Modified Stange test gives new gynecological criteria and recommendations for choosing caesarean section childbirth

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Summary

Pregnancy and childbirth often threaten the life and health of the fetus. The greatest threat to the fetus during these periods is intrauterine hypoxia. The threat of intrauterine fetal hypoxia increases during natural childbirth and decreases during caesarean section. Therefore, it is no coincidence that the rate of C-section births is increasing worldwide. However, the generally accepted recommendations on the choice of caesarean delivery need to be clarified. A new test is needed to simulate intrauterine hypoxia and predict fetal survival during natural childbirth. Such a test would improve current C-section recommendations and newborn health outcomes. The most appropriate basis for such a functional test is the generally accepted Stange test. The fact is that the Stange test is a very easy to use and accurate functional test based on the duration of the longest breath hold. For more than 100 years, the Stange test has been successfully used to assess the adaptation reserves of adults to hypoxia in real time. The purpose of this letter is to present a new easy-to-use functional test designed to assess the resistance to hypoxia not only of the pregnant woman, but also of her fetus in real time. This new test could be a new vector in obstetric practice aimed at improving neonatal health and reducing infant mortality during delivery.

Author's Biosketch

Aleksandr Urakov is a professor, head of the department of General and Clinical Pharmacology at the Izhevsk State Medical Academy (ISMA) and a leading researcher at the Institute of Mechanics of the Udmurt Federal Research Center of the Ural branch of the Russian Academy of Sciences. His specific research interest is in physical-chemical materials science, pharmacy, and medicine to develop new inventions designed to diagnose, prevent, and treat life-threatening conditions.

Dear the Editor,

Pregnancy and childbirth are often a challenge for the pregnant woman and her fetus. The greatest test for the fetus during these periods is its resistance to intrauterine hypoxia. Intrauterine fetal hypoxia is a constant companion of natural childbirth and is usually absent during an artificial caesarean section. Therefore, since ancient times, the C-section has been a proven and reliable method of saving the life of the mother and her fetus, and the frequency of C-sections has been steadily increasing. It is time to clarify the generally accepted recommendations for choosing a caesarean section. Today, every pregnant woman has the right to choose natural childbirth or caesarean section. Obstetricians are also involved in solving this problem. At the same time the choice of the right type of delivery becomes very

important in *in vitro* fertilization (IVF) pregnancies. Many researchers believe that maternal health status largely predicts the development of complications during labor.[1] To predict the obstetric outcome during IVF pregnancy, these researchers offer a special nomogram reflecting the state of health of the mother. This information remains relevant and useful for women planning IVF as well as for obstetricians and gynecologists, but it is not sufficient to accurately select a safe delivery option.

At the same time, the prognostic value of these data can be improved if the nomogram proposed by the authors is supplemented with data on fetal resistance to intrauterine hypoxia. The fact is that adverse obstetric outcomes depend not only on the health of the mother, but also on the health of her fetus. An integral indicator of fetal health during labor is fetal resistance to intrauterine

hypoxia. For more than 100 years, resistance to hypoxia in adults has been assessed by the Stange or Hentsch tests, which determine the maximum possible duration of apnea during deep breathing or exhalation, respectively. Since the fetus inside the uterus cannot hold its breath because it does not breathe with its own lungs, but its mother breathes for herself and her fetus, it is the pregnant woman who can hold her breath for both. This can be done, for example, against the background of breathing. In this case, the mother can easily determine the moment when apnea begins, and then recognize the moment when the fetus does not start to "knock" hands, feet or head on the uterus. The fact is that this is how the fetus signals to its mother that it is running out of reserves to adapt to hypoxia. When this "distress signal" comes from the fetus, the mother must immediately stop apnea and resume breathing. In this way, the mother can easily determine the duration between the onset of apnea and the moment she receives the "distress signal" from her fetus, preserving her life as well as the life and health of her choking. In essence, it is an upgraded Stange test.

Normally, fetuses are resistant to hypoxia and do not signal distress until 30 seconds of apnea. Therefore, at these Stange test values, the birth of the fetus through the natural birth canal will result in the delivery of a live and healthy newborn. In cases where the fetus gives the distress signal immediately after the onset of apnea, the prognosis of natural birth is unfavorable. The fact is that a very early distress signal indicates that the fetus has no reserves to adapt to hypoxia. In these cases, the fetus may not be able to withstand the periods of hypoxia that occur during periodic uterine contractions. If the fetus does not have sufficient adaptive reserves for hypoxia, the fetus may begin premature chest breathing movements that cause its lungs to fill with amniotic fluid and the fetus may drown in it. As a result, the newborn may develop asphyxia and, after birth, encephalopathy and/or pneumonia. Therefore, when Stange test values are less than 10 seconds, a planned C-section may improve the prognosis of labor.

The new functional test is easy to use. To perform the test, a pregnant woman selects a date and time during the day when the fetus is stationary for an extended period of time. At the selected time, she monitors the fetus's motor activity tactilely using the skin of the fingertips of her working hand. To do this she first locates the upper part of the fetus's body and presses this part of the fetus's body tightly against her spine with all fingers of her hand. Then she holds the fetal body in this position, makes sure it is completely still and holds her breath. Records the moment when breathing stops and continues continuous tactile monitoring of the fetus until the fetus's arms and chest start to move. Immediately records the timing of this moment, immediately hyperventilates the lungs with air until a feeling of dizziness appears, then normalizes breathing and determines the duration of the fetal immobility period during apnea. If the duration of this period is more than 60 seconds, she decides on the possibility of a favorable outcome of labor through the vaginal birth canal, if the duration of this period is 30-60 seconds, she postpones the choice of the mode of delivery, and if the duration of this period is less than 30 seconds, she chooses a C-section.[2]

In general, it appears that the use of this functional test makes it possible to improve the efficiency and accuracy of the choice of delivery method, as well as to make timely preparation of pregnant women for childbirth.

References
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