

Diagnosis of abnormal pregnancy and outcomes by color Doppler ultrasound.

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Abstract

Objective: To discuss diagnostic value of color Doppler ultrasound for abnormal pregnancy and pregnancy outcome.

Method: To carry out color Doppler analysis of 282 cases of hospitalized twin pregnancy in Maternity and Child Care Center of Qinhuangdao from December 2008 to December 2015.

Results: Through comparison of multiple ultrasonic indexes like CRL, NT, HR, DVP of foetuses of 282 pregnant women, we find these differences statistically significant ($p < 0.05$). All foetuses were delivered smoothly, among which there were 5 cases of twin-twin transfusion syndrome, 4 cases of twin reverse perfusion sequence, 3 cases of twin anaemia-polycythaemia sequence, 7 cases of twin selective intrauterine growth retardation, and 2 cases of conjoined twins. Results of Spearman's correlation analysis reveal that pregnancy outcome of twin pregnancy yields a significant correlation with detection differences of ultrasonic indexes including CRL, NT, HR and DVP ($p < 0.05$).

Conclusion: Color Doppler ultrasound boasts high diagnostic value for abnormal twin pregnancy and pregnancy outcome. It can detect abnormal condition of fetuses as early as possible and assist clinical intervention and evaluating prognosis.

Keywords: Color Doppler ultrasound, Abnormal twin pregnancy, Pregnancy outcome, Early diagnosis.

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Introduction

As one of the commonest type in multiple pregnancies, twin pregnancy refers to the phenomenon in which there are two fetuses at the same time in a pregnancy. Along with application of ovulation induction drugs, development of assisted reproductive technology and rise of overall child-bearing age in society, incidence of twin pregnancy is increasing year by year [1-3]. As a non-invasive inspection method, ultrasound has become a main approach currently for prenatal evaluation of twin pregnancy. With the development of medical technology, measurements of Crown-Rump Length (CRL) and foetal Nuchal Translucency (NT) thickness in early pregnancy have become routine items in prenatal check-up, while measurements of Heart Rate (HR) and maximum depth of amniotic fluid (DVP) are also important parts in prenatal ultrasonic examination [4,5]. Meanwhile, color Doppler ultrasound can determine twin type, placenta location and condition of amniotic membrane in diagnosis of twin pregnancy, and diagnose foetal syndromes and malformation, while Doppler technology can realize real-time observation of foetal vascular resistance, such as single peak of umbilical-artery spectrum, enhancing S/D value of umbilical blood-flow spectrum, diastole inversion of umbilical blood-flow spectrum, low pulsatility indexes of artery and renal artery in brain, reverse a wave of venous catheter, etc., which is of great clinical significance for twin idiopathic diseases [6,7]. This paper has thus specifically discussed the diagnostic value of

color Doppler ultrasound for abnormal twin pregnancy and pregnancy outcome, which is reported as follow.

Materials and Method

Materials

282 cases of twin pregnancy hospitalized in our hospital from December 2008 to December 2015 Inclusion criteria: complete clinical data, clinical diagnosis of twin pregnancy, pregnant women aged 20 to 40 years old, who were ultrasonically observed during the 10th-12th week of pregnancy. Exclusion criteria: fetal karyotype abnormality, abortion, stillborn, dead-birth, etc. Pregnant women aged 21 to 40 years old, average (28.34+3.84) years old; pregnancy complications: 27 cases of hypertensive disorder during pregnancy, 35 cases of gestational diabetes, 33 cases of anaemia, 11 cases of placental abruption, 14 cases of placenta previa; 230 cases of primipara, 52 cases of multipara.

Method

GE Voluson E8 color Doppler ultrasound diagnostic instrument was selected, with transabdominal low-frequency convex array probe and frequency range of 3.5~5 MHz. To measure and record all biometric parameters including CRL, NT, HR and DVP of all twin pregnancies in early pregnancy, take the average after measuring for three times. At the same time, to

observe brain, heart, limbs of fetuses and watch for any evident structural abnormality.

Observation indexes

All twin pregnancies were followed up for one month after birth; mode of delivery, foetal condition, the number of viable fetuses, foetal gender and birth weight are recorded.

Statistical analysis

Use SPSS 22.0 statistical software for data analysis, t for comparison of measurement data in results, chi square for comparative analysis of attribute data; $p < 0.05$ represents that the difference is significant.

Results

Through measurement of comparison of ultrasound indexes, comparative differences between varied ultrasonic indexes like CRL, NT, HR and DVP of fetuses of 282 pregnant women are of statistical significance ($P < 0.05$). All the data were shown in Table 1.

Table 1. Comparisons of ultrasound indicators between large and small fetus.

Fetus	CRL	NT	HR	DVP
Large fetus	61.46 ± 5.23	1.35 ± 0.24	157.23 ± 4.64	28.62 ± 4.63
Small fetus	65.14 ± 6.46	1.58 ± 0.33	163.22 ± 4.85	35.52 ± 5.88

Notes: All of the four indexes have significant differences between large and small fetus.

Prognosis

All fetuses were delivered smoothly and their gestational age of delivery was 28~40 weeks, with an average gestational age of (35.62±5.13) weeks. There were 5 cases of twin-twin transfusion syndrome, 4 cases of twin reverse perfusion sequence, 3 cases of twin anaemia-polycythaemia sequence, 7 cases of twin selective intrauterine growth retardation, and 2 cases of conjoined twins.

Correlation analysis

Through Spearman's correlation analysis, the results reveal that pregnancy outcome of twin pregnancy yields a significant correlation with detection differences of ultrasonic indexes including CRL, NT, HR and DVP ($r=0.457, 0.455, 0.581, 0.492$; $p < 0.05$).

Discussion

At present, incidence of twin pregnancy has taken on an obvious increasing tendency in China, and the incidence rate is around 1.5% [8,9]. Twin pregnancy is of high risks for both mother and fetus, while fetal complications mainly involve premature birth, fetal intrauterine growth restriction, fetal

malformation, etc. In perinatal period, fetal morbidity is 3~7 times higher than single pregnancy and mortality rate is 4~6 times higher than single pregnancy, accounting for about 15% of total perinatal incidence and mortality [10,11]. For twin pregnancy, if one fetus is significantly smaller than another one, another fetus could be considered as being with growth retardation in early pregnancy, and thus its incidences of congenital malformation and chromosomal abnormality have been increased correspondingly.

Studies show that, various fetal malformations may occur in twin pregnancy, such as twin-twin transfusion syndrome, twin reverse perfusion sequence, twin anaemia-polycythaemia sequence, twin selective intrauterine growth retardation, conjoined twins [12,13]. Malformation may be shown as that both fetuses are deformed uniformly or differently; or as that one of two fetuses is severely deformed while another fetus is completely normal. Studies show that, through comparison between single fetus and twin premature infants who were born in the same gestational age, there was no significant increase in the incidence of its respiratory distress syndrome, ventricular haemorrhage, etc.

With the extensive application and development of ultrasound in early pregnancy, whether or not twin pregnancy can achieve balanced growth in early pregnancy has attracted attention of scholars. Prenatal ultrasound can detect the imbalance of twin growth and effectively predict imparity of birth weight of twin fetuses. In twin pregnancy, 10%~30% of the new-born may present diversity in birth weight, while the latter would increase perinatal morbidity and mortality. Indexes for detection include CRL, NT, HR, DVP and so on, among which researches on the latter three are relatively few [14]. For example, in mono-chorionic sac twin pregnancy, if difference of twin CRL ≥ 12 mm in early pregnancy or there is significant difference in the amount of amniotic fluid between twin fetuses (one fetus's DVP ≤ 3 cm, while another DVP ≥ 5 cm), the risks of twin-twin transfusion syndrome, growth retardation of one of twin fetuses or intrauterine fetal death will increase. In this paper, comparative differences between varied ultrasonic indexes like CRL, NT, HR and DVP of fetuses of 282 pregnant women are of statistical significance ($P < 0.05$). However, average of such difference isn't very large. Therefore, encountering twin pregnancy that conceived naturally but with indefinite last menstrual period in clinical practice, whether we should use ultrasonic measurements of large fetus or that of small fetus to determine gestational age still remains as a problem to be solved.

In improving the outcome of twin pregnancy, pregnant women in such condition shall firstly strengthen routine check-up during pregnancy, rest in bed more, during which left lateral position should be adopted [15]. It is recommended that such pregnant women shall supplement folic acid and minerals during pregnancy, or be given intravenous nutritional supplements in terms of actual circumstances. Favourable timing and mode of delivery should be selected to terminate pregnancy, so as to reduce the morbidity and mortality of

perinatal infants as well as improve prognosis of twin perinatal infants [16].

To sum up, color Doppler ultrasound showed high diagnostic value for abnormal twin pregnancy and pregnancy outcome. It could detect abnormal condition of fetuses as early as possible and assist clinical intervention and prognosis evaluation.

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