CASE REPORT

Three-dimensional Ultrasound Diagnosis of Circumvallate Placenta Early in Second Trimester of Pregnancy

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ABSTRACT

We present three patients with a circumvallate placenta diagnosed by two-dimensional (2D)/three-dimensional (3D) ultrasound and HDlive early in the second trimester of pregnancy. The characteristic 2D sonographic findings were a thick placenta with its edges protruding into the uterine cavity. The unique 3D ultrasound characteristic of a circumvallate placenta early in the second trimester is a pizza-like appearance. Moreover, 3D ultrasound and HDlive can clearly differentiate partial from complete circumvallate placentas. Three-dimensional ultrasound and HDlive provide additional, useful information for the early second-trimester diagnosis of a circumvallate placenta.

Keywords: Circumvallate placenta, Early second trimester, HDlive, Prenatal diagnosis, Three-dimensional ultrasound.

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INTRODUCTION

The estimated prevalence of a circumvallate placenta is approximately 5–8%.¹ A circumvallate placenta is included in the placenta extrachorialis category, as the chorionic plate is smaller than the basal plate, with resulting marginal placental infarction, hemorrhage, fibrin deposition, and tethering of membranes.² It is characterized by the inward insertion of chorioamniotic membranes from the edges toward the center of the placenta, leading to back folding of the placenta and fetal membranes toward the chorionic surface.¹ Complications such as placental abruption, preterm labor, oligohydramnios, and intrauterine fetal death have been reported with a circumvallate placenta.³ There have been only four studies on three-dimensional (3D) ultrasound and HDlive diagnosis of a circumvallate placenta.^{4–7} However, there have been only two cases of a circumvallate placenta diagnosed with these techniques early in the second trimester of pregnancy.^{5,7} In the current study, we presented three additional patients diagnosed by 3D ultrasound and HDlive early in the second trimester of pregnancy.

CASE DESCRIPTION

CASE 1

A 34-year-old pregnant Japanese woman, gravida 2, para 0, was referred to our outpatient department at 18 weeks and 1 day of gestation for routine obstetric examination. Two-dimensional (2D) sonography (Voluson E10, GE Healthcare Japan, Tokyo, Japan) revealed an increased thickness (51.2 mm) with peripheral, irregular edges on the fetal surface (Fig. 1). Central placental depression with everted placental edges and thick, rolled up placental margins resembling pizza edges surrounding the depressed placental center could be easily depicted using HDlive (Fig. 2). Moreover, a partial defect of everted placental edges was noted.

At 39 weeks and 6 days of gestation, an emergency cesarean section was performed due to a nonreassuring fetal heart rate pattern, resulting in a single male newborn weighing 3,600 g, with a length of 52 cm. The umbilical artery pH was 7.34. The Apgar score was 8/9 at 1 and 5 minutes, respectively. Placental examination

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Fig. 1: A circumvallate placenta at 18 weeks and 1 day of gestation. Two-dimensional sonography shows placental edges protruding into the uterine cavity. Placental thickness is 51.2 mm. P, placenta

Fig. 2: A circumvallate placenta (arrow) at 18 weeks and 1 day of gestation. Central placental depression with everted placental edges and thick, rolled up placental margins resembling pizza edges surrounding the depressed placental center can be easily depicted using HDlive. Moreover, a partial defect of everted placental edges could be noted. P, placenta

Fig. 3: Gross examination of a partial circumvallate placenta (arrow) after delivery

Fig. 4: A circumvallate placenta at 16 weeks of gestation. Two-dimensional sonography shows placental edges protruding into the uterine cavity. Placental thickness is 33.3 mm. P, placenta

Fig. 5: A circumvallate placenta at 16 weeks of gestation. Three-dimensional ultrasound shows a central placental depression with partial everted placental edges (arrow). P, placenta

revealed its weight to be 673 g, and it showed a partial circumvallate placenta (Fig. 3).

Case 2

A 19-year-old pregnant Japanese woman, gravida 3, para 1, was referred to our outpatient department at 16 weeks of gestation for routine obstetric examination. Two-dimensional sonography revealed placental edges protruding into the uterine cavity (Fig. 4). The placental thickness was 33.3 mm. Three-dimensional ultrasound showed a central placental depression with partially everted placental edges (Fig. 5).

One male newborn was vaginally delivered at 38 weeks and 6 days of gestation with a body weight of 3,104 g and a length of 50.5 cm. The umbilical artery pH was 7.48. He had an Apgar score of 9/10 at 1 and 5 minutes, respectively. Placental examination

revealed its weight to be 633 g, and it showed a partial circumvallate placenta (Fig. 6).

Case 3

A 34-year-old pregnant Japanese woman, gravida 1, para 0, was referred to our outpatient department at 16 weeks and 1 day of gestation for routine obstetric examination. Two-dimensional sonography revealed placental edges protruding into the uterine cavity (Fig. 7). The placental thickness was 36.5 mm. Three-dimensional ultrasound showed a central placental depression with everted placental edges and thick, rolled up placental margins resembling pizza edges surrounding the depressed placental center could be easily depicted (Fig. 8).

At 38 weeks and 1 day of gestation, the elective cesarean section was performed due to a low-lying placenta, resulting in a single female newborn weighing 2,438 g, with a length of 46 cm. The umbilical artery pH was 7.39. The Apgar score was 9/10 at 1 and 5 minutes, respectively. Placental examination revealed its weight to be 658 g, and it showed a typical circumvallate placenta (Fig. 9).

Fig. 6: Gross examination of a partial circumvallate placenta (arrow) after delivery

Fig. 7: A circumvallate placenta at 16 weeks and 1 day of gestation. Two-dimensional sonography shows placental edges protruding into the uterine cavity. Placental thickness is 36.5 mm. P, placenta

Fig. 8: A circumvallate placenta at 16 weeks and 1 day of gestation. Three-dimensional ultrasound shows a central placental depression with everted placental edges and thick, rolled up placental margins resembling pizza edges surrounding the depressed placental center can be easily depicted. P, placenta

Fig. 9: Gross examination of a complete circumvallate placenta after delivery

DISCUSSION

Two-dimensional sonographic diagnosis of a circumvallate placenta depends upon identifying projecting edges of placental margins representing the redundant membranes.⁸ Placental thickness measurement was suggested during 18–21 weeks of gestation to improve the diagnostic accuracy of 2D sonography in detecting a circumvallate placenta.⁹ In our cases, these characteristic 2D sonographic findings were obtained, and a thick placenta was evident. Moreover, unique 3D ultrasound features were a pizza-like appearance in the second trimester of pregnancy. In previous studies, a characteristic 3D ultrasound finding of a circumvallate placenta in the third trimester was the appearance of a “tire mounted on a wheel” (“tire” sign).^{4,6} The difference in the appearance of the circumvallate placenta between early second and third trimesters is currently unknown. One possible difference is the placental thickness. AboEllail et al.⁵ reported an increased placental

thickness in the second-trimester circumvallate placenta, and their HDlive image also showed a pizza-like appearance. Therefore, important diagnostic criteria of the circumvallate placenta early in the second trimester of pregnancy may be projecting edges of placental margins using 2D sonography, increased placental thickness, and a pizza-like appearance on 3D ultrasound.

In the present investigation, there were two partial circumvallate placentas and one complete circumvallate placenta. Two-dimensional sonography could not differentiate partial from complete circumvallate placentas, whereas 3D ultrasound and HDlive could clearly demonstrate the partial defect of everted placental edges in the case of a complete circumvallate placenta because the whole placenta could be visualized using 3D ultrasound and HDlive early in the second trimester of pregnancy. These results suggest that 3D ultrasound and HDlive provide additional, useful information for the early second-trimester diagnosis of a circumvallate placenta.

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