Correlation between pregnancy outcomes and hormone levels in early pregnancy of women with threatened abortion and subchorionic hematoma

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ABSTRACT

Objective: To investigate the correlation between pregnancy outcomes and hormone levels in early pregnancy of women with threatened abortion and subchorionic hematoma. Methods: Three groups of subjects (48 cases each) were selected including the group of healthy pregnant women (Group C), and the two groups of subchorionic hematoma diagnosed via B-ultrasound examination with and without (Groups A and B) positive symptoms of threatened abortion such as abdominal pain, colporrhagia etc. Chemiluminescence analysis was applied to determine serum progesterone and HCG levels of all three groups, and investigate the correlation between variations of such levels and pregnancy outcomes. Results: Statistical significance existed in the differences between serum progesterone and HCG levels of the three groups at 12, 28 and 37 weeks of gestation. In early pregnancy, serum progesterone and β-HCG levels were lower in Group A than Groups B and C, and lower in Group B than Group C. In the second trimester, the serum β-HCG level was higher, while the progesterone level lower in Group A than Groups B and C; the serum β-HCG level higher, while the progesterone level lower in Group B than Group C. And the comparative results in late pregnancy were the same as those of the second trimester. The premature birth rate, abortion rate, fetal death rate were the highest, and the full time delivery rate was the lowest in Group A among all the three groups. Adverse pregnancy outcomes of women with threatened abortion and subchorionic hematoma were closely related to serum progesterone and HCG levels in early gestation. Conclusion: Serum progesterone and HCG levels in early pregnancy of women with threatened abortion and subchorionic hematoma are positively correlated with pregnancy outcomes; the lower such levels of the two early indicators, the higher the incidence of adverse pregnancy outcomes. Therefore, tests of early pregnancy serum progesterone and HCG levels can be used to determine pregnancy outcomes.

1. Introduction

Human chorionic gonadotropin (HCG) is a glycoprotein hormone produced by syncytiotrophoblast, a portion of the placenta following implantation. Therefore, the HCG test bears great significance in the diagnosis of early pregnancy, and is valued to a certain extent in diagnosing diseases related to pregnancy and trophoblastic tumor etc. HCG level increases on a daily basis during normal pregnancy while decreases if in abnormal pregnancy[1]. Progesterone is an ovarian corpus luteum-secreted natural progestin, which as one of the essential hormones to maintain pregnancy, has significant morphological effects on estrogen-stimulated endometrium[2]. Presently there are still no reports of systematic observation on serum progesterone and HCG levels, and pregnancy outcomes. This study as follows observes and investigates exactly the correlation between pregnancy outcomes and hormone level variations of serum HCG and progesterone in women with threatened abortion and subchorionic hematoma.
2. Data and method

2.1. Clinical data

From January 2013 to December 2013, Group A had included a total of 48 cases of threatened abortion (with relevant symptoms such as abdominal pain, colporrhagia etc.) and subchorionic hematoma. The age of subjects ranged 22-36 years, averaged (24.5±3.8) years. Gestational age at the beginning of observation ranged 6-12 weeks, averaged (7.1±2.6) weeks. Among the 48 cases of Group A, there were 12 multiparas and 36 primiparas. The inclusion criteria consisted of intrauterine pregnancy; no smoking or drug use history; no severe organic lesions of the heart, liver, kidney etc.; no complications such as uterine malformation, hysteromyoma etc.; no multiple pregnancy and with informed consent. Group B consisted of 48 cases (14 multiparas and 34 primiparas) with subchorionic hematoma diagnosed by B-ultrasound examination, and no threatened abortion symptoms such as abdominal pain, colporrhagia etc. The age ranged 21-35 years, averaged (24.4±3.4) years; the gestational age at the beginning of observation ranged 6-12 weeks, averaged (7.2±2.5) weeks. Group C consisted of 48 healthy pregnant women (11 multiparas and 37 primiparas) with the same gestational age (±7 d). The age ranged 22-36 years, averaged (25.1±4.2) years; the age of subjects ranged 22-36 years, averaged (24.5±3.8) years; the gestational age at the beginning of observation ranged 6-12 weeks, averaged (7.5±2.8) weeks. Comparability was proved for the gestational age at the beginning of observation etc. Morning venous blood (5 mL) was extracted in early, mid and late pregnancy (at 12, 28, 37 weeks of gestation) respectively, to investigate the variations of serum progesterone and HCG, chemiluminescence analyses on serum progesterone and HCG, using Roche Elecsys 2010 Automatic Electro-Chemiluminescence Immuno-Analyzer, and Roche agent kits.

2.2. Methods

For each pregnant subject, fasting venous blood (4ml) was extracted, centrifuged to separate serum, and stored at the temperature of -20 °C in the refrigerator, for subsequent chemiluminescence analyses on serum progesterone and HCG, using Roche Elecsys 2010 Automatic Electro-Chemiluminescence Immuno-Analyzer, and Roche agent kits.

2.3. Statistical treatment

All data were processed by SPSS 17.0. Quantified data were indicated in means ± standard deviations (Mean±SD). Variance analysis was adopted, SNK- F test for comparative analysis between two indices, and repetitive measurement variance analysis for comparison of indices taken at different times. Enumeration data were indicated in percentage, analyzed using χ² test. Analysis of related factors was carried out using non-conditional Logistic regression method, with the test level of α =0.05. Statistically significant difference existed if P<0.05.

3. Results

3.1. Comparison of serum progesterone and HCG levels of the three groups at different gestational ages

As per results of the study, statistical significance existed in differences between progesterone and HCG levels inside each of the three groups at 12, 28 and 37 weeks of gestation. And so did it when it comes to inter-group differences at the same gestation ages (P<0.05, Table 1).

3.2. Comparison of pregnancy outcomes between the three groups

The premature birth rate, abortion rate, fetal death rate were the highest, and the full time delivery rate was the lowest in Group A among all the three groups (Table 2).

3.3. Correlation analysis between pregnancy outcomes and hormone levels in early pregnancy of women with threatened abortion and subchorionic hematoma

Variables were incorporated in the multi-factor non-conditional Logistic regression model. With pregnancy outcome as the dependent variable (adverse pregnancy outcome = 1, normal pregnancy outcome = 0), stepwise regression (standards of fit and rejection were 0.05 and 0.10 respectively) revealed that pregnancy outcomes were closely correlated with serum progesterone and HCG levels in early pregnancy of women with threatened abortion and subchorionic hematoma.

4. Discussion

HCG was entirely produced by transitional and trophoblastic cells of the chorionic villi of placenta[3-5]. The secretion of HCG initiates at 10-14 d after conception; the secreting rapidly increases
incur abortion or threatened abortion once the progesterone level changes are favorable to intrauterine embryo development, and will in turn relaxes the muscle fibers, reducing their excitability, as in abnormal sodium and potassium ion concentrations, which increases the permeability of uterine smooth muscle cells, resulting in abnormal sodium and potassium ion concentrations, which in turn relaxes the muscle fibers, reducing their excitability, as well as uterine contractions and sensibility to oxytocin. All these changes are favorable to intrauterine embryo development, and will incur abortion or threatened abortion once the progesterone level decreases[8,9].

This study has shown that women with threatened abortion or subchorionic hematoma have higher serum β-hCG and progesterone levels in early pregnancy, but relatively higher serum β-hCG level and lower progesterone level in mid and late pregnancy than women with both these early conditions. Such findings are consistent with reported ones in literature[10], and may be related to the decrease of progesterone due to less HCG and corpus luteum generation. Decidua lesion in proteolytic enzyme releasing by syncytiotrophoblast cells of external chorion, caused by subchorionic hematoma-incurred expansion to the decidua and other multiple factors, is the possible reason for the decrease of syncytiotrophoblast cells and HCG secretion. Also as indicated by the study, women with threatened abortion and subchorionic hematoma have higher incidence of adverse pregnancy outcome than normal pregnant women, which proves the perspective reported by some[11,12] that abnormal prostogen levels in early gestation may suggest abortion or ectopic pregnancy. Women with threatened abortion and subchorionic hematoma have higher premature birth, abortion, and fetal death rates, while lower full time delivery rate than healthy pregnant women and those with subchorionic hematoma but no abortion symptoms. As revealed by non-conditional Logistic regression, adverse pregnancy outcomes are closely correlated with serum progesterone and HCG levels in early pregnancy of women with threatened abortion and subchorionic hematoma. In conclusion, serum progesterone and HCG levels in early pregnancy of women with threatened abortion and subchorionic hematoma are positively correlated with pregnancy outcomes; the lower such levels of the two early indicators, the higher the incidence of adverse pregnancy outcomes. Therefore, tests of early pregnancy serum progesterone and HCG levels can be used to determine pregnancy outcomes.

### References