Case Report

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Fetal and Uteroplacental Flow Velocity Waveforms in the Expectant Management of Placental Abruption

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Key Words

Abruptio placentae
Doppler ultrasound

Abstract

The change in flow velocity waveforms was assessed by Doppler ultrasound in the course of evolution of placental separation. The velocity changes reflected a high response to blood flow in the placental circulation along with decreased cerebral vascular resistance.

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Introduction

Definitive abruptio placentae is reported to occur in approximately 30% of pregnancies complicated by bleeding in the third trimester [1]. The usefulness of ultrasound in the diagnosis of abruptio placentae is limited: indirectly by excluding placenta previa [2] and in about 25% of cases by visualization of a retroplacental clot [3].

Expectant management was advocated in nonacute cases to promote prolongation of the pregnancy and minimize perinatal mortality [4].

The following case report illustrates the change in flow velocity waveforms as assessed by Doppler ultrasound in the course of evolution of placental separation.

Case Report

A 38-year-old woman, para 1, was admitted to our hospital because of painful uterine contractions at 26 weeks of gestation. Electronic fetal monitoring showed late decelerations after spontaneous uterine contractions. Ultrasound scanning revealed a single fetus in vertex presentation, of an estimated weight of 810 g with normal anatomy. The placenta was situated at the fundus, no retroplacental blood clot was noted.

The arcuate [5], umbilical [6] and fetal internal carotid [7] arteries were assessed between contractions using a pulsed Doppler (duplex) system (Diasonics DRF 400). The degree of pulsatility was quantified by calculating the pulsatility index according to Gosling and King [8].

Fig. 1. Anechoic area representing retroplacental blood clot (SEP).

After hydration, uterine contractions stopped. A nonstress test showed the baseline heart rate at 150 bpm with a normal fetal heart rate pattern, and an expectant management plan was instituted. Nonstress tests and ultrasound examinations including Doppler flow studies were performed every other day. Ten days later because of vaginal bleeding and diffuse abdominal tenderness with mild uterine contractions, ultrasound examination disclosed a retroplacental anechoic area (fig. 1) of $8 \times 5 \times 4$ cm representing a retro-

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Fig. 2. Arcuate artery sonogram, the pulsatility index is 1.25 (normal < 0.8).

Fig. 3. Umbilical artery sonogram, the pulsatility index is 1.46 (normal < 1.1).

Fig. 4. Internal carotid artery sonogram, the pulsatility index is 0.79 (normal > 1.2).

placental clot of an abruptio placentae. Analysis of flow velocity waveforms (fig. 2–4) resulted in increased pulsatility index values in the umbilical artery (1.46) and arcuate arteries (1.25) and decreased values in the fetal internal carotid artery (0.79) compared to previous examinations (0.7–0.9, 0.6–0.8, 1.1–1.3, respectively).

An emergency cesarean section was performed, and a female infant weighing 850 g was delivered with Apgar scores of 6 and 9 at 1 and 5 min, respectively. An area of 30 % abruptio placentae was confirmed by pathologic examination.

Comment

Morrow and Ritchie [9] reported on a case of placental abruption assessed by Doppler ultrasound. The velocity changes in response to abruption were dramatic and reflected high resistance in both the maternal and fetal placental circulation.

The findings in our patient suggest high resistance to blood flow in both the maternal and fetal placental circulation along with decreased cerebral vascular resistance – reflecting the ‘brain-sparing’ effect [7].

In cases of progressive placental separation, the volume of the retroplacental clot will increase, and the fetomaternal exchange area will be insufficient. Doppler velocimetry enables the study of natural history and pathophysiology of this circumstance.

We managed 2 other patients with progressive placental separation by serial Doppler studies along with two-dimensional ultrasound and nonstress tests to find the point of fetal or maternal jeopardy.

The combined use of ultrasound, Doppler and fetal heart monitoring in the conservative management of abruptio placentae could allow us to decrease perinatal mortality and morbidity.

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