

MEDICINE

THE ROLE OF TRANSVAGINAL CERVICOMETRY AND THE DETERMINATION OF FETAL FIBRONECTIN AS METHODS OF PREVENTION OF PRETERM LABOR

Ph. D. Malinina O. B.,
MD Chayka G. V.

Ukraine, Vinnytsya, National Pirogov Memorial University

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ABSTRACT

Preterm labor is a major cause of perinatal morbidity and mortality. Despite the significant progress in predicting, diagnosing, treating and preventing premature births, their level remains high enough. Therefore, the purpose of our study was to assess the need for a joint test for the determination of fetal fibronectin and the expert assessment of transvaginal cervicometry for the timely prevention of premature birth.

Methods: A prospective study was conducted and included 52 patients with a period of 26-27 weeks of gestation and a shortened cervix. All patients were tested for fetal fibronectin.

Results: The mean age of women was 29.5 ± 4.2 years. The gestational age of pregnant women included in the study was 26.4 ± 2.5 weeks of gestation. Childbirths that occurred in the period up to 34 weeks of gestation – 13 (25.1 %). Of these, those that occurred within two weeks after the start of the study were 6 (46.15 %). In all 6 cases, a positive test result was found for the determination of fetal fibronectin. Childbirths from the 34th to 36 + 6th weeks of pregnancy occurred in 16 (30.7 %). Urgent births were in 23 (44.2 %) cases.

Conclusions: The decrease in the length of the cervix in combination with the positive result of the test for the detection of fetal fibronectin is a significant risk factor for the development of preterm labor and the demonstration of the feasibility of a diagnosis of the threat of preterm birth and a review of the tactics of treatment for pregnant women with a shortened cervix.

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At present, preterm labor is a major cause of perinatal morbidity and mortality. Despite the significant progress in predicting, diagnosing, treating and preventing premature births, their level remains high enough [1]. A number of studies conducted in recent years have shown that the diagnosis of preterm labor on the basis of patient complaints is not sufficiently substantiated, in contrast to the use of tests for the determination of fetal fibronectin in the cervicovaginal secretion, as well as the transvaginal cervicometry [2].

A short cervix is a cervix with a length of less than 25 mm, according to transvaginal cervicometry. This criteria is a reliable risk factor for preterm labor [3]. There are many reasons for the shortening of cervix and they are not fully understood. The most common causes of cervical shortening are: congenital hypoplasia of the uterus, shortening due to surgical interventions (conization), formation of isthmic-cervical insufficiency and premature activation of myometrium [6,8].

Fetal fibronectin (FF) is the main glycoprotein of the extracellular choriodecidual matrix [7,9,10]. Due to such localization, FF plays a significant role in the processes of implantation and mutual choriodecidual influences [5]. FF It is in close connection with other biologically active molecular systems, and its concentration increases under the influence of the activated calicreïn-kinin system. Based on the name, FF has a high affinity for molecules of the hemostasis system, and is involved in the process of transforming inactive fibrinogen into active fibrin. It deserves attention to the dynamics of the ability of the FF to bind to heparin - it decreases with the increase in gestational age, and is also suppressed by high concentrations of calcium. The complex of heparin-FF is more closely related to collagen, that is more functionally active than FF itself [4].

To determine the content of PF in the cervicovaginal secretion, the method of immunoassay analysis is used. The concentration of FF in the vaginal secretion above 50 ng / ml in

the gestational period from 22 to 37 weeks is associated with an increased risk of preterm labor within the next 7 days [4,5].

The literature discusses widely the necessity and expediency of using both methods described above for the diagnosis and prevention of premature birth. A test for the determination of fetal fibronectin is necessary in those clinics where transvaginal cervicometry is not possible. On the other hand, is it desirable to use the above-mentioned test to diagnose the threat of premature birth in clinics in the presence of expert transvaginal cervicometry.

The purpose of our study is to assess the need for a joint test for the determination of fetal fibronectin and an expert assessment of transvaginal cervicometry for the timely prevention of premature birth.

Materials and methods. A prospective study was conducted that included 52 patients with a period of 26-27 weeks of gestation and a shortened cervix.

All women were given transvaginal cervicometry with the following parameters: the length of the closed part of the cervix, the opening of the internal cavity, the depth of the prolapse of the fetal membranes, the total length of the cervix. In all patients, the length of the closed part of the cervix was less than 25 mm by transvaginal cervicometry. The examination of women was carried out at the empty urinary bladder, lying on the back with bent knees. The ultrasound sensor was inserted into the vagina directed to the anterior artery of the vagina to obtain a sagittal incision of the cervix.

All patients were tested for fetal fibronectin. Testing Technique: A cotton swab was injected into the vagina in the posterior vault and scrolled several times for 20 seconds. The cotton swab was then placed in a buffer solution (fibronectin collection kit, Adeza Biomedical). The presence or absence of fetal fibronectin was a positive or negative result of the test strip. The concentration of fetal fibronectin greater than 50 ng / ml in the vaginal secretion was regarded as a positive result.

Based on the assessment of the effects of pregnancy, all patients were divided into two groups. The main group (n = 28) included women whose pregnancy ended in preterm labor. The comparison group (n = 24) consisted of women whose pregnancy ended at ≥ 37 weeks gestational age.

Statistical analysis of the data was carried out using the STATISTICA 8.0 program. The normality of the distribution of quantitative indicators was determined by the Kolmogorov-Smirnov method. The analysis of the relationships between the quantitative parameters

was calculated using Spearman's rank correlation test. For the presence of a difference in qualitative characteristics, the Fisher's one-sided criterion (p) was used. Statistically significant results were considered at $p < 0,05$.

Results. Our study included a group of 52 patients who had cervical dilatation ($CL \leq 25$ mm) with cervical catheterization.

General characteristics of patients in the study group are shown in Table 1.

Table 1. Characteristics of patients

Characteristics	Value M \pm m, %
Age	29,5 \pm 4,2
Gestational age when included in the study	26,4 \pm 2,5
Childbirth in the term <34 weeks of pregnancy	13 (25,1 %)
Childbirth in the term 34 to 36 ⁺⁶ weeks of pregnancy	16 (30,7 %)
Interm childbirth (≥ 37 weeks of pregnancy)	23 (44,2 %)

The average age of women was 29.5 ± 4.2 years. The gestational age of pregnant women included in the study was 26.4 ± 2.5 weeks of gestation. Childbirths that occurred in the period up to 34 weeks of gestation - 13 (25.1 %). Of these, those that occurred within two weeks after the start of the study were 6 (46.15 %). In all 6 subjects, a positive test result was found for the determination of fetal fibronectin. Childbirths from the 34th to 36 + 6th weeks of pregnancy occurred 16 (30.7 %). Urgent births were credited to 23 (44.2 %).

The examined pregnant women are divided into two groups. The main group (n = 28) included women with a truncated cervix (<25 mm), whose pregnancy ended in preterm labor. The comparison group (n = 24) consisted of women with a shortened cervix (<25 mm), the pregnancy of which ended in emergency delivery (Table 2). Only one pregnant from the comparison group gave birth to 36 + 3 weeks of pregnancy.

In a study group of 6 patients, a positive test result was found on the FF and all pregnant women were born within two weeks after the positive finding.

In the 13 pregnant groups, childbirth studies took place in less than 34 weeks of gestation. In the period from 34 to 36 + 6 weeks gestation gave birth to 15 patients.

The causes of preterm labor in women with a positive test on FF was the emergence of regular labor activity against the backdrop of drug correction, as well as correction by the setting of obstetric pessaries. In women, the tests of which were the negative causes of preterm labor were mainly VUI and premature withdrawal of amniotic fluid.

Table 2.

Key Features	Main group (n=28), %	Comparison group n=24, %
FF+ CL<25MM	6 (21,4)	0
FF- CL<25MM	22 (78,6)	24 (100)
Childbirth within 14 days after the start of the study	6 (21,4)	0
Childbirth <34 weeks of gestation	13 (46,4)	0
Childbirth from 34 to 36 ⁺⁶ weeks of gestation	15 (53,6)	1(4,2)
Interm childbirth (≥37 weeks of gestation)	0	23(95,8)

A direct strong correlation between the total length of the cervix in transvaginal cervicometry, a positive test for determining fetal fibronectin and the term of delivery ($r = 0.65$) was also found.

Discussion. The study shows that the implementation of transvaginal cervicometry in combination with a test for the detection of fetal fibronectin in a period of less than 34 weeks of gestational period makes it possible to carry out timely and correct correction of the threat of

premature births. Since the cervical dilatation is not always a sign of the threat of premature birth, the test for the determination of FF makes it possible to more accurately distinguish between patients for those who require correction of the detected pathology and those that are subject to dynamic outpatient observation.

Some sources of literature have information about a separate conduction of transvaginal cervicometry or a test for the determination of FF in women at risk of premature birth (Rozenberg et al.). But, since the survey was conducted by a non-selective method, we can not consider them to be the most reliable. For the first time, a combination of the above-described Hincz and Schmitz studies was suggested and the informativity of this study proved.

Consequently, in our study, we proved the need for a test to detect PF after transvaginal cervicometry as the probability of a correct diagnosis of the threat of premature birth.

Conclusions. Thus, a decrease in the length of the cervix in combination with the positive result of the test for the detection of fetal fibronectin is a significant risk factor for the development of premature births and the demonstration of the feasibility of a diagnosis of the threat of preterm labor and a review of the treatment strategy for pregnant women with a shortened cervix.

REFERECES

1. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *Lancet* 2008; 371:75-84.
2. Iams JD, Romero R, Culhane JF, Goldenberg RL. Primary, secondary, and tertiary interventions to reduce the morbidity and mortality of preterm birth. *Lancet* 2008; 371:164-75.
3. Iams JD. Prediction and early detection of preterm labor. *Obst et Gynecol* 2003; 101:402-12.
4. Hincz P, Wilczynski J, Kozarzewski M, Szaflik K. Two-step test : the combined use of fetal fibronectin and sonographic examination of the uterine cervix for prediction of preterm delivery in symptomatic patients. *Acta Obst et Gynecol Scand* 2002; 81:58-63.
5. Gomez R, Romero R, Medina Schmitz T, Maillard F, Bessard-Bacquaert S, Kayem G, Fulla Y, Cabrol D, et al. Selective use of fetal fibronectin detection after cervical length measurement to predict spontaneous preterm delivery in women with preterm labor. *Am J Obstet Gynecol* 2006; 194:138-43.
6. Berghella V, Roman A, Daskalakis C, Ness A, Baxter JK. Gestational age at cervical length measurement and incidence of preterm birth. *Obst et Gynecol* 2007; 110(2 Pt 1):311-7.
7. Rozenberg P, Goffinet F, Malagrida L, Giudicelli Y, Perdu M, Houssin I, et al. Evaluating the risk of preterm delivery: a comparison of fetal fibronectin and transvaginal ultrasonographic measurement of cervical length. *Am J Obstet Gynecol* 1997; 176:196-9.
8. Kurkinen-Raty M, Ruokonen A, Vuopala S, Koskela M, Rutanen EM, Karkkainen T, et al. Combination of cervical interleukin-6 and -8, phosphorylated insulin-like growth factor-binding protein-1 and transvaginal cervical ultrasonography in assessment of the risk of preterm birth. *BJOG* 2001;108:875-81.
9. Heath V, Daskalakis G, Zagaliki A, Carvalho M, Nicolaides KH. Cervicovaginal fibronectin and cervical length at 23 weeks of gestation: relative risk of early preterm delivery. *BJOG* 2000; 107: 1276-1281.
10. Rinehart BK, Terrone DA, Isler CM, Scott Barrilleaux P, Bufkin L, Morrison JC. Pregnancy outcome in women with preterm labor symptoms without cervical change. *Am J Obstet Gynecol* 2001; 184: 1004-1007.