analysis based on a large case-control, population-based study in France. *Am J Epidemiol* 2003;157:185–194.
14. Levine D. Ectopic pregnancy. *Radiology.* 2007 Nov;245(2):385–97.
15. Tay JI, Moore J, Walker JJ. Clinical review: Ectopic pregnancy. *BMJ.* 2000;320:916–9.
16. Sivalingam VN, Duncan WC, Kirk E, Shephard LA, Horne AW. Diagnosis and management of ectopic pregnancy. *J Fam Plann Reprod Health Care.* 2011 Oct;37(4):231–40.
17. Stucki D, Buss J. The ectopic pregnancy, a diagnostic and therapeutic challenge. *J Med Life.* 2008 February 15; 1(1): 40–80.