

Placental shelf – a common, typically transient and benign finding on early second-trimester sonography

O. SHEN*, E. GOLOMB†, O. LAVIE‡, Y. GOLDBERG‡, R. EITAN* and R. R. RABINOWITZ*

*Department of Obstetrics and Gynecology and †Department of Pathology, Shaare Zedek Medical Center, Jerusalem, affiliated to the Faculty of Health Sciences, Ben-Gurion University of the Negev, Be'er Sheva, and ‡Department of Obstetrics and Gynecology, Carmel Hospital, Technion Medical School, Haifa, Israel

KEYWORDS: circumvallate placenta; perinatal outcome; placenta; placental sheet; placental shelf

ABSTRACT

Objective Placental shelves are believed to represent circumvallate placentae. It is thought that circumvallate placenta may be associated with adverse perinatal outcome when present at delivery. The objective of this study was to determine the prevalence, persistence and significance of placental shelves detected in the early second trimester.

Methods In 152 consecutive anomaly scans performed between 13 and 16 weeks of gestation, special attention was directed to placental structure and the presence of a placental shelf. When present, a mid-gestation scan was performed to verify if the finding persisted. If so, a third-trimester scan was performed. Delivery charts were reviewed for all cases initially diagnosed with a placental shelf, recording any placenta-related complications.

Results In 17 of 152 (11.2%) early second-trimester scans a placental shelf was detected. In three of these 17 cases the shelf persisted to the 20–22-week scan. In the two cases that presented for the third-trimester scan the shelf was no longer present. In all 17 cases the perinatal outcome was good.

Conclusions In our study group early second-trimester placental shelves rarely persisted to mid-gestation and never to the third trimester. There were no placenta-related perinatal problems. Early second-trimester placental shelf appears to be a common, benign and transient sonographic finding. Copyright © 2006 ISUOG. Published by John Wiley & Sons, Ltd.

INTRODUCTION

Improved resolution of sonographic equipment permits detailed evaluation of the placenta and the chorioamniotic membranes at early stages of gestation.

Abnormalities such as amniotic bands, chorioamniotic separation or circumvallate placenta may have important implications in terms of detecting patients at risk for various complications. Amniotic bands are associated with disruptive fetal deformations^{1,2}. Third-trimester circumvallate placenta may be associated with placental abruption, preterm delivery, intrauterine growth restriction, fetal malformations and perinatal death^{3,4}. Amniotic 'sheets' are believed to represent uterine adhesions and infolding of the chorioamniotic membrane around the adhesion⁵. Although this is thought to be a benign finding, one group suggested a possible association between certain sheets and fetal death⁶.

A 'shelf at the margin of the placenta' is the terminology used to describe the sonographic appearance of tissue contiguous with the edge of the placenta, protruding into the uterine cavity⁷. The tissue is iso-echogenic with the placenta and is not attached to any fetal parts. This shelf is considered to represent circumvallate placenta.

The purpose of this study was to determine the frequency and prognostic significance of shelves at the margin of the placenta detected in the early second trimester, and to examine if they persist into the late second and third trimesters.

PATIENTS AND METHODS

During the period between October 2004 and August 2005 a single experienced sonographer (O. S.) performed early second-trimester scans between 13 and 16 weeks' gestation. The indication was a routine anomaly scan, as is customary in Israel. Patients were a mix of low-risk and high-risk patients for fetal anomalies. In 15 cases the referral was because of fetal anomalies in a previous pregnancy, and the remaining cases were considered low risk. None was referred because of suspicion of a placental

Correspondence to: Dr O. Shen, Department of Obstetrics and Gynecology, Shaare Zedek Medical Center, pob 3235, Jerusalem 91031, Israel (e-mail: orishen@netvision.net.il)

Accepted: 31 August 2006

abnormality. A placental shelf was searched for, using previously published criteria⁷, and recorded when present. A transabdominal, transvaginal, or combined approach was used to achieve optimal imaging quality. When a placental shelf was identified (Figures 1–3), the patient was asked to return for a repeat scan at 20–22-weeks' gestation. If the shelf persisted the patient was asked to return for a third scan at approximately 30–32 weeks' gestation. All scans were performed by the same examiner. The ultrasound equipment consisted of a Voluson 730 PRO (GE Medical Systems, Milwaukee, WI, USA) or an ATL HDI 5000 (Advanced Technology Laboratories, Bothell, WA, USA). Delivery charts were reviewed for all patients with a placental shelf detected on the initial scan, specifically noting problems possibly associated with abnormal placentation such as premature delivery or placental abruption, intrauterine growth restriction (IUGR) or fetal death. All the placentas were examined in the delivery room by the delivery room staff and, when possible, by a pathologist.

RESULTS

During the study period 152 consecutive 13–16-week anomaly scans were performed. Seventeen (11.2%) cases of placental shelf were recorded. In all cases the shelves involved no more than 25% of the placental circumference. Other than the shelf, the placenta appeared normal in all cases. Several of the placentas were previa and were not considered abnormal at this stage of gestation. None of the fetuses with a placental shelf had a major anomaly. All patients with a shelf presented for follow-up at 20–22 weeks' gestation. In 14 patients the shelf was not demonstrated on the follow-up 20–22-week scan, while in three the shelf was still present. Two of these

three cases had normal scans at 30–32 weeks' gestation with no evidence of a placental shelf, and one patient failed to attend the third-trimester scan.

The delivery charts of all 17 patients with a placental shelf on the initial examination were reviewed. All 17 had term deliveries. There were no perinatal deaths or cases of placental abruption. Two had birth weights below the 10th centile for gestational age (centile 8 for one case and centile 9 for the second case). No abnormality was noted by the delivery-room staff on the placental examination. Three of the placentas were available for examination by a pathologist, and were considered to be normal. One of the patients had late postpartum hemorrhage, and a small amount of trophoblastic tissue was recovered on curettage. None of the children born had a major anomaly.



Figure 1 Placental shelf at 15 weeks' gestation.



Figure 2 Placental shelf in a view perpendicular to that in Figure 1.

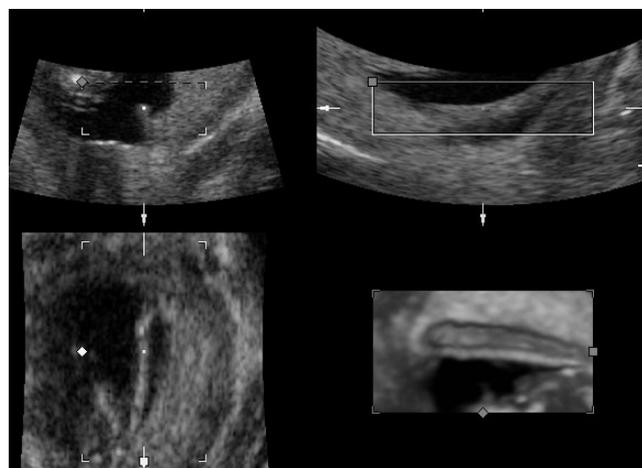


Figure 3 Three-dimensional view of a placental shelf.

DISCUSSION

When a tissue protrusion is identified from the placental or uterine area towards or into the amniotic cavity the differential diagnosis includes amniotic band, uterine adhesions, septate uterus and circumvallate placenta. Amniotic bands are thin avascular structures originating from any point of the amniotic surface, either related or unrelated to the placental surface. They may be attached to fetal parts and cause disruption of fetal tissue resulting in limb amputations, facial clefts and other deformations^{1,2,8}. Septate uterus, when detected by sonography, is usually easily recognizable by its fundal position. Intrauterine adhesions, possibly draped by layers of chorion and amnion, can protrude into or cross the amniotic cavity. These structures, often referred to as amniotic sheets⁹, may have blood flow detected within them, and may originate from any point of the uterine cavity. A shelf-like, smooth, regular structure with its base at the placental edge and tapering towards its free edge, which protrudes towards the amniotic cavity, is compatible with a diagnosis of circumvallate placenta^{5,7,10,11}. McCarthy *et al.*⁷ referred to this sonographic diagnosis as a 'shelf at the margin of the placenta'; in the interest of simplicity we have called this a 'placental shelf'.

The reported prevalence of circumvallate placenta ranges from 0.5 to 18% on placental examination postpartum⁷. As to prenatal diagnosis of circumvallate placenta or placental shelves, we found two publications with a reported prevalence of 0.2 and 21%, respectively^{5,10}. In both these studies gestational age varied widely, and it is difficult to establish a gestational age-specific prevalence. Our study is the first to investigate the prevalence and significance of this finding in the early second trimester. We have specifically searched for this finding and detected it in a relatively high proportion of our population. This is possibly owing to our specific focus on the full circumference of the placental margin.

In most of our cases, the shelf was no longer detected by the mid second trimester and in the few cases where it did persist, it was no longer visible by the third trimester. In all cases there were no placenta-related perinatal complications and the placenta was found to be normal on gross examination. Considering that both the mid-gestation sonogram and gross placental examination were normal in the single case with late postpartum hemorrhage, it is unlikely, in our opinion, that a circumvallate placenta was present to cause the late hemorrhage.

Others have noticed an association between circumvallate placenta and third-trimester hemorrhage, preterm delivery and IUGR. These associations were made for

cases with sonographic abnormalities during the third trimester, or discovered on gross examination of the placenta postpartum³, and may represent the more severe and relatively uncommon end of the spectrum of circumvallate placentas, i.e., those that persist into the third trimester.

The importance of these shelves lies in realizing that they will not be demonstrated, at least in most cases, later on in gestation, and are not expected to be associated with perinatal complications. Most importantly, they should not be confused with amniotic bands or amniotic sheets, which may be associated with an adverse outcome.

We might conclude that the finding of a placental shelf, presumably representing circumvallate placenta, in the early second trimester, is a common finding. In this study, all our prenatally diagnosed placental shelves were transient, and they were all found to be benign.

REFERENCES

1. Moerman P, Fryns JP, Vandenberghe K, Lauweryns JM. Constrictive amniotic bands, amniotic adhesions, and limb-body wall complex: discrete disruption sequences with pathogenetic overlap. *Am J Med Genet* 1992; **42**: 470–479.
2. Seeds JW, Cefalo RC, Herbert WNP. Amniotic band syndrome. *Am J Obstet Gynecol* 1982; **144**: 243–248.
3. Diseases and abnormalities of the placenta. In *Williams Obstetrics* (21st international edn), Cunningham FG, Gant NF, Leveno KJ, Gilstrap III LC, Hauth JC, Wenstrom KD (eds). McGraw-Hill: International edition, 2001; 829–830.
4. Rolschau J. Circumvallate placenta and intrauterine growth retardation. *Acta Obstet Gynecol Scand* 1978; **72** (Suppl.): 11–14.
5. Siström CL, Ferguson JE. Abnormal membranes in obstetrical ultrasound: incidence and significance of amniotic sheets and circumvallate placenta. *Ultrasound Obstet Gynecol* 1993; **3**: 249–255.
6. Tan KBL, Tan TYT, Tan JVK, Yan YL, Yeo GSH. The amniotic sheet: a truly benign condition? *Ultrasound Obstet Gynecol* 2005; **26**: 639–643.
7. McCarthy J, Thurmond AS, Jones MK, Siström C, Scanlan RM, Jacobson SL, Lowensohn R. Circumvallate placenta: sonographic diagnosis. *J Ultrasound Med* 1995; **14**: 21–26.
8. Mahony BS, Filly RA, Callen PW, Golbus MS. The amniotic band syndrome: antenatal sonographic diagnosis and potential pitfalls. *Am J Obstet Gynecol* 1985; **152**: 63–68.
9. Lazebnik N, Hill LM, Many A, Martin JG. The effect of amniotic sheet orientation on subsequent maternal and fetal complications. *Ultrasound Obstet Gynecol* 1996; **8**: 267–271.
10. Harris RD, Wells WA, Black WC, Chertoff JD, Poplack SP, Sargent SK, Crow HC. Accuracy of prenatal sonography for detecting circumvallate placenta. *AJR Am J Roentgenol* 1997; **168**: 1603–1608.
11. Bey M, Dott A, Miller JM Jr. The sonographic diagnosis of circumvallate placenta. *Obstet Gynecol* 1991; **78**: 515–517.