Factors affecting the frequency of Caesarean section

Factores que afectan la frecuencia del parto por Cesária

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Abstract

Objectives: Caesarean section rates are on growth owing to a vast range of clinical and non-clinical factors. The current study mainly aims to determine the factors impacting the frequency of abdominal delivery. Methods: To fulfill the study's aim, a study of women with cesarean delivery (n=404) and women with vaginal delivery (n=310), a survey of 75 doctors, and 175 puerperal was carried out. A correlation matrix of indicators of risk factors has been established. Results: The results of the correlation analysis of the materials demonstrate the following factors that influence the cesarean section rate: a scar on the uterus and its condition, a woman's age over 35 years, a burdened obstetric history; a clinician's gender, age, professional experience and time of graduation from the university; the material position of a woman, age of primiparous, latching a baby onto the breast after birth (from the standpoint of postpartum complications), choice of a maternity hospital. Considering the criteria-based assessment of risk factors has a high degree of reliability and informational significance, forecast models have been developed based on the results of clinical, social, and hygienic research of doctors and women in childbirth. Conclusion: The devised models and forecasts make it likely not only to allow for quantitative evaluation of the situation but also can influence it qualitatively, developing the mechanisms of administrative mechanisms for the prevention of cesarean section.

Keywords: cesarean section, vaginal delivery, model, prognosis, non-clinical factors.

Resumen

Objetivos: Las tasas de cesáreas están en aumento debido a una amplia gama de factores clínicos y no clínicos. El estudio actual tiene como objetivo principal determinar los factores que afectan la frecuencia del parto abdominal. Métodos: Para cumplir con el objetivo del estudio se realizó un estudio de mujeres con parto por cesárea (n=404) y mujeres con parto vaginal (n=310). Se realizó una encuesta a 75 médicos y 175 puérperas. Se estableció una matriz de correlación de indicadores de factores de riesgo. Resultados: Los resultados del análisis de correlación de los materiales demuestran los siguientes factores que influyen en la tasa de cesáreas: cicatriz en el útero y su estado, edad de la mujer mayor de 35 años, antecedentes obstétricos sobrecargados; el sexo, la edad, la experiencia profesional y el momento de la graduación de la universidad del médico; la posición material de una mujer, la edad de la primípara, el agarre de un bebé al pecho después del parto (desde el punto de vista de las complicaciones posparto), la elección de una maternidad. Teniendo en cuenta que la evaluación basada en criterios de los factores de riesgo tiene un alto grado de confiabilidad y significado informativo, se han desarrollado modelos de pronóstico basados en los resultados de la investigación clínica, social e higiénica de médicos y mujeres durante el parto. Conclusión: Los modelos y pronósticos elaborados hacen probable que no solo permitan evaluar cuantitativamente la situación, sino que también puedan influir en ella cualitativamente, desarrollando mecanismos de mecanismos administrativos para la prevención de la cesárea.

Palabras clave: cesárea, parto vaginal, modelo, pronóstico, factores no clínicos.

Introduction

Cesarean section for medical reasons has proven to be an effective tool in reducing maternal and perinatal mortality. However, recently there has been a steady increase in the rate of caesarean section, both in developed and developing countries, which causes concern in the world community[1].

According to the latest WHO data in 150 countries, caesarean section accounts for 18.6% of all births (1.4% - 56.4%)[2]. Recently, in Russia, the frequency of caesarean sections in comparison with 2006 has more than doubled: in 2006 - 17.9 per 100 births, and 2018 - 30.0 per 100 births[3].

The data indicate no relationship between maternal and perinatal mortality and the incidence of caesarean section over 10%, while the effect of the rate of abdominal delivery on maternal and perinatal morbidity remains poorly understood[4].

The caesarean section rate is increasing due to many factors. The clinical reasons include increased incidence of maternal obesity, multiple pregnancies and older women in labor, uterine scarring, abnormal labor, and fetal distress. These factors are unlikely to explain the scale of the increase in the rate of caesarean section. Studies have shown an association between caesarean section rate and nonclinical factors such as differences in physician practice, fear of potential legal problems after vaginal delivery due to malpractice, and organizational, economic, social, and cultural factors[5,6].

The choice of surgical interventions without medical indications was the reason for the high rates of operative delivery[7]. The motivation for operative childbirth on the part of a woman is most often the fear of pain in childbirth, future sexual dysfunction, stress urinary incontinence, prolapse of the pelvic organs, pathological condition of the fetus during childbirth, fear of emergency intervention in the form of forceps, as well as convenience[6,8-10]. This phenomenon aims to search for reserves to reduce the frequency of operative delivery.

The available scientific literature has reports related to risk factors affecting the growth of cesarean delivery, but the strength and hierarchy of their effects are poorly understood. In this regard, it is impossible to calculate the risk, make a prognosis and effectively carry out measures to prevent cesarean delivery without medical indications[11-14].

Many domestic and foreign researchers have attempted to predict the frequency of cesarean sections. However, we have not found a comprehensive study of risk factors for caesarean delivery, such as socio-hygienic, biomedical, behavioral, and lifestyle, with the subsequent construction of prognostic models, based on the data obtained. Accordingly, in the absence of such data, it is impossible to draw up targeted preventive measures in relation to this phenomenon.

Methods

This study was conducted in maternity hospitals of the constituent entity of the Russian Federation. The objects of the study during the first stage were women with caesarean delivery, who made up the experimental group of the study (n=404), and women with vaginal delivery, who made up the control group (n=310). The source material was collected by copying data from birth histories. We developed a study map that included 63 questions and reflected the factors influencing the rate of caesarean section.

At the second stage, a questionnaire for obstetrician-gynecologists was developed, which included 29 ques-

tions, and a questionnaire for postpartum women, which consisted of 39 questions. Seventy-five doctors and 175 women in childbirth were surveyed.

Data were statistically processed. Methods of parametric and nonparametric statistics were applied. The latter include correlation, regression, and discriminant analyzes. The SPSS software package is used.

Considering the criteria-based assessment of risk factors has a high degree of reliability and informational significance, forecast models have been developed based on the results of clinical, social, and hygienic research of doctors and women in childbirth. The models were built by discriminant analysis, which allows identifying risk factors for caesarean section, as well as predicting the outcome of childbirth based on the values of the calculated centroids.

Statistical processing of clinical trial cards provided us with the following data. In the experimental group, older women prevail. Women of 30-39 years old account for 55% in the experimental group.

Analysis of the obstetric and gynecological history showed that in the experimental group, compared with the control group, the level of cervical cancer (28.7%:20%), malformations of the pelvic organs (5.4%:1.9%), abortion (31.7%:24.5%), multiparous were more common (60.4%:41.3%). The analysis of the course of pregnancy revealed prevailing complications among women with caesarean section (86.6%:72.9%), and their absence in the control group (27.1%:13.4%). In the experimental group, 46.5% and 53.5% of multiparous women have competent and incompetent uterine scars, respectively.

The results of the correlation analysis of the materials of a clinical block show the following factors that affect the cesarean section rate: a uterine scar (V=0.558) and its condition (V=0.577), a woman's age over 35 years (V=0.310), a burdened obstetric history (V=0.307).

To build a model of the discriminant function for predicting a caesarean section, many factors were considered, of which 12 factors were significant, and were included in the equation.

Equation

$$K= 0.2\times X_1 + 0.3\times X_2 - 1.4\times X_3 + 2.2\times X_4 - 1.8\times X_5 - 0.9\times X_6 - 1.1\times X_7 - 0.4\times X_8 - 0.5\times X_9 + 3.0\times X1_{10} + 3.0\times X_{11} - 1.1\times X_{12} + 6.5$$

K - is the resulting indicator in the form of a forecast of the method of delivery (vaginal, cesarean)

Xn - factors

X_1 Education:

The factor had 3 grades of indicators:

1 - secondary; 2 - secondary vocational; 3 - higher

X_2 - Body mass index:

The factor had 5 grades of indicators:

1 – 10-18.5;

2 – 18.6-24.99;

3 – 25-29.99;

4 – 30-39;

5 – 40-59 or more

X_3 – Uterine scar after cesarean section or other interventions:

The factor had 3 grades of indicators:

1 – none;

2 – corporal longitudinal;

3 – transverse in the lower segment;

3 – two or more

X_4 – Scar condition:

The factor had 2 grades of indicators:

1– competent; 2– incompetent

X_5 – Burdened obstetric history:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_6 Age over 35 years:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_7 –Large fetus with concomitant pathologies:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_8 – Fetal distress:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_9 – Abnormal labor:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_{10} –Cesarean section:

The factor had 2 grades of indicators:

1 – yes; 2 – no

X_{11} –Cesarean section:

The factor had 2 grades of indicators:

1 – for medical reasons; 2 – at the request of the woman

X_{12} – Commercial services:

The factor had 2 grades of indicators:

1 – yes; 2 – no

When building the discriminant function, we calculated the centroids, which are the criteria for predicting the options for delivery.

Centroids

Vaginal delivery	-5.5
Cesarean section	4.2

Substituting the values of the ranges into the equation, we get the value of the resulting indicator. If the resulting value is close to -5.5, there will be a vaginal delivery with a high degree of probability. If the value is close to 4.2, there is a high probability of a cesarean section.

Thus, there are reasons to consider the following as risk factors for caesarean section: education, body mass index, uterine scar, and its condition, burdened obstetric history, age of the woman in labor over 35 years, the transverse or oblique lie of the fetus, incorrect position and presentation of the head, fetal distress, obstetric institution, planned or emergency cesarean section, cesarean section according to medical indications or at the woman's request.

A socio-hygienic study among doctors provided us with the following data.

Among the respondents included in the sample population of this study, 66.7% are women and 33.3% are men. The age of most doctors is 35-49 years old (33.3%) and over 50 (33.3%), under 30 - 26.7%, and 31-34 years old - 6.7%.

The structure of professional experience is as follows: over 15 years (53.3%), 11-15 years (13.3%), 6-10 years (6.7%), and up to 5 years (26.7%). The analysis showed the prevalence of both low-skilled doctors (up to 5 years old) and highly skilled doctors (more than 15 years).

The age of graduation from a university for most respondents was 25 years old or more (53.3%).

Most of the surveyed doctors believe that natural childbirth, proceeding without the use of drug intervention, is the safest and does not have long-term consequences for the health of the mother and her child (93.3%).

As a result of the correlation analysis of Pearson, the factors influencing the option of delivery are the doctor's gender, age, professional experience, and age of graduation from the university.

The influence of the doctor's gender is estimated as X^2 P=0.003, and according to the distribution of indicators within the correlation matrix, it can be seen that men reliably more often than women resort to operative delivery.

The choice of the method of delivery is significantly influenced by the age of the doctor (P^2 P = 0.013). The age range of 35-49 years is statistically significant.

The influence of professional experience on the choice of the method of delivery is expressed as X^2 P = 0.000, and according to the distribution of indicators within the correlation matrix, it can be seen that the gradations of experience in 11-15 years, P = 0.0001, and over 15 years, P = 0.016, have a significant effect.

Correlation analysis revealed the influence of the time factor of graduation from the university X^2 P = 0.0001, and according to the distribution of indicators within the correlation matrix, it can be seen that the gradations of experience in 15-24 years, P = 0.000, and 25 years or more, P = 0.016, have a significant effect.

Summary

1. We have conducted a comparative analysis of the indicators of medico-biological, socio-hygienic, and clinical blocks in the control (vaginal delivery) and experimental (cesarean section) groups.

We have identified the factors that reliably affect the cesarean section rate: a scar on the uterus and its condition, a woman's age of over 35 years, a burdened obstetric history; a clinician's gender, age, professional experience, and time of graduation from the university; the material position of a woman, age of primiparous, latching a baby onto the breast after birth (from the standpoint of postpartum complications), choice of a maternity hospital.

3. A model for predicting a caesarean section has been developed, which makes it possible to predict the mode of delivery, to manage factors, considering their gradation of controllability.

Conclusions

Based on the results of this work, we have developed a method for the socio-hygienic study of risk factors in terms of an obstetrician-gynecologist, postpartum women, and clinical study materials that affect the frequency of caesarean section. This study made it possible to develop a criteria assessment for the problem of optimizing preventive measures for caesarean sections. Subject to this criteria assessment of factors, models for the prognosis of caesarean section have been developed according to the data of a clinical study, doctors, and women in childbirth. The model not only predicts the method of delivery but also helps understand the way of managing risk factors and increasing the likelihood of predicting vaginal delivery.

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